Operations Safety Management Plan

Site C Clean Energy Project

October 3, 2024

Revision 3

Revision History

Version	Date	Comments
Rev 0	August 21, 2023	Draft – shared for review: Ministry of Transportation and Infrastructure, Peace River Regional District, City of Fort St. John, District of Hudson's Hope Indigenous Nations
Rev 1	January 19, 2024	Final – shared with EAO for review
Rev 2	September 10, 2024	Updated in response to EAO comments.
Rev 3	October 3, 2024	Updated in response to EAO comments.

1.0 Introduction

The Site C Clean Energy Project (the Project) will be the third dam and generating station on the Peace River in northeast BC. The Project will provide 1,100 megawatts (MW) of capacity and about 5,100 gigawatt hours of energy each year to the province's integrated electricity system.

In October 2014, the Provincial Ministers of Environment (MOE) and Forests, Lands and Natural Resource Operations (FLNRO)[1] issued the Environmental Assessment Certificate (EAC) for the Project. In November 2014, the Federal Minister of the Environment[2] issued a Federal Decision Statement (FDS) for the Project. Both the EAC and FDS set out conditions under which the Project can be constructed and operated. The Project is also governed by Conditional Water Licences 132990 and 132991, Fisheries Act Approval 15-HPAC-01160, and Canadian Navigable Waters Act Approval 2008-500822 (CNWA).

The purpose of this document is to fulfil Conditions 38 and 73 of the EAC which requires BC Hydro to prepare an Operations Safety Management Plan to manage worker and public safety throughout the operations phase of the project. These conditions specifically require the development of the below components plans:

- Public Safety Management Plan
- Boater communication protocol including communication of navigational hazards during operations
- Reservoir Shoreline Monitoring and Management Plan
- Worker Safety and Health Management Plan

Table 1 attached contains the full conditions associated with this plan, while a summary of each plan, including its scope, is provided below.

2.0 Component Plan Summary

Public Safety Management Plan (Appendix A)

The Site C Public Safety Management Plan (PSMP) for Initial Operations documents hazards, and their associated public safety risks, and outlines control measures implemented to eliminate or reduce the risk of public injury or death at, or associated with, the initial operation of Site C dam and generating facilities. The PSMP for Initial Operations will be applicable from the point the reservoir is filled to normal operating levels until the reservoir is deemed safe for public use. When this occurs, an updated version will be issued where the control measures will be modified to reflect that the reservoir still contains hazards but is no longer considered dangerous. When the project is fully operational in late 2025 a PSMP for Operations will be issued where public safety is the responsibility of the Senior Field Manager, Peace East.

The public safety management plan includes a public safety signage plan.

[1] Now separated into two Ministries: Ministry of Forests (MOF) and Ministry of Water, Land and Resource Stewardship (WLRS).
[2] Now Environment and Climate Change Canada

Boater Communications Protocol (Appendix B)

The boater communications protocol outlines the ways in which BC Hydro will be communicating with stakeholders, the public and Indigenous Nations about navigational hazards and boater safety issues related to the Site C reservoir. The protocol describes methods of communications during initial operations (when boaters will be advised to stay off the reservoir due to hazardous conditions) and regulator operations (once BC Hydro controlled access / boat launches have been opened). The protocol includes details on communications content, audiences, and methods.

Boater Safety and Shoreline Monitoring Plan (Appendix C)

The boater safety and shoreline monitoring plan is closely related to the public safety management plan and describes the measures BC Hydro will undertake to support boater safety on the reservoir. These measures incorporate BC Hydro's comprehensive monitoring program that assesses the stability of the shoreline which has a direct impact on boater safety on the reservoir. Section 6.6 of this plan is the Shoreline Monitoring Program which describes the monitoring methods and surveillance response plans in response to monitoring.

Worker Safety and Health Management Plan (Appendix D)

The Worker Safety and Health Management Plan (WSHMP) describes BC Hydro's safety management system processes and requirements for working in and around the Site C Generating Station (STC) and Dam. The plan describes:

- Legislative framework and BC Hydro policies
- BC Hydro safety governance
- Site C safety hazards and risk management
- Worker qualifications and training requirements
- Compliance and effectiveness monitoring
- Reporting requirements, and
- Process for revising and updating the plan

This plan is a summary of safety processes and requirements set out in other BC Hydro documents. This plan does not replace any safety plans or task specific requirements established through other BC Hydro safety practices or guidelines.

3.0 Updates and Reporting

The OSMP is applicable from the point the reservoir is filled to normal operating levels until the reservoir is deemed safe for public use. We estimate the reservoir will be deemed safe for public use 1 year after reservoir fill but cannot confirm this timeline as it will depend on slope stability and debris. The OSMP will be reviewed for potential updates at least 90 days prior to opening of the reservoir to the public for use by boaters. Subsequent reviews of the OSMP will occur every five years during operations.

Reporting requirements for each of the component plans are set out in the individual plans.

Table 1: Environmental Assessment Certificate - Conditions 38 and 73

Condition #	Condition
38	The EAC Holder must develop a Public Safety Management Plan to describe how it will implement measures to avoid or manage the effects of the Project on public safety during construction and operations. The Public Safety Management Plan must be developed by a QEP. The Public Safety Management Plan must include at least the following: • Increase public awareness of safety hazards, including navigational hazards, access restrictions and closures during the construction and operation of the Site C reservoir. • Establish boater communication protocol including communication of navigational hazards during construction and operations. • Develop standard navigation mitigations for signals, markings and notifications, relating to overhead structures such as towers and conductors crossing navigable waters. • Manage public water-based access during construction and for the first 5 years of operation. The EAC Holder must provide this draft Public Safety Management Plan to MOTI, Peace River Regional District, City of Fort St. John, District of Hudson's Hope and Saulteau, West Moberly, Halfway River, Doig River, Blueberry River and Prophet River First Nations, and McLeod Lake Indian Band for review 90 days prior to the commencement of construction and operations. The EAC Holder must file the final Public Safety Management Plan with the MOTI, Peace River Regional District, City of Fort St. John, District of Hudson's Hope and Saulteau, West Moberly, Halfway River, Doig River, Blueberry River and Prophet River First Nations, and McLeod Lake Indian Band 30 days prior to the commencement of construction and operations. The EAC Holder must develop, implement and adhere to the final Public Safety Management Plan, and any amendments, to the satisfaction of EAO.
Condition 73	The EAC Holder must manage worker and public safety throughout the operations phase by implementing measures detailed in an Operations Safety Management Plan that complies with all applicable requirements of statutes, permits, approvals, and authorizations as outlined in Section 35 of the EIS. The Operations Safety Management Plan must be developed by a QEP. The Operations Safety Management Plan must include the following component plans: • Public Safety Management Plan (including the Reservoir Shoreline Monitoring and Management Plan); and • Worker Safety and Health Management Plan. Each component plan must include the following: • Clear Statement of Objectives; • Description of potential Project effects and safety hazards, through consideration of baseline conditions and sensitive receptors; • Clear documentation of all applicable legislative requirements that must be adhered to, as well as BC Hydro policies, guidelines and other best management practices that will be followed; • Clear documentation of compliance and effectiveness monitoring to be undertaken; • Description of worker qualifications and training requirements pertaining to the Plan(s); • Description of reporting requirements; and • Process for revising and updating the Operations Safety Management Plan.

Condition #	Condition
	The EAC Holder must provide this draft Operations Safety Management Plan, including all component plans, to regulatory agencies, Peace River Regional District, City of Fort St. John, District of Hudson's Hope and Aboriginal Groups for review a minimum of 90 days prior to the commencement of operations. The EAC Holder must file the final Operations Safety Management Plan, including component plans with EAO, regulatory agencies, Peace River Regional District, City of Fort St. John, District of Hudson's Hope and Aboriginal Groups a minimum of 30 days prior to the commencement of operations. The EAC Holder must develop, implement and adhere to the final Operations Safety Management Plan, and any amendments, to the satisfaction of EAO.

APPENDICES

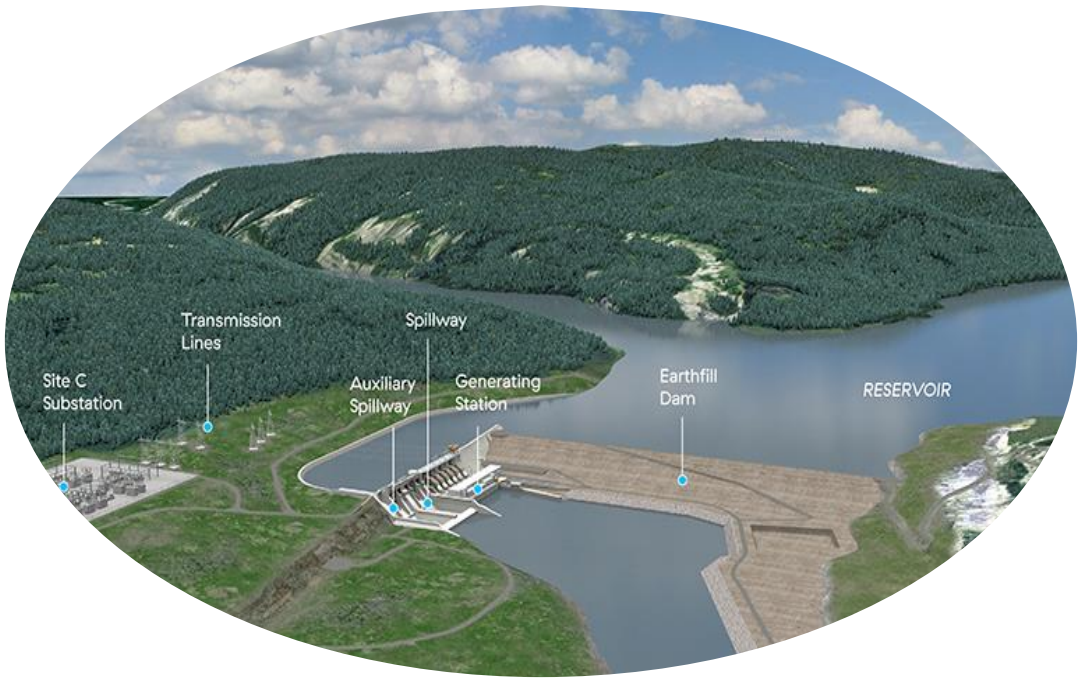
- Appendix A: Public Safety Management Plan, including signage plan
- Appendix B: Boater Communications Protocol
- Appendix C: Boater Safety and Reservoir Shoreline Monitoring Plan
- Appendix D: Worker Safety and Health Management Plan

BC Hydro
Power smart

Appendix A
Public Safety Management Plan

BC Hydro Generation
Site C
Public Safety Management Plan for Initial Operation (PSMP)

October 2024



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BC Hydro Generation

Site C

Public Safety Management Plan for Initial Operations (PSMP)

October 2024

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Distribution

PSMP Distribution

A current version of the PSMP can be found on BC Hydro's Controlled Document FileNet Search:

http://w3ecm/eargcd/simpleSearch.jsp

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1.0 Introduction

The purpose of the Site C Public Safety Management Plan (PSMP) for Initial Operations is to document hazards, and their associated public safety risks, and to outline control measures implemented to eliminate or reduce the risk of public injury or death at, or associated with, the initial operation of Site C dam and generating facilities. The PSMP aims to mitigate risks to the public associated with the initial operation of the Site C project by managing them within BC Hydro's tolerable risk criteria. The risk criteria set out in this plan is consistent with the Canadian Dam Association's (CDA) *Guidelines for Public Safety Around Dams, 2011*, which establishes methodology and risk guidance for dam owners in Canada. The CDA is the only public safety legislation applicable to dams and powerhouses in Canada.

This PSMP for Initial Operations will be applicable from the point when the reservoir is filled to normal operating levels until the reservoir is deemed safe for public use. When this occurs, an updated version will be issued where the control measures will be modified to reflect that the reservoir still contains hazards but is no longer considered dangerous. The updated PSMP will be issued at least 1 month prior to the reservoir being deemed safe for public use. The PSMP for Operations will the responsibility of the Senior Field Manager, Peace East.

2.0 Objectives

This objectives of the PSMP are to address:

- Public activities in the area affected by the Site C initial operation, including the former construction site and the reservoir
- Hazards to the public that may be present
- Safety control measures that are employed to protect the public
- Procedures for inspection, remediation, and modification of safety controls
- Revisions to this PSMP, as required, due to changes in initial operating procedures, transitions of physical plant, legal or management direction, and/ or the public interest

Areas NOT addressed in this PSMP are:

- Highway 29 (Ministry of Transportation and Infrastructure (MOTI) responsibility)
- Transmission facilities
- Public Use Management Areas (PUMAs). PUMAs are created by BC Hydro to encourage safe public use of areas affected by BC Hydro's operations. Separate Public Safety Management Plans (PSMPs) are developed for PUMAs to address public safety associated with use, contractors, recreation, and site hazards. PUMAs for the Site C reservoir will be developed prior to opening of the reservoir to the public and will be shared with EAO on request.

- BC Hydro properties under the control of a third party (i.e., property leased to a third party) that are unaffected by the facility or its operation
- Property owned by the Crown or others including public roads and provincial, municipal and regional district land and facilities that are unaffected by the facility or its operation

This PSMP is applicable throughout the range of normal operating conditions during the Initial Operations phase. Situations outside of the range of normal operations (e.g., spilling, emergency drawdowns) are the subject of separate emergency protocols, such as *System Operating Orders* and *Local Operating Orders*, which supersede this PSMP.

The term "public" does NOT refer to BC Hydro workers or contractors working for BC Hydro. Safety practices for these workers are managed in accordance with the requirements of applicable WorkSafe BC *Occupational Health and Safety Regulations* and BC Hydro's *Occupational Safety and Health Standards.* Additional information on Worker Safety is provided in the "Worker Safety and Health Management Plan", attached as Appendix D of the OSMP.

3.0 Responsibilities

BC Hydro has an obligation to:

- Understand public use within areas affected by the operation of the Site C facilities
- Identify the risks or dangers involved with public use of areas affected by BC Hydro's assets and their operations
- Ensure that steps are taken as required by the CDA Guidelines in order to remove or reduce the dangers if removal is not possible

BC Hydro is responsible for ensuring that:

- A PSMP is in place and aligns with the requirements of the Canadian Dam Association *Guidelines for Public Safety Around Dams, 2011*
- Inspections and remedial measures are performed as outlined in a Local Operating Order for Public Safety during Initial Operations. Local Operating Orders are internal BC Hydro documents that set out specific requirements for each generating station.
- Records are kept of inspections and remedial measures
- Public safety controls are implemented or enhanced if changes to the physical plant and operating procedures occur due to the potential of new operations and/or Capital works creating new public safety hazards
- The PSMP is revised and updated. Annual assessments of the Public Safety Management Plan will be undertaken for the first 2 years of Initial Operations and revisions made to reflect any changes to the risk profile or mitigation measures. During Operations, assessments of the PSMP will be conducted every three years and revisions made to reflect any changes to the risk profile or mitigation measures.

4.0 Worker Qualifications and Training Requirements

Worker qualifications and training requirements are described in Section 5.0 of the Worker Safety and Health Management Plan, which forms Appendix D of this document package, the Operations Safety Management Plan.

5.0 Public Uses, Safety Hazards, and Safety Control Measures

The Site C project has been divided into components to address public uses, safety hazards, and safety control measures specific to each. These components are further elaborated in section 8.0:

- Reservoir
- Approach Channel
- Damsite
- Tailrace
- Downstream

5.1 Public Uses

Reservoir. During this initial operation phase, the reservoir will be unsafe for public use. Although BC Hydro will implement numerous public safety control measures to discourage public use, it is anticipated that these may be ignored by some members of the public and there may be some boating and fishing activity on the new reservoir.

Approach Channel. The approach channel to the powerhouse and spillway will be secured by a debris boom and no public use within this area is anticipated.

Damsite. During the initial operation phase, the construction site, which has a large footprint, will be undergoing phased transitions to a tighter and fully secured operating facility. The damsite will remain within a secured perimeter and public access will remain restricted by fencing, gates, and barriers. From experience throughout construction of the project, no public use of the dam site is expected during initial operation.

Tailrace. During initial operation, there will be no downstream physical barrier (public safety boom) in place to prevent boaters from entering the tailrace portion of the Peace River. Although there will be signage, it can be anticipated that some boaters may enter the tailrace.

Downstream. This includes the reach of the Peace River downstream from Site C to Peace Island Park near Taylor. Boating and fishing is expected along this reach of the river.

5.2 Safety Hazards

Reservoir. No overhead hazards (towers, conductors, etc) will be present on the reservoir. During this initial operation phase, the primary hazards on the newly formed reservoir will be floating debris and instability of the reservoir slopes. The sources of the floating debris are the remains of vegetation on the reservoir floor, trees that were not removed due to worker safety concerns, and new debris entering the reservoir from the main tributaries such as the Halfway and Moberly Rivers. Potential slides along the reservoir shoreline can not only contribute to additional floating debris, though can also cause waves within the reservoir that are sufficient to overturn small watercraft.

Approach Channel. The hazards associated with the headpond and approach channel are strong currents and undertow in front the powerhouse intakes and spillway gates.

Damsite. The damsite will remain an active construction site as it transitions to a compact operating facility. The hazards will be exposure to heavy construction equipment, open excavations, dust, noise, and energized electrical equipment.

Tailrace. The primary hazard in the tailrace in the Peace River will be the operation of the spillway which can result in a hazardous change in flow immediately downstream of the dam. Strong currents, turbulence, and air entrainment (which reduces water density) occur during spillway operation.

Downstream. Once changes in flow are attenuated at a distance of about 2km downstream of the dam, there are few hazards associated with the operation of the Site C discharges. Stranding of boats on the shore when flows from the powerhouse are reduced and inundating campers on the shoreline during increases in powerhouse flows have been experienced at other hydroelectric facilities in the province, though is not expected to occur along the Peace River.

5.3 Safety Control Measures

Safety control measures are initiatives designed to protect the public by the installation of physical restraints and by raising awareness of hazards and risks associated with generation facilities.

Where the risks are high and the consequences severe, a site is designated a ***Danger Zone*** in which unauthorized access is prohibited and appropriate control measures are implemented.

Where the risks are medium or low and the consequences are minor, a site may be deemed a ***Warning Zone*** in which the public are alerted to the specific nature of the risk and warned accordingly.

Selection of the appropriate control measure is based upon the nature and degree of risk each safety hazard represents to the public. Gates are used to prevent vehicles, including ATVs, from accessing hazardous area such as the reservoir, fences prevent people walking into hazardous areas such as energized substations, booms prevent watercraft from entering hazardous water and sign define the hazard and the expected public response, such as KEEP OUT. The Site C Security and Public Safety Manager will be responsible for assessing and modifying an

implemented control measure if the control measure is not effectively protecting public safety. The Site C Security and Public Safety Manager will oversee any changes in the field which will be implemented by the BC Hydro project team or contractors.

Reservoir. Extensive public communication, gates, and signs will be used to discourage public use of the reservoir during initial operation. The dock at the D.A. Thomas PUMA in Hudson's Hope will not be installed until the reservoir is deemed safe. The new boat launches at Lynx Creek and the Halfway River will remain closed and gated with the appropriate warning signs installed. The new boat launches will not be opened until the reservoir is deemed safe.

Approach Channel. A series of 10 large warning buoys have been installed 2km upstream of the dam to provide notification to boaters of the hazards associated with the dam. Large signs on both shores will indicate the specifics hazards and advise boaters to stay away. The double log debris boom in front of the approach channel is a physical barrier that will prevent watercrafts from entering the *Danger Zone*.

Damsite. Security gates, fencing, signage, and security patrols will be used to prevent public exposure to the hazards on the damsite.

Tailrace. A Public Warning System (PWS), which consists of sirens and strobe lights, is the primary control measure to warn the public in advance of hazardous flow changes from the spillway. It is anticipated that the PWS will not be completed and operational until sometime in 2025 when electrical power and communications are established to the siren/strobe stations on the left bank. Until the PWS is completed and commissioned, portable electronic detection stations with audible warning will be employed in the river downstream of the spillway to warn boaters of the impending operation of the spillway. The Local Operating Order for Public Safety Initial Operations outlines the control measures to be used during spillway operation.

Downstream. Signs located at the boat launch at Peace Island Park will advise the public that river levels will fluctuate due to operation of the upstream hydroelectric dam and powerhouse. The signs also indicate that the Peace River is blocked by the Site C dam.

5.4 Boater Communications Protocol

The purpose of the communications protocol is to outline the ways in which BC Hydro will be communicating with stakeholders, the public, and First Nations about navigational hazards and boater safety issues related to the Site C reservoir during operations.

6.0 Safety Control Specifications

Guidelines are provided to assist in the placement, inspection, and replacement of safety control devices. Locations of control devices will be confirmed through a field assessment that considers terrain (non-steep slopes), visibility (non-obstructed views), and ease of access for installation and maintenance.

Signs

Signs are installed to advise the public of hazards that may be present including dangerous structures. BC Hydro complies with the American National Standards Institute (ANSI) sign standards (link), and the type of sign that is used is based on the CDA guidelines.

There are four types of signs:

1. **NOTICE**: gives the public a particular piece of information, it is not used to present a hazard/if there is no possibility of credible injury
2. **CAUTION**: warns the public of a hazard that could potentially cause personal injury
3. **WARNING**: used if death or serious injury is possible if a hazardous situation occurs or a control measure fails
4. **DANGER**: used if death or serious injury is almost certain if a control measure is ignored or fails

Signs that are not in compliance with BC Hydro sign standards (i.e., ANSI standards) will be replaced. Existing signs that do not conform to the format found in the BC Hydro Sign Order Shop but were deemed to be adequate at the time of the latest review and meet the signage minimum requirements may remain on site.

Signs that are outdated, damaged/illegible, missing, do not follow the BC Hydro sign standard, and is not deemed to be adequate upon inspection must be replaced. Please contact Public Use Risk Management for assistance on sign replacement.

Fences

Fences around *Danger Zones* shall comply with BC Hydro standards (i.e., ANSI standards) to prevent unauthorized entry. Fences are to be minimum 2.4m high and have double strands of barb wire.

The purpose of fencing is to reduce hazard exposures. The permanent layout of fencing for the Site C damsite will be provided in the PSMP for Operations.

Booms

A BC Hydro debris boom is in place at the entrance to the approach channel to the powerhouse and spillway. The primary intent of the boom is to prevent debris from entering and potentially plugging the intakes to the powerhouse and the spillway gates. However, this boom also serves as a public safety boom as it is a physical barrier to watercraft accessing the project.

7.0 Inspection Program

Regular inspections of the public safety control measures are imperative during Initial Operations. Inspection frequency and the response to missing or damaged controls are outlined in the Local Operating Order for Public Safety during Initial Operations. Local Operating Orders are internal BC Hydro documents that set out specific requirements for each generating station.

8.0 Public Safety Incident Report

If a BC Hydro employee or contractor, during their duties, observes a member(s) of the public in an area identified as *Danger Zone* (shown in red on the PSMP maps), please use caution and note the following recommended actions:

1. Let the person(s) know that they are in a *Danger Zone* and ask them to leave the area immediately. If they are uncooperative or hostile do not approach the individual or group unless they are in immediate danger of injury.
2. If the danger is not immediate, contact your manager or crew leader who will then direct you to a course of action.
3. Ensure your safety; ensure your limits of approach. Know the hazard.
4. Use the Hydro radio or cell phone to communicate your actions and personal safety.
5. Do not leave the site until the public safety concern has been resolved or someone of a higher authority like the RCMP or the fire department has arrived to take care of the issue.
6. Follow-up to ensure the incident is recorded in the incident management system (IMS).

Note: If an employee or contractor is not with BC Hydro (e.g., Transport Canada), the individual is to follow the above steps and then report the incident to a BC Hydro representative in order for the incident to be submitted into the IMS. Any public safety incidents that result in unlawful activity will be reported to the RCMP.

9.0 Site C Components

This Public Safety Management Plan for Initial Operation will address the public safety risks and the proposed control measures for the Site C facility.

To explore and address the full range of public safety issues at Site C, this PSMP is organized into the following Components:

Table 1: Site C Components

Component	Reference Section	**Map #** (Appendix 1)
1. Reservoir	8.1	1 – 13
2. Approach Channel	8.2	14
3. Damsite, earthfill dam, powerhouse, spillway, and ancillary structures	8.3	*In progress*
4. Tailrace	8.4	15
5. Downstream as far as Peace Island Park	8.5	16

9.1 Reservoir

The reservoir will cover 5,550 hectares of land, with a total surface area of about 9,330 hectares. It will be 83 kilometres long, 52 metres deep close to the dam, 36 metres deep at Halfway River, and 18 metres deep near Hudson's Hope.

During initial operation, the reservoir will be unsafe for the public to boat on as well as recreate on the shoreline due to hazards associated with floating debris and potential large wave created by the instability of the reservoir shoreline. The public are discouraged from accessing the reservoir by closure of the 3 formal boat launches (D.A. Thomas PUMA, Lynx Creek, and Halfway River boat launches). Remnant sections of Highway 29 that access the reservoir have been decommissioned through the placement of woody debris. Those sections that still require access by BC Hydro, MOTI, or private landowners are gated to prevent non-authorized access and signed indicating the hazards on the reservoir.

Although the public are strongly discouraged from accessing the reservoir during initial operation, the hazards that they would encounter should they choose to boat on the reservoir include:

Floating debris. Clearing of the Site C reservoir was completed in accordance with the project's Vegetation Clearing and Debris Management Plan (VCDMP). Estimates of expected debris quantities were updated in Spring 2023 based on post-clearing surveys. The *Debris Management Plan for Reservoir Filling* discusses the quantity of debris, the plans to remove it, and annual assessments of debris quantities.

Submerged hazards. Structures, such as permanent bridges from the Highway 29 relocation and stockpiles within the reservoir, do not exceed the Safe Boater Elevation of El/ 455.0m and therefore would not be a hazard to boaters. Shallower fish habitat areas will be identified on bathymetry mapping, which will be available to the public once the reservoir is deemed safe for public use.

Landslide Generated Waves. Instability of the reservoir slopes can generate waves as they enter the reservoir, posing hazards to boaters.

To reduce the risk to the public associated with these hazards, the following control measures are in place to reducing public exposure to the hazards:

Communication. This extensive program informs the public that the reservoir is hazardous during initial operation.

Physical access control. Where BC Hydro has the authority, access routes to the reservoir are gated, locked, and signed indicating that the reservoir is hazardous and to stay off it. The dock at the D.A. Thomas PUMA in Hudson's Hope won't be installed until the reservoir is deemed safe for public use in addition to the gates at the Lynx Creek and Halfway River boat launches being locked. The remnant sections of Highway 29 that lead to the reservoir have been decommissioned by MOTI and are inaccessible to the public.

Signage Program. An extensive signage program is in place advising the public of the hazards associated with the reservoir and to stay away from it.

The following table summarizes the hazards and controls of this component. Appendices 1 and 2 provide the details of the physical controls and the signage plan.

Table 2: Hazards, Activities, and Recommended Control Measures – Reservoir

Hazard	Known & Potential Activities	Control Measures
Floating debris, submerged objects, and landslide generated waves	**All watercraft.**	• ***Boater Communication Protocol*** • ***Access Control*** – Locked gates at access points that BC Hydro has authority to close. Decommissioned remnant sections of Highway 29 that access the reservoir. • ***Warning, Signs*** – Warning signs are installed at all potential access points to the reservoir and large warning signs on Highway 29
Landslide generated waves	**Shoreline recreation**	• ***Boater Communication Protocol*** • ***Access Control*** – Locked gates at access points that BC Hydro has authority to close. Decommissioned remnant sections of Highway 29 that access the reservoir. • ***Warning, Signs*** – Warning signs are installed at all potential access points to the reservoir and large warning signs on Highway 29

9.2 Approach Channel

The primary purpose of the approach channel is to direct flows around the earthfill dam and towards the powerhouse and spillway where the water will be used to generate electricity and, in the case of large inflow, passed through the spillway gates.

This component would be extremely hazardous to any member of the public exposed to it. As such, boat access is physically restricted through a double log debris boom. Security cameras monitor for unauthorized access to the component.

Table 3: Hazards, Activities, and Recommended Control Measures – Approach Channel

Hazard	Known & Potential Activities	Control Measures
Strong Currents and undertow	**All watercraft.**	• ***Public Communications Program*** • ***Warning Buoys –*** 10 warning buoys have been installed across the width of the reservoir 2 km upstream of the dam and debris boom. • ***Signage –*** Signs on both banks in line with the warning buoys define the hazard and to advise boaters to stay away from the dam

		• **Access Control** – Debris boom is installed at the entrance to the approach channel, which serves as a public safety boom.

9.3 Damsite

This component includes the entire damsite within the defined security perimeter, including the earthfill dam, powerhouse, spillway, substation, and all ancillary structures.

The damsite is a *Danger Zone* and no unauthorized personnel are permitted within the security perimeter. The damsite will transition in phases from a large construction site to a compact operating facility over the next two years and the necessary public control measures will be reflected in updated version of this PSMP. Throughout this time, the damsite will be fenced and gated with security. Signs will be posted on the fences and gates advising the public of the hazards and to stay out.

Appendix A
Public Safety Magenemtn Plan

At the time of preparing this PSMP for Initial Operation, the detailed layout of the site has not been finalized and therefore maps showing the location of these public safety control measures are not included. However, the following table summarizes the control measures that will be in place once the final layout is established.

Table 4: Hazards, Activities, and Implemented Control Measures – Damsite

Hazard	Known & Potential Activities	Control Measures
Heavy construction activity	Persons entering by land	• ***Warning, Signs*** – All *Danger Zones* are signed to restrict public access. • ***Restraints, Fences & Gates*** – Public access to Site C is strictly controlled through 24/7 security. Gates and barriers control all public vehicle access to the site. • ***Guards*** – Security gates A and B on the north bank and C on the south bank are staffed 24/7. There are roaming security patrols within the secured perimeter. • ***Electronic Security*** – Cameras located at the security perimeter are monitored by on-site security 24/7.
Electrical contact	Persons entering by land	• ***Restraints, Fences & Gates*** – Areas with electrical hazards will be fenced and signed • ***Electronic Security*** – Cameras located at security perimeter, particularly around the switchyard are monitored by on-site security 24/7
Falling from height	Persons entering by land	• ***Restraints, Fences & Gates*** – Public access to Site C is strictly controlled through 24/7 security. Gates and barriers control all public vehicle access to the site. • ***Electronic Security*** – Cameras located at the security perimeter are monitored by on-site security 24/7

9.4 Tailrace

The Tailrace component in the Peace River is a *Danger Zone* due to the potential for hazardous changes in flow from the spillway. The *Danger Zone* extends from the downstream toe of the dam to the current location of Memorial Bridge. The *Warning Zone* extends a further 2.0km downstream.

The hazards associated with the *Danger Zone* include hazardous changes in flow, turbulence, and air entrained water. Air entrainment causes buoyancy to reduce signficantly such that a person wearing a life jacket will not float. The hazards associated with the *Warning Zone* are strong currents and rapid changes in water level.

Both the *Danger* and *Warning Zones* are signed indicating the hazards. Public can access the *Warning Zone* but are advised to stay out of the *Danger Zone*.

A Public Warning System (PWS), consisting of sirens and strobes, will warn anyone in the area in advance of any hazardous changes in flow from the spillway. However, the PWS may not be fully operational during the first few months of initial operation. Until the PWS is fully operational and commissioned, electronic detection will serve as an interim control measure, which audible warnings will be directed to boaters on both banks of the tailrace. These devices will remain in place and operational until the PWS is commissioned.

Table 5: Hazards, Activities, and Implemented Control Measures – Tailrace

Hazard	Known & Potential Activities	Control Measures
Hazardous Flow Changes. Strong currents, turbulent flows and air entrained water	Persons entering the component by water from downstream	• ***Warning, Signs*** – All *Danger Zones* are signed to restrict public access. *Hazard Zones* are signed to explain nature of hazard. • **Public Warning System** – The PWS will provide advance warning through sirens/strobe lights in advance of hazardous changes in flow from the spillway. Until the PWS is employed, control measures will comprise electronic detection and verbal warnings. • ***Electronic Security*** – Mobile security trailers with radar, cameras and speakers will be used by security to ensure access control to the tailrace 24/7.
Rapid Changes in Flow and water level	Persons fishing from shore in the *Warning Zone*	• ***Warning, Signs*** –The *Hazard Zone is* signed to explain nature of hazard. • **Public Warning System** – The PWS will provide advance warning through sirens/strobe lights in advance of hazardous changes in flow from the spillway. Until the PWS is employed, control measures will comprise electronic detection with verbal warnings..

9.5 Downstream

This Component comprises the reach of the Peace River from 2.0km downstream of Memorial Bridge to Peace Island Park boat launch.

Flow changes through this reach are not rapid and do not pose hazards to boaters greater than any other river in northern British Columbia. The public does need to know that there is a dam upstream and that the river is closed to all watercraft upstream of Memorial Bridge.

Signs have been installed at the Highway 97 bridge over the Peace River at Taylor and at the boat launch at Peace Island Park.

Table 6: Hazards, Activities, and Implemented Control Measures – Downstream (DS)

Hazard	Known & Potential Activities	Control Measures
Turbulent water being discharged from the diversion tunnels	Persons entering by water (boating upstream on the Peace River)	• ***Warning, Signs*** – Warning signs are installed on both sides of the Peace River 2km downstream of Site C indicating that the reach of the river through the construction is closed to the public due to the presence of the cofferdam and diversion tunnels (see Map 2 for location of these signs).
Presence of dam construction site upstream	Persons boating on the Peace River	• ***Notice, Warning and Danger Signs*** – Signs are installed downstream of the Taylor Bridge over the Peace River and at Peace Island Park advising boaters that the Peace River is closed at Site C and to stay way.

Appendix A
Public Safety Ma

10.0 Public Safety Risk Assessment

The Canadian Dam Association's (CDA) *Guidelines for Public Safety Around Dams* provides a risk assessment methodology which is applied to BC Hydro's generation facilities. These guidelines outline a consistent approach to assessing the risk by assigning a rating to both the likelihood of occurrence and the consequence of exposure to the hazard. Both likelihood and consequence are scored by 1 (least) to 5 (highest).

Table 7 illustrates the rating of increasing likelihood on the scale from 1 to 5.

Table 7: Incident Likelihood Rating (ILR)

Descriptor	Definition of Likelihood	ILR
Very Frequent	More than 10 occurrences in the hazardous area in any one of the last 3 years Or 25 or more occurrences in total in the last 3 years	5
Frequent	More than 2 occurrences in the hazardous area in any one of the last 3 years	4

Descriptor	Definition of Likelihood	ILR
Occasional	Any occurrence in the hazardous area in the last 6 years	3
Possible	Any occurrence in the hazardous area in the last 10 years	2
Remote	No known occurrences in the last 10 years	1

Table 8 illustrates the rating of increasing consequence on the scale from 1 to 5.

Table 8: Incident Consequence Rating (ICR)

Descriptor	Definition of Consequence	ICR
Fatality	Fatality	5
Critical	Permanent Partial or Total Disability	4
Major	Medical Treatment or Stranding (rescue required)	3
Minor	First Aid or Stranding (self-rescue possible)	2
Insignificant	No attention required	1

10.1 CDA Risk Assessment of the Site C Components

This section places the above information regarding the Incident Likelihood Rating (ILR) and the Incident Consequence Rating (ICR) into practice with the Site C components. The two ratings are multiplied together to create either a low, medium, or high risk rating, which is indicated in Table 9 below.

Reservoir

For the duration of Initial Operations, the reservoir will be deemed to be unsafe and therefore a “hazardous area”. Given that some members of the public will ignore the messaging that BC Hydro has provided to stay off the reservoir and away from the shoreline, it is expected that there will be some limited public use. Using the CDA Incident Likelihood Rating system, there will be more than 10 such occurrences in the first year of initial operation. Hence an ILR of 5 is assigned.

The **most likely consequence** to boaters of being exposed to the hazards on the reservoir is boat damage by floating debris. This would lead to stranding on the reservoir until they can be towed, repaired, or otherwise returned to safety. There are more severe potential consequences but CDA’s rating is always based on what is most likely. An ICR of 3 is assigned to the Reservoir.

Approach Channel

The existing control measures (buoys, signs and the debris boom) are anticipated to be effective in preventing any public access into the approach channel. Access to the approach channel by

foot is through the security perimeter around the site, though there have been no such trespassing events in the last two years. An ILR of 1 is assigned.

There will always be flows in the approach channel leading to either the penstock intakes or one the spillway gates. Although a fatality is a possibility in the approach channel, a cold water rescue would most likely be required which could lead to a critical injury. An ICR of 4 is assigned.

The existing control measures (buoys, signs and the debris boom) are anticipated to be effective in preventing any public access into the approach channel. An ILR of 1 is assigned to the approach channel.

Damsite

Site security around the Site C damsite has been proven to be very effective, with no trespassing events in the last 2 years. As with the approach channel, an ILR of 1 is assigned.

There are numerous hazards that someone trespassing on the site can be exposed to. All electrical hazards have secondary security around them with the powerhouse being compliant with the North American Electric Reliability Corporation (NERC) cyber security. Hazards include vehicle encounters, tripping, and falling from heights. The most likely consequence of exposure to these hazards would be medical treatment. An ICR of 3 is assigned for the damsite.

Tailrace

There are no physical barriers, such as a downstream public safety boom, preventing boaters from entering the tailrace on the Peace River. Experience during construction of the project is that there have been more than 2 but less than 5 times where boaters have been observed upstream of the Memorial Bridge. There have been no events where people have been observed walking or fishing along the shore upstream of the bridge. Based on this experience, an ILR of 4 is assigned to the tailrace. However, BC Hydro will install a public safety boom downstream of the tailrace, which will decrease the ILR over time.

The hazards to boaters and people on the shore are rapid changes in flow, turbulence, and air entrainment. Increased flows from the powerhouse will result in stronger currents that will encourage boaters to move further downstream out of the *Danger Zone*. Until the Public Warning System is installed, electronic detection with audible warning have been installed on both banks of the tailrace to detect boaters upstream of the Memorial Bridge and direct them to the leave the area. Once the Public Warning System is operational and commissioned, hazardous changes in spillway flows will be signaled by sirens/strobe light in advance of the flow change. An ICR of 3 is assigned.

Sudden changes in flow, turbulence and a high degree of air entrainment pose significant hazards to any member of the public in the tailrace, regardless of whether they are in a boat or on the shoreline. Although a fatality is a possibility, the most likely outcome would be a medical treatment (hypothermia due to the very cold water) or stranding. An ICR of 3 has been assigned to the tailrace.

Downstream

The reach of the Peace River between Peace Island Park and Memorial Bridge is extensively used by boaters. Hence an ILR of 5 is assigned.

Once Site C is into the initial operations phase, there will be no significant changes to downstream flows. An ICR of 1 is assigned.

The following table summarizes the risk assessment for the 5 Site C components.

Table 9: Site C Component Risk Ratings

Component	ILR	ICR	Risk Rating	Risk Score
Reservoir	5	3	**15**	**HIGH**
Approach Channel	1	4	**4**	**LOW**
Damsite	1	3	**3**	**LOW**
Tailrace	4	3	**12**	**HIGH**
Downstream	5	1	**5**	**LOW**

Under BC Hydro's tolerable risk criteria, any risk rating over 8 requires further risk reduction controls. Since it is difficult to reduce consequences, BC Hydro's effort is directed to reducing the likelihood of occurrences. For the reservoir, daily inspections of the access controls will be made. The Manager of Site C Security has contacted both the Ministry of Transportation and Infrastructure (MOTI) and the local RCMP to observe any evidence of unauthorized access to the reservoir and report that to BC Hydro for response. For the tailrace, the ILR will be re-assessed once the reservoir is filled and the effectiveness of the mobile security stations has demonstrated.

11.0 Qualified Professionals

This plan was prepared by Dave Cattanach, P. Eng., Public Safety Specialist.

Appendix 1

Maps

Map 1: Site C Reservoir Overview	**Drawing No.:** 1016-N11-01843-1
Map 2: Hudson's Hope Boat Launch	**Drawing No.:** 1016-N11-01843-2
Map 3: Lynx Creek #1	**Drawing No.:** 1016-N11-018439-3
Map 4: Lynx Creek #2	**Drawing No.:** 1016-N11-01843-4
Map 5: New Lynx Creek Boat Launch	**Drawing No.:** 1016-N11-01843-5
Map 6: Farrell Creek #1	**Drawing No.:** 1016-N11-01843-6
Map 7: Farrell Creek #2	**Drawing No.:** 1016-N11-01843-7
Map 8: Halfway River #1, #2, and #3	**Drawing No.:** 1016-N11-01843-8
Map 9: Halfway River #4 & New Halfway River Boat Launch	**Drawing No.:** 1016-N11-01843-9
Map 10: Cache Creek #1	**Drawing No.:** 1016-N11-01843-10
Map 11: Cache Creek #2	**Drawing No.:** 1016-N11-01843-11
Map 12: Cache Creek #3	**Drawing No.:** 1016-N11-01843-12
Map 13: Charlie Lake Outflow	**Drawing No.:** 1016-N11-01843-13
Map 14: Site C Headpond	**Drawing No.:** 1016-N11-01843-14
Map 15: Peace River Downstream	**Drawing No.:** 1016-N11-01843-15
Map 16: Peace Island Park	**Drawing No.:** 1016-N11-01843-16

N

CS-3818

CS-4593

CS-3264

Red Creek

Cache Creek

Charlie Lake

29

97

Halfway River

Wilder Creek

Tea Creek

Map 12

Map 11

Map 10

Map 9

Map 8

Map 13

Fort St. John

Map 14

Map 16

Peace View Littoral Habitat

Mobert River

Map 15

Taylor

Pine River

Boudreau Lake

Farrell Creek

Dry Creek Littoral Habitat

Map6

Map7

Dry Creek

CS-3264

North Monias Road

Lynx Creek

CS-3818

Map 5

Map 4

Map 3

Hudson's Hope

Map 2

KM26 Fish Enhancement Area

CS-4593

Alwin Holland Campground

KM21 Fish Enhancement Area

CS-3264

DANGER

Site C reservoir is dangerous for boating and recreation.

Keep off the reservoir and stay away from the shoreline.

CS-4593

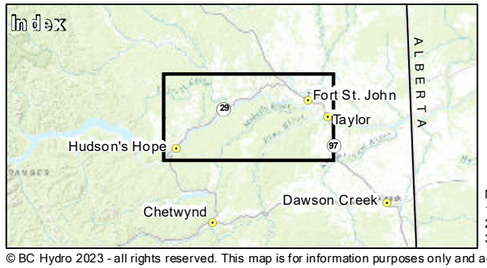
CS-3818

WARNING

Reservoir is dangerous

Keep off water and away from shoreline

Index



Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Basemap: ESRI

Legend

- Informal access into reservoir
- Sign Location
- Installed Sign
- Road
- Highway
- Reservoir Full Supply Level 461.8m
- Fish Enhancement Areas
- Dam Site Area

1:210,000

0 9.5 km

BC Hydro

Public Safety Management Plans for Reservoir Filling and Initial Operations

Map1 - Site C Reservoir Overview

Date	Aug 20, 2024	DWG NO	1016-N11-01843-1	R6

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

Path: X:\Arc\GIS\Projects\Safety\ReservoirFilling_InitialOperations\SignPlan_Operation_1016-N11-01843-1.mxd

Map Notes:
1. Datum: NAD 83
2. Projection: UTM Zone 10N
3. Imagery: LIDAR October 2023

Legend

- Sign Location
- Installed Sign
- To be Installed Sign
- Vehicle Gate
- Danger Zone
- Reservoir Full Supply Level 461.8m

1:2,000 0 90 m

BC Hydro

Public Safety Management Plans for Reservoir Filling and Initial Operations

Map 2 - Hudsons Hope Boat Launch

Date	Aug 21, 2024	DWG NO	1016-N11-01843-2	R 4

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

Path: X:\Arc GIS Projects\Safety\Reservoir Filling_Initial Operations\SignPlan_Operation_1016-N11-01843-2.mxd

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Imagery: LIDAR October 2023

Legend

- Sign Location
- Installed Sign
- Danger Zone
- Reservoir Full Supply Level 461.8m
- Concrete Lock Blocks

1:2,000

0 100 m

BC Hydro

Public Safety Management Plans for Reservoir Filling and Initial Operations

Map 3- Lynx Creek #1

Date	Aug 20, 2024	DWG NO	1016-N11-01843-3	R 5

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

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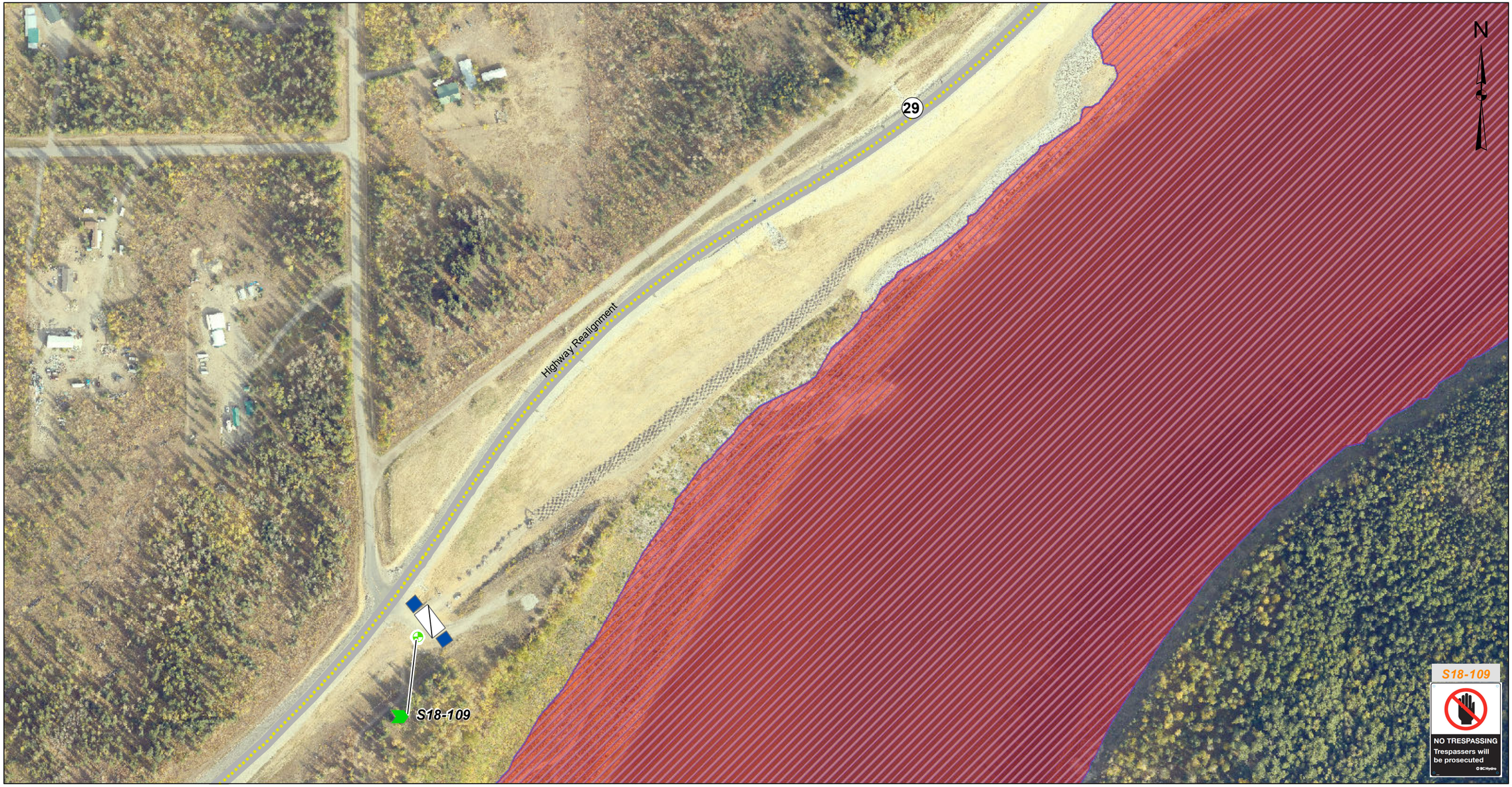

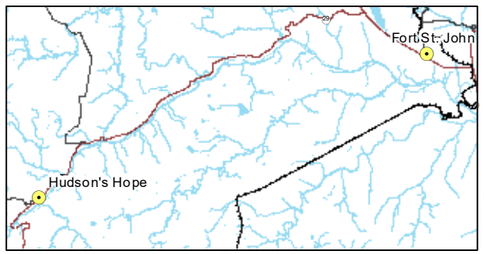

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Imagery: LIDAR October 2023

Legend

- Sign Location
- Installed Sign
- Danger Zone
- Reservoir Full Supply Level 461.8m
- Vehicle Gate
- Jersey barriers

1:3,000

0 100 m

BC Hydro

Public Safety Management Plans for Reservoir Filling and Initial Operations

Map 4 - Lynx Creek #2

Date	Aug 20, 2024	DWG NO	1016-N11-01843-4	R 3

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

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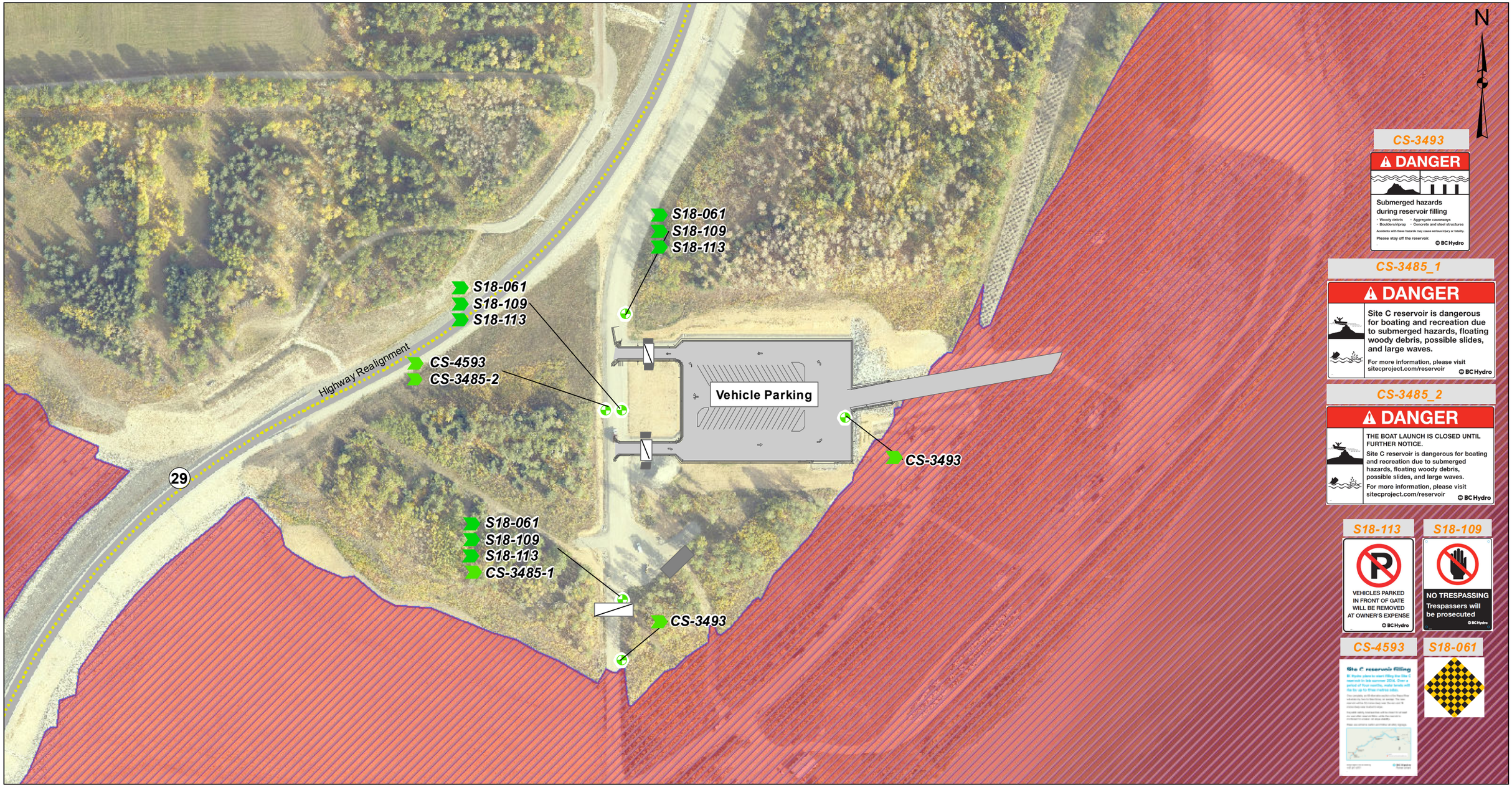

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Imagery: LIDAR October 2023

Legend

- Sign Location
- Installed Sign
- Danger Zone
- Reservoir Full Supply Level 461.8m
- Vehicle Gate
- Concrete Lock Blocks

1:2,500

0 100 m

BC Hydro

Public Safety Management Plans for Reservoir Filling and Initial Operations

Map5 - Lynx Creek Boat Launch

Date	Aug 21, 2024	DWG NO	1016-N11-01843-5	R 4

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

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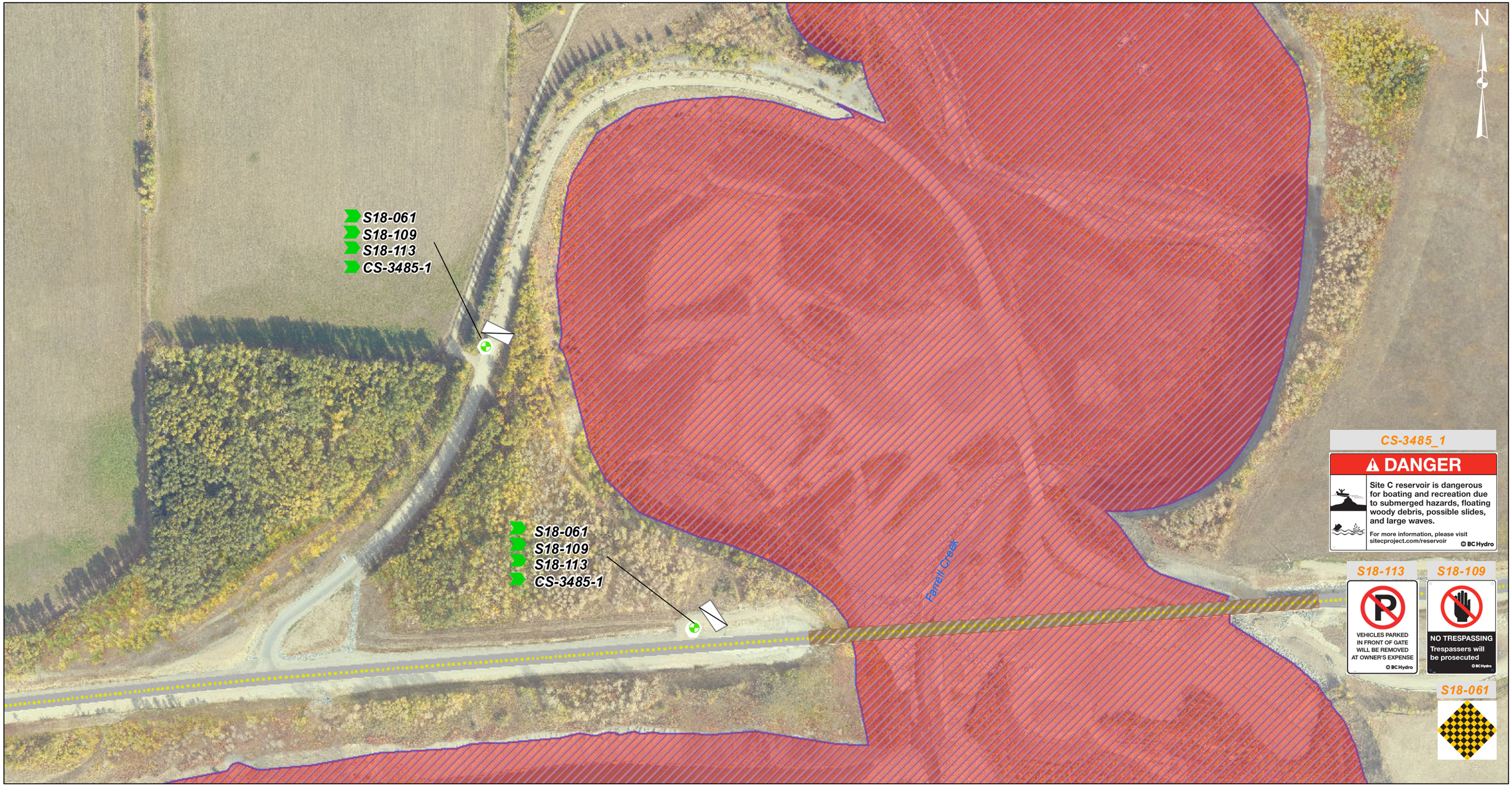

Map Notes:
1. Datum: NAD 83
2. Projection: UTM Zone 10N
3. Imagery: LIDAR October 2023

Legend

- Sign Location
- Installed Sign
- Danger Zone
- Highway Realignment Bridge
- Reservoir Full Supply Level 461.8m
- Vehicle Gate

1:3,000

0 150 m

BC Hydro

Public Safety Management Plans for Reservoir Filling and Initial Operations

Map 6 - Farrell Creek#1

Date	Aug 21, 2024	DWG NO	1016-N11-01843-6	R 2

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

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Map Notes:
1. Datum: NAD 83
2. Projection: UTM Zone 10N
3. Imagery: LIDAR October 2023

Legend

- Sign Location
- Installed Sign
- Danger Zone
- Highway Realignment Bridge
- Reservoir Full Supply Level 461.8m
- Vehicle Gate
- Concrete Lock Blocks

1:3,000

0 150 m

BC Hydro

Public Safety Management Plans for Reservoir Filling and Initial Operations

Map 7 - Farrell Creek #2

Date	Aug 20, 2024	DWG NO	1016-N11-01843-7	R 5

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

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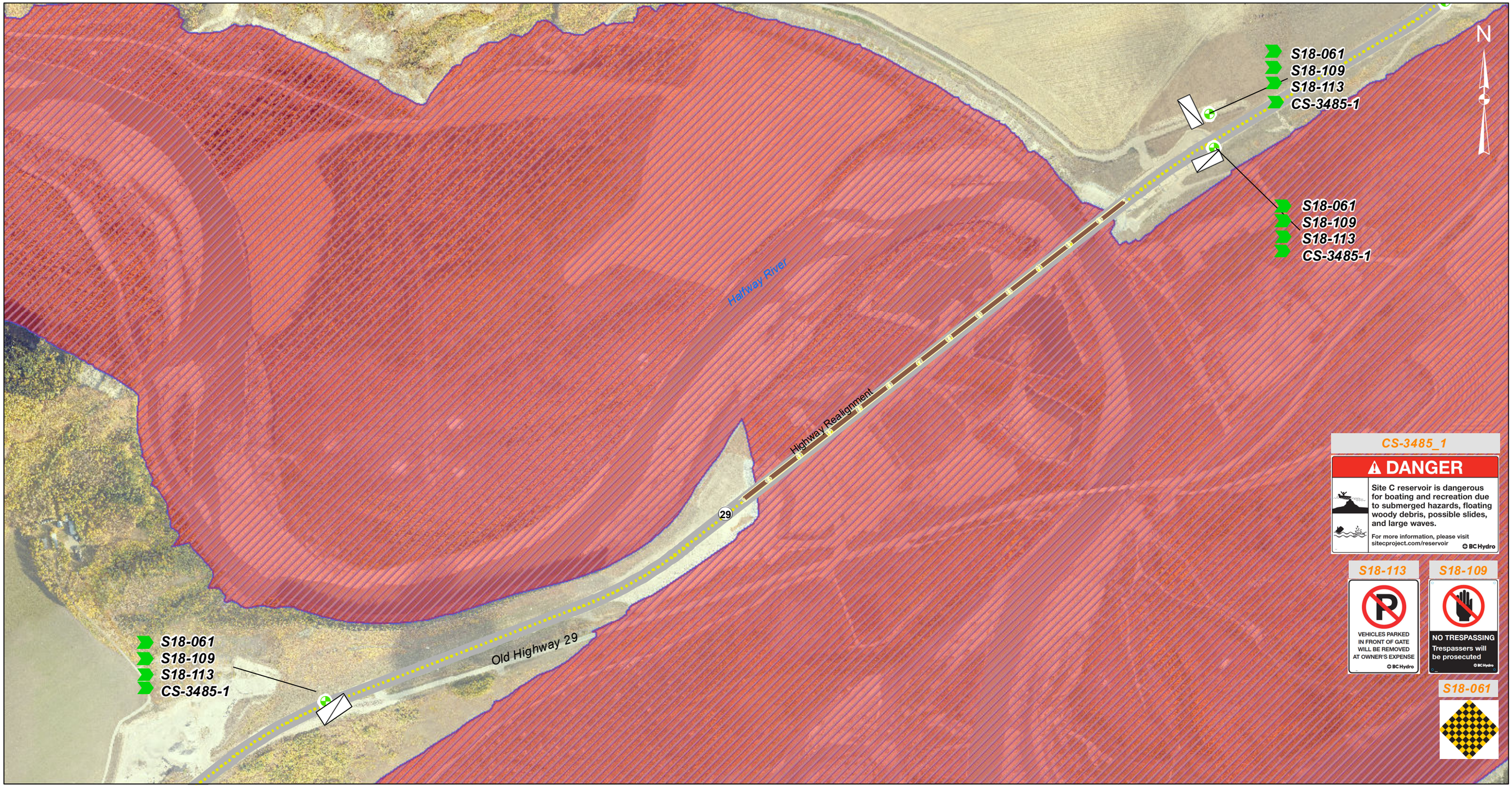

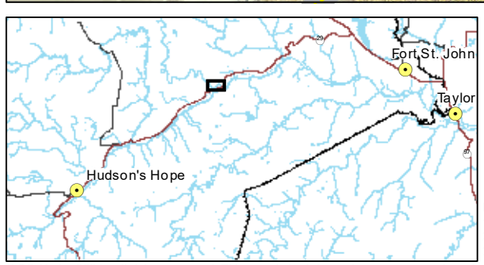

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Imagery: LIDAR October 2023

Legend

- Sign Location
- Installed Sign
- Danger Zone
- Highway Realigment Bridge
- Reservoir Full Supply Level 461.8m
- Vehicle Gate

1:8,000

0 400 m

BC Hydro

Public Safety Management Plans for Reservoir Filling and Initial Operations
Map 8 - Halfway River #1 and #2 and #3

Date	Aug 20, 2024	DWG NO	1016-N11-01843-8	R 5

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

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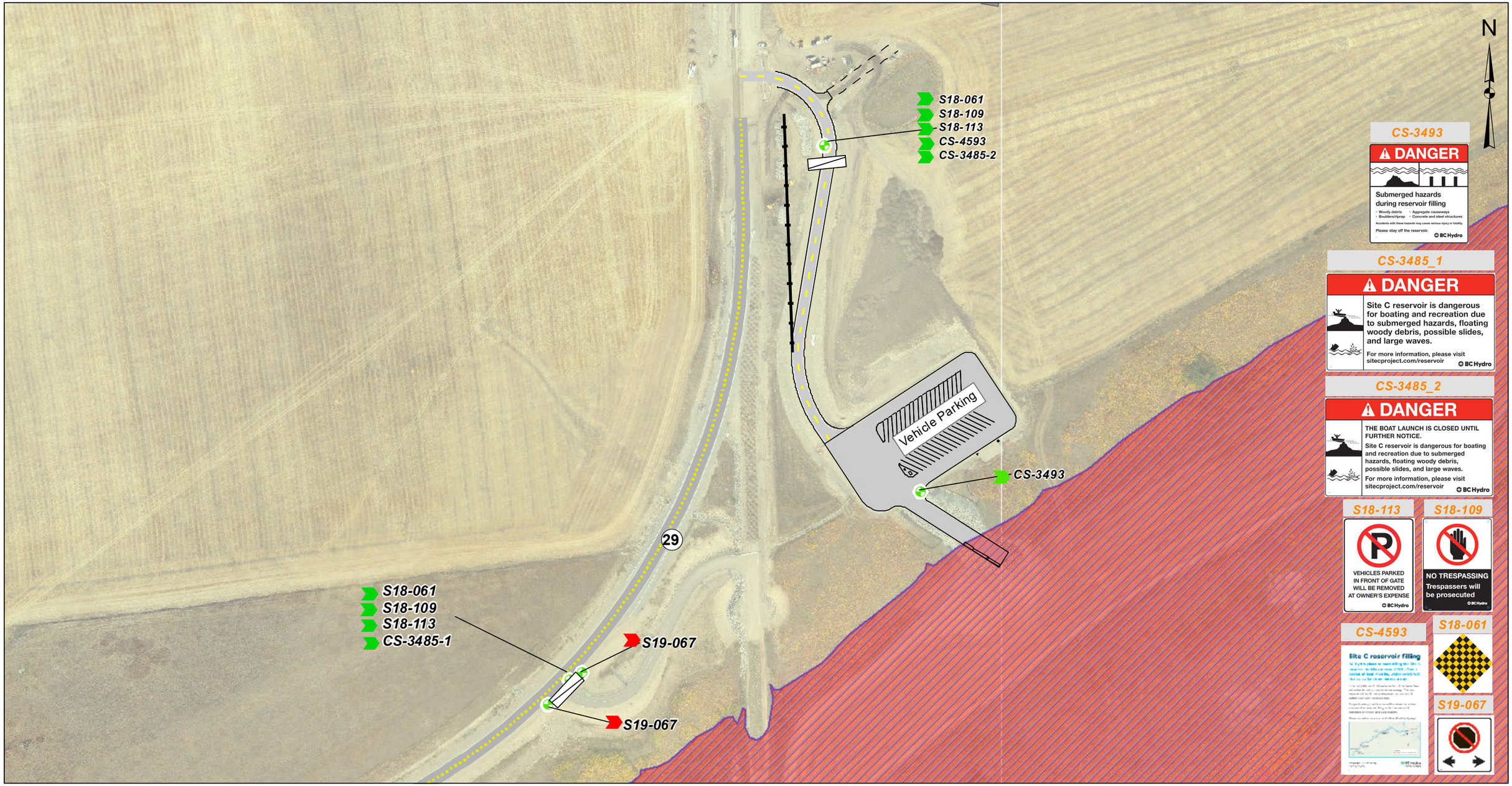

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Imagery: LIDAR October 2023

Legend

- Sign Location
- Installed Sign
- To be Installed Sign
- Danger Zone
- Reservoir Full Supply Level 461.8m
- Vehicle Gate
- Proposed Fencing

1:2,600 0 100 m

BC Hydro

Public Safety Management Plans for Reservoir Filling and Initial Operations
Map 9- Halfway River #4 and New Halfway River Boat Launch

Date	Aug 20, 2024	DWG NO	1016-N11-01843-9	R 5

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

Path: X:\Arc\GIS\Projects\Safety\Reservoir Filling_InitialOperations\SignPlan_Operation_1016-N11-01843-9.mxd

N

S18-061
S18-109
S18-113
CS-3485-1

29

S18-061

Highway Realignment

Old Highway 29

CS-3485_1

⚠ DANGER

Site C reservoir is dangerous for boating and recreation due to submerged hazards, floating woody debris, possible slides, and large waves.

For more information, please visit sitecproject.com/reservoir

BC Hydro

S18-113

VEHICLES PARKED IN FRONT OF GATE WILL BE REMOVED AT OWNER'S EXPENSE

BC Hydro

S18-109

NO TRESPASSING
Trespassers will be prosecuted

BC Hydro

S18-061

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Imagery: LIDAR October 2023

Legend

- Sign Location
- Installed Sign
- Danger Zone
- Reservoir Full Supply Level 461.8m
- Vehicle Gate

1:5,000

0 250 m

BC Hydro

Public Safety Management Plans for Reservoir Filling and Initial Operations

Map 10 - Cache Creek #1

Date	Aug 20, 2024	DWG NO	1016-N11-01843-10	R 5

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

Path: X:\ArcGIS\Projects\Safety\ReservoirFilling_InitialOperations\SignPlan_Operation_1016-N11-01843-10.mxd

N

29

S18-109
CS-3485_1

CS-3485_1

DANGER

Site C reservoir is dangerous for boating and recreation due to submerged hazards, floating woody debris, possible slides, and large waves.

For more information, please visit sitecproject.com/reservoir

© BC Hydro

S18-109

NO TRESPASSING
Trespassers will be prosecuted

© BC Hydro

Map Notes:
1. Datum: NAD 83
2. Projection: UTM Zone 10N
3. Imagery:LIDAR October 2023

Legend

- Sign Location
- Installed Sign
- Danger Zone
- Reservoir Full Supply Level 461.8m
- Vehicle Gate
- Concrete Lock Blocks

1:2,500

0 100 m

BC Hydro

Public Safety Management Plans for Reservoir Filling and Initial Operations

Map 11 - Cache Creek #2

Date	Aug 20, 2024	DWG NO	1016-N11-01843-11	R 4

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

Path: X:\Arc\GIS\Projects\Safety\Reservoir Filling_Initial Operations\SignPlan_Operation_1016-N11-01843-11.mxd

Map Notes:
1. Datum: NAD 83
2. Projection: UTM Zone 10N
3. Imagery: LIDAR October 2023

Legend

- Sign Location
- Installed Sign
- Danger Zone
- Reservoir Full Supply Level 461.8m
- Vehicle Gate

1:3,000

0 150 m

BC Hydro

Public Safety Management Plans for Reservoir Filling and Initial Operations

Map 12 - Cache Creek #3

Date	Aug 20, 2024	DWG NO	1016-N11-01843-12	R 5

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

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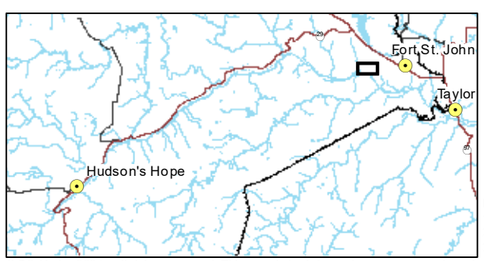


Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Imagery: LIDAR October 2023

Legend

- Sign Location
- Installed Sign
- Danger Zone
- Reservoir Full Supply Level 461.8m
- Vehicle Gate

1:10,000

0 500 m

BC Hydro

Public Safety Management Plans for Reservoir Filling and Initial Operations

Map 13 - Charlie Lake Outfall

Date	Aug 20, 2024	DWG NO	1016-N11-01843-13	R 4

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

Path: X:\ArcGISProjects\SafetyReservoirFilling_InitialOperations\SignPlan_Operation_1016-N11-01843-13.mxd

CS- 4162

CS- 4162

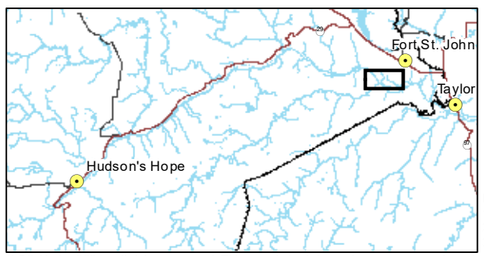
CS- 4593

Dam Site Area

N

CS-4162

CS-4593



Map Notes:
1. Datum: NAD 83
2. Projection: UTM Zone 10N
3. Imagery: LIDAR Ortho October 2023

Legend

- Sign Location
- Dam Site Area
- Reservoir Full Supply Level 461.8m
- Installed Sign
- To be Installed Sign
- Danger Zone
- Warning Zone
- Safe Area
- Anchors
- Hazard Buoys
- Anchor Chain
- Dam Safety Boom (440m)
- Shear Boom
- Existing Construction Debris Boom (440m)
- Anchor Cables
- Debris Handling Facility
- Gate A fence

1:18,500

0 1 km

BC Hydro

Public Safety Management Plans for Reservoir Filling and Initial Operations

Map14 - Site C Headpond

Date	Aug 20, 2024	DWG NO	1016-N11-01843-14	R 6

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

Path: X:\Arc\GIS\Projects\Safety\Reservoir Filling_InitialOperations\SignPlan_Operation_1016-N11-01843-14.mxd

N

CS-3448-2

CS-3448-2

S20-013

CS-3464

CS-4520

CS-320

S20-132

S20-132

Peace River

CS-320

CS-4520

CS-3448-2

DANGER

EXTREME HAZARD
DIVERSION TUNNEL OUTLET
Strong currents and undertow
No entry

BC Hydro

CS-4520

WARNING

KEEP AWAY
Dam ahead

Water levels and flows may change without notice.

BC Hydro

CS-320

DANGER

Keep Out
Dam Outflow

Access beyond this point may result in drowning

BC Hydro

S20-132

DANGER

RIVER CLOSED

No public access beyond this point

BC Hydro

CS-3464

WARNING

Submerged hazards ahead

Proceed with caution

BC Hydro

S20-013

DANGER

DAM AHEAD
RIVER BLOCKED

No public access

BC Hydro

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Imagery: LIDAR Ortho October 2021

Legend

- Sign Location
- Dam Site Area
- Danger Zone
- Warning Zone
- Safe Area
- Reservoir Full Supply Level 461.8m
- Installed Sign
- To be Replaced Sign

1:11,000

0 400 m

BC Hydro

Public Safety Management Plans for Reservoir Filling and Initial Operations
Map15 - Peace River Downstream

Date	Aug 20, 2024	DWG NO	1016-N11-01843-15	R 6

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

Path: X:\Arc\GIS\Projects\Safety\Reservoir Filling_Initial Operations\SignPlan_Operation_1016-N11-01843-15.mxd

Old Fort

CS-4583

Map 15

Peace River

CS-4593

S-CS-712

S-S20-072

CS-2853

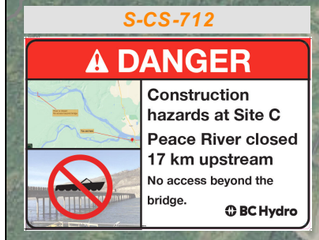
Peace Island Park

N

CS-4463

Pine River

S-CS-712



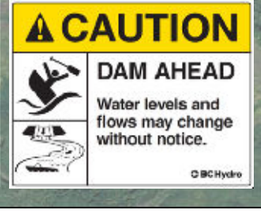
CS-4463

CS-4593

S-S20-072

CS-2853

CS-4583



Map Notes:
1. Datum: NAD 83
2. Projection: UTM Zone 10N
3. Imagery:ESRI World Imagery

Legend

- Sign Location
- Installed Sign

1:38,000

0 1,600 m

BC Hydro

Public Safety Management Plans for Reservoir Filling and Initial Operations
Map16 - Peace Island Park

Date	Aug 20, 2024	DWG NO	1016-N11-01843-16	R 5

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

Path: X:\Arc\GIS\Projects\Safety\Reservoir Filling_Initial Operations\SignPlan_Operation_1016-N11-01843-16.mxd

Appendix 2

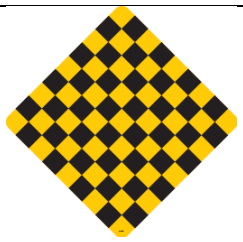
Sign Index

Map 1:

Sign	Purpose
 **CS-3818** 96” x 72”	To advise drivers on the highway during reservoir filling that the reservoir is not safe for use.
 **CS-4593** 48” x 72”	Communications sign that delivers more specific information regarding reservoir filling.
 **CS-3818** 96” x 72”	To advise boaters on Moberly River at North Monias during reservoir filling that the reservoir is not safe for use.

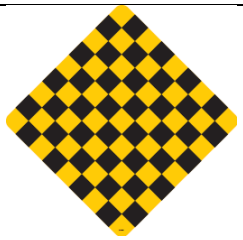
Map 2:

Sign	Purpose
 **CS-3485_1** 60" x 36"	To advise the public that access into the reservoir is restricted due to the reservoir being unsafe for use.

 **S18-061** 30” x 30”	BC Hydro Public Safety standard to prevent drivers from parking in front of vehicle gates.
 **S18-113** 18” x 24”	BC Hydro Public Safety standard to prevent drivers from parking in front of vehicle gates.
 **S18-109** 18” x 24”	To let the public know that any point beyond this sign is considered trespassing.
 **CS-3493** 60" x 60"	To advise anyone who trespasses past the boat launch vehicle gates of the specific submerged hazards (e.g., causeways) that could cause serious injury.
 **CS-4593** 48” x 72”	Communications sign that delivers more specific information regarding reservoir filling.

 **CS-4123** 24” x 36”	To delineate property lines at D.A. Thomas PUMA.

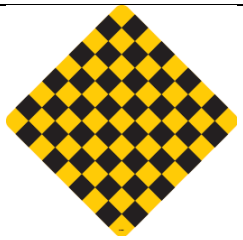
Map 3:

Sign	Purpose
 **CS-3485_1** 60" x 36"	To advise the public that access into the reservoir is restricted due to the reservoir being unsafe for use.
 **S18-061** 30” x 30”	BC Hydro Public Safety standard to prevent drivers from parking in front of vehicle gates.
 **S18-109** 18” x 24”	To let the public know that any point beyond this sign is considered trespassing.

Map 4:

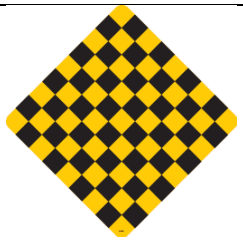
Sign	Purpose
 **S18-109** 18” x 24”	To let the public know that any point beyond this sign is considered trespassing.

Map 5:

Sign	Purpose
 **S18-061** 30” x 30”	BC Hydro Public Safety standard to prevent drivers from parking in front of vehicle gates.
 **S18-113** 18” x 24”	BC Hydro Public Safety standard to prevent drivers from parking in front of vehicle gates.
 **S18-109** 18” x 24”	To let the public know that any point beyond this sign is considered trespassing.

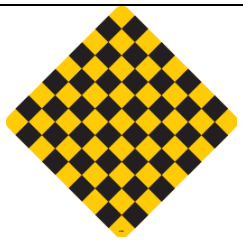
 **CS-3485_2** 60" x 36"	To advise the public at boat launches that access into the reservoir is restricted due to the reservoir being unsafe for use.
 **CS-4593** 48” x 72”	Communications sign that delivers more specific information regarding reservoir filling.
 **CS-3493** 60" x 60"	To advise anyone who trespasses past the boat launch vehicle gates of the specific submerged hazards (e.g., causeways) that could cause serious injury.
 **CS-3485_1** 60" x 36"	To advise the public that access into the reservoir is restricted due to the reservoir being unsafe for use.

Map 6:

Sign	Purpose
 **S18-061** 30” x 30”	BC Hydro Public Safety standard to prevent drivers from parking in front of vehicle gates.

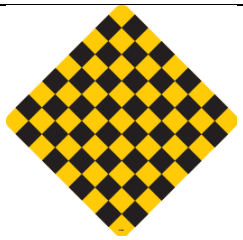
 **S18-113** 18” x 24”	BC Hydro Public Safety standard to prevent drivers from parking in front of vehicle gates.
 **S18-109** 18” x 24”	To let the public know that any point beyond this sign is considered trespassing.
 **CS-3485_1** 60" x 36"	To advise the public that access into the reservoir is restricted due to the reservoir being unsafe for use.

Map 7:

Sign	Purpose
 **S18-061** 30” x 30”	BC Hydro Public Safety standard to prevent drivers from parking in front of vehicle gates.
 **S18-109** 18” x 24”	To let the public know that any point beyond this sign is considered trespassing.

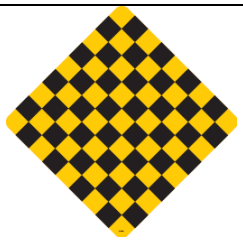
 **S18-109** 18” x 24”	To let the public know that any point beyond this sign is considered trespassing.
 **CS-3485_1** 60" x 36"	To advise the public that access into the reservoir is restricted due to the reservoir being unsafe for use.

Map 8:

Sign	Purpose
 **S18-061** 30” x 30”	BC Hydro Public Safety standard to prevent drivers from parking in front of vehicle gates.
 **S18-113** 18” x 24”	BC Hydro Public Safety standard to prevent drivers from parking in front of vehicle gates.

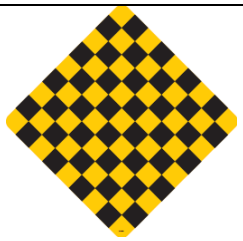
 **S18-109** 18” x 24”	To let the public know that any point beyond this sign is considered trespassing.
 **CS-3485_1** 60" x 36"	To advise the public that access into the reservoir is restricted due to the reservoir being unsafe for use.

Map 9:

Sign	Purpose
 **CS-3485_1** 60" x 36"	To advise the public that access into the reservoir is restricted due to the reservoir being unsafe for use.
 **S18-061** 30” x 30”	BC Hydro Public Safety standard to prevent drivers from parking in front of vehicle gates.
 **S18-113** 18” x 24”	BC Hydro Public Safety standard to prevent drivers from parking in front of vehicle gates.

 **S18-109** 18” x 24”	To let the public know that any point beyond this sign is considered trespassing.
 **S19-067** 12" x 12"	To prevent stopping on the highway around the gate.
 **CS-4593** 48” x 72”	Communications sign that delivers more specific information regarding reservoir filling.
 **CS-3485_2** 60" x 36"	To advise the public at boat launches that access into the reservoir is restricted due to the reservoir being unsafe for use.
 **CS-3493** 60" x 60"	To advise anyone who trespasses past the boat launch vehicle gates of the specific submerged hazards (e.g., causeways) that could cause serious injury.

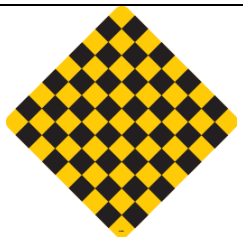
Map 10:

Sign	Purpose
 **S18-061** 30” x 30”	BC Hydro Public Safety standard to prevent drivers from parking in front of vehicle gates.
 **S18-113** 18” x 24”	BC Hydro Public Safety standard to prevent drivers from parking in front of vehicle gates.
 **S18-109** 18” x 24”	To let the public know that any point beyond this sign is considered trespassing.
 **CS-3485_1** 60" x 36"	To advise the public that access into the reservoir is restricted due to the reservoir being unsafe for use.

Map 11:

Sign	Purpose
 **S18-109** 18” x 24”	To let the public know that any point beyond this sign is considered trespassing.
 **CS-3485_1** 60" x 36"	To advise the public that access into the reservoir is restricted due to the reservoir being unsafe for use.

Map 12:

Sign	Purpose
 **S18-061** 30” x 30”	BC Hydro Public Safety standard to prevent drivers from parking in front of vehicle gates.
 **S18-113** 18” x 24”	BC Hydro Public Safety standard to prevent drivers from parking in front of vehicle gates.

 **S18-109** 18” x 24”	To let the public know that any point beyond this sign is considered trespassing.
 **CS-3485_1** 60" x 36"	To advise the public that access into the reservoir is restricted due to the reservoir being unsafe for use.

Map 13:

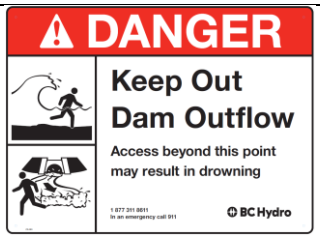
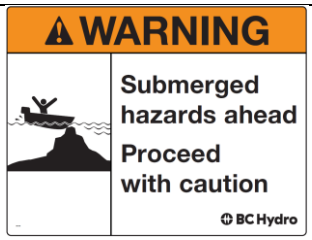
Sign	Purpose
 **CS-3485_1** 60" x 36"	To advise the public that access into the reservoir is restricted due to the reservoir being unsafe for use.
 **CS-3613** 18" x 24"	To advise drivers who get close to the Charlie Lake Outflow that there is no safe turnaround if they drive too far.

Map 14:

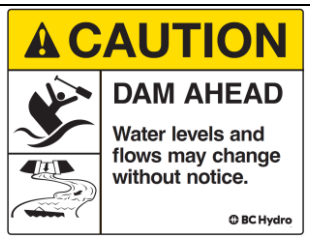
Sign	Purpose
 **CS-4593** 48” x 72”	Communications sign that delivers more specific information regarding reservoir filling.
 **CS-4162** 156" x 120"	To provide boaters warning of the dam ahead.

Map 15:

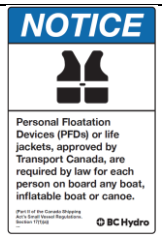
Sign	Purpose
 **CS-3448_2** 192"x96"	To provide warning of the diversion tunnel outlet if boaters are to boat past Memorial Bridge.
 **S20-132** 156” x 120”	To provide boaters coming up to the dam in the downstream component that they are not able to access the area.

 **CS-320** 4m x 3m	To advise boaters of the dam outflow.
 **CS-3464** 156” x 120”	Transport Canada regulatory requirement. Identifies shallow water hazards associated with submerged fish habitat structures.
 **CS-3464** 156” x 120”	To advise boaters of the dam approximately 2.5km downstream of the dam.

Map 15:

Sign	Purpose
 **CS-4583** 156" x 120"	To advise boaters of the dam approximately 6km downstream of the dam.
 **CS-4463** 156" x 120"	To advise boaters of the dam approximately 13km downstream of the dam.

 **CS-712** 72” x 48”	Notifying boaters at Peace Island Park of the hazards associated with the downstream component of Site C.
 **S20-072** 36” x 54”	Park information and safety guidelines for the public recreating at Peace Island Park.
 **CS-4593** 48” x 72”	Communications sign that delivers more specific information regarding reservoir filling.

 **CS-2853** 12”x18”	PFD notice.

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Appendix B
Boater Communications Protocol

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Site C Boater Communications Protocol

August 26, 2023

1.0 Introduction

The purpose of this boater communications protocol is to outline the ways in which BC Hydro will be communicating with stakeholders, the public and Indigenous Nations about navigational hazards and boater safety issues related to the Site C reservoir. The protocol describes methods of communications during:

- Initial operations, when boaters will be advised to stay off the reservoir due to hazardous conditions, and
- regular operations, once BC Hydro-controlled access and boat launches (at Halfway River, Lynx Creek and D.A. Thomas Recreation Area) have been opened.

This document has been prepared in accordance with Condition 38 of the Environmental Assessment Certificate which requires a "boater communications protocol including communication of navigational hazards during operations", as well as specific conditions set out in Canadian Navigable Waters Act Approval 2008-500822 (https://www.sitecproject.com/sites/default/files/Approval-2008-500822-9-1-Dam-Spillway-Cofferdams-Diversion-Tunnels-Generating-Station-and-RSEM-R5b_0.pdf) as described below.

2.0 Communications Content

BC Hydro will implement the boater communications protocol to provide information on topics such as:

- Boat launches: construction updates and openings
- Hazards:
  - Submerged hazards
  - Floating debris
  - Shoreline stability and monitoring
- Reservoir
  - Reservoir mapping and marking of hazards
  - Underwater contour maps
- Downstream discharges
- Reservoir water levels
  - Current reservoir levels
  - Notification of:
    - Drawdowns of the reservoir for planned maintenance, upgrades and unplanned repairs
    - Drawdowns ordered by the Comptroller of Water Rights
    - Emergency Surcharges (greater than reservoir elevation 462.10 m) that extend beyond 24 hours
    - Emergency drawdowns
- Hazards on land and water, bathymetry, submerged hazards, shoreline safety
- Fishing and methylmercury
- Boater Portage program

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3.0 Audiences

BC Hydro will implement the boater communication protocol to reach the following audiences:

Primary

- General public (specifically river users) in the Site C project area, including residents of:
  - City of Fort St. John
  - Peace River Regional District
    - Old Fort settlement area
  - District of Hudson's Hope (D.A. Thomas Road, Dudley Drive and Canyon Drive)
  - Local businesses/groups that use the river
    - North Peace Rod and Gun Club
    - Peace County River Rats
    - Chetwynd Outdoors Society
    - Wolverine Nordic and Mountain Society
    - Moose ATV Club
    - Northland Trail Blazers Snowmobile Club
    - Whiskey Jack Nordic Ski Club Society
    - BC Wildlife Federation

- Indigenous Nations
  - Blueberry River First Nations
  - Dene Tha' First Nations
  - Doig River First Nations
  - Duncan's First Nations
  - Fort Nelson First Nations
  - Halfway River First Nations
  - Horse Lake First Nations
  - Kelly Lake Metis
  - McLeod Lake Indian Band
  - Metis Nation
  - Prophet River First Nation
  - Saulteau First Nations
  - West Moberly First Nations

Secondary

- Media
- Governments and project stakeholders
  - Local governments (see list above)
  - Provincial government
    - Ministry of Forests
    - Ministry of Water, Land, and Resource Stewardship
    - Environmental Assessment Office
    - Ministry of Environment and Climate Change Strategy
    - Ministry of Energy, Mines and Low Carbon Innovation

- Federal government
  - Transport Canada
  - Impact Assessment Agency of Canada
- Regional MLAs

4.0 Communication Methods

1. **Develop advisory group composed of recreational water users.**
   The advisory group will be formed, seeking membership from Indigenous Nations, existing recreational groups, and interested members of the public through targeted engagement with the aforementioned groups. The advisory group will meet quarterly or on a different basis based on agreement with the group to share information and provide feedback to BC Hydro on issues of concern and the best ways of communicating with the boating community. One of the main objectives of the group will be to vet and add to this communications protocol.
   - Frequency: Quarterly meetings or on a different basis based on agreement with the group

2. **Maintain and regularly update sitecproject.com/boating**
   The webpage will be the main way of sharing information. BC Hydro will update the page when new information becomes available regarding:
   - reservoir access points (when permitted)
   - safety updates
   - slope stability monitoring results
   - fish methylmercury monitoring results
   - underwater bathymetry maps
   - reservoir levels

   - Frequency: When new information becomes available

3. **Social media posts**
   Operational information about boating and reservoir safety will be posted on social media, through the BC Hydro Facebook and Site C Twitter account as targeted posts, when new information becomes available regarding:
   - reservoir access points (when permitted)
   - safety updates
   - slope stability monitoring results
   - fish methylmercury monitoring results
   - underwater bathymetry maps
   - reservoir levels
   - Frequency: When new information becomes available

4. **Updates to local government and First Nations**
   Boating information will be shared with local government and First Nations through, the Peace Williston Advisory Committee and First Nations Environment Forums.

- Frequency: Standing item during meetings

5. **Email distribution list**
   Members of the public will be invited to sign up to an email distribution list to receive Site C boating information. The invitation will be sent out through the construction bulletin, social media, and BC Hydro's other regular avenues (liaison committees, website, Hudson's Hope Public Service Announcement, newspaper ads).

   - Frequency: Monthly during boating season, between the months of May – October.

6. **Posters, advisories, and printed material**
   Posters and public advisories will be posted in key locations in the community, including:
   - Places where fishing licenses can be purchased
     - Chinook Wind Outfitter, Chetwynd
     - District of Hudson's Hope
     - Ace Hardware, Tumbler Ridge
     - Corlane Sporting Goods, Dawson Creek
     - Mile Zero Esso, Dawson Creek
     - Canadian Tire, Fort St. John
     - Backcountry, Fort St. John
   - Tourism offices
   - Public libraries
   - WAC Bennet visitor's centre
   - Dinosaur Reservoir boat launch
   - Peace Island Park
   - New recreation sites (D.A. Thomas, Lynx Creek, Halfway River)

   - Frequency: Monthly during boating season, between the months of May – October.

7. **Signage**
   Updated signage will be posted in accordance with the public safety signage plan set out in the public safety management plan, as well as at the new boat launches, Peace Island Park, and the Dinosaur Reservoir boat launch.

   - Frequency: Annually in May, prior to boating season.

8. **Qualified Professional**

   This Boater Communication Protocol was developed by Jesse Johnston, BC Hydro Public Affairs.

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Appendix C
Boater Safety and Reservoir Shoreline Monitoring Plan

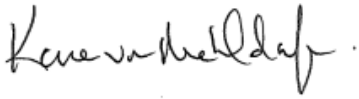
Boater Safety and Shoreline Monitoring Plan

Version:	4.1
Release Date:	October 3, 2024

Document Revision History

Version	Release Date	Author	Comments
1.0	2022-07-13	Dave Cattanach	Issued for review
2.0	2022-09-12	Dave Cattanach	Review comments incorporated
3.0	2023-12-15	Dave Cattanach	Update based on new reservoir filling date
4.0	2024-08-23	Dave Cattanach	Incorporated comments from EAO
4.1	2024-10-03	Dave Cattanach	Addressed additional comments from EAO

Signatures

Role	Title	Name	Signature
Author	Public Safety Specialist	Dave Cattanach	
Review	Project Manager, Fire Risk Management Safety and Compliance	Urvi Ramsoondar	
Review	Regulatory Manager	Karen von Muehldorfer	
Review	Security Manager	Jim Ellis	
Approve	Director, RESPC	Shanna Mason	
Approve	Director, Design Engineering	Andrew Watson	

Approve	Senior Field Manager, Peace East	David Mengering	
Accept	Director, Site C Construction Management	Chris Waite	

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1. INTRODUCTION

The Boater Safety and Shoreline Monitoring Plan (BSSMP) describes the measures BC Hydro will undertake to support boater safety at the Site C reservoir. The objective of the plan is to ensure the safety of the boating public by understanding the risks and implementing risk reduction control measures. These measures incorporate BC Hydro's comprehensive monitoring program that assesses the stability of the shoreline which has a direct impact on boater safety on the reservoir.

This plan assesses public safety risks associated with boating and other recreational activities in and around the Site C reservoir. Risk is assessed by examining potential public uses of the reservoir, hazards the public would or could be exposed to, potential consequences of encountering the hazards, and mitigations BC Hydro will implement to reduce public safety risk to acceptable levels.

The *Canadian Dam Association (CDA) Guidelines for Public Safety around Dams* (2011) [Ref 1] provides guidance to dam owners in Canada on the assessment and mitigation of risk to the public due to the construction, presence, and operation of hydroelectric and water storage dams. BC Hydro adopted these guidelines in 2011 and applies this methodology to all its hydroelectric facilities. The CDA is the only public safety legislation applicable to dams and powerhouses in Canada.

This plan applies the CDA guidelines by ensuring the following:

- all regulatory requirements are met,
- the anticipated public use of the reservoir and shoreline is understood,
- the hazards to the public are identified,
- the public safety risk is documented using the established CDA methodology,
- appropriate control measures are recommended, such that when they are implemented, the risk to the pubic is reduced to acceptable levels.

These procedures, although focused on the public, also apply to work activities on the reservoir and shoreline.

Additional technical engineering risk assessments will be used to address the specific hazards associated with reservoir shoreline stability.

This plan has been developed in accordance with Canadian Navigable Waters Act (CNWA) Approval 2008-500822 (Appendix A), which outlines the requirements for ensuring boater safety at the Site C reservoir.

2. SITE C DESCRIPTION AND RESERVOIR OPERATING LEVELS

The Site C Dam is a 61.5m high (from the riverbed) earthfill dam with a till core. The crest elevation is at El. 469.4m and the overall length is just over 1km. An approach channel on the right bank, supported by a roller compacted concrete buttress, will provide water to the power intakes and spillway. A dam safety boom will extend across the entrance to the approach channel to minimize the volume of debris entering the approach channel.

The Site C reservoir will be approximately 83km long. On average, it will be two to three times the width of the current river and will have a total surface area of approximately 9,330 hectares. The Site C reservoir will have minor fluctuations in water levels as it relies on the existing Williston reservoir for water storage.

The operating range of the Site C reservoir will be limited to between a normal Minimum Reservoir Level (Min NRL) of El. 460.0m and a normal Maximum Reservoir Level (Max NRL) of El. 461.8m. The reservoir will only be below the Min NRL in exceptional circumstances, such as an emergency drawdown of the reservoir.

The Dinosaur reservoir, which was first filled in 1980 and is 21km long, has never been operated below the Min NRL in its 41 years of operation. Similarly, the Revelstoke reservoir which was first filled in 1983 and is 81km long has never been operated below Min NRL in its 38 years of operation. Given BC Hydro's operating practices, it is extremely unlikely that the Site C reservoir will operate below the Min NRL.

Similarly, the Site C reservoir will only exceed the Max NRL in exceptional conditions, such as a severe flood that would exceed the spillway design flood of 11,000 m^3/s.

3. PUBLIC USE OF THE SITE C RESERVOIR

The minimal seasonal and daily fluctuations in operating levels is ideal for recreation, particularly boating, shoreline camping, and picnicking. BC Hydro has constructed three formal boat launches which will be associated with small recreational areas that feature picnic tables, pit toilets, and garbage bins. The boat launches will be located at Hudson's Hope, Lynx Creek, and Halfway River.

In addition to these formal boat launches, informal boat launches are likely to be developed by local user groups over time. For example, Revelstoke reservoir, which is also operated within a very narrow level, has good access with multiple informal boat ramps and camping along the east shoreline. However, unlike Revelstoke reservoir, there is a potential for a greater amount of shoreline erosion and landslides due to the local ground conditions at Site C.

Once the Site C reservoir is determined to be safe, it is expected to be used extensively by powered and non-powered boaters.

4. HAZARDS FOR BOATING ON THE SITE C RESERVOIR

Hazards to boaters are expected to increase during reservoir filling and will potentially last well into operations with a gradual reduction of hazards over time as the reservoir shoreline and slopes stabilize. This section outlines the hazards at the Site C reservoir. Details for the proposed mitigation to address these hazards are described in Section 6.

4.1 Floating Woody Debris

Floating woody debris is a concern on most reservoirs, particularly those that have a large annual operating range. Due to its narrow operating range, the Site C reservoir is expected to have a low volume of debris. This debris will largely be a result of flood events on the Halfway River. Prevailing winds are expected to push most of this floating woody debris toward the upstream face of the dam.

A significant volume of debris is anticipated during initial Reservoir Filling. This debris is the result of reservoir clearing that has been completed in accordance with the project's Vegetation Clearing and Debris Management Plan (VCDMP). [Ref 2] Most of this debris is likely to be removed after one year after reservoir filling as set out in the Debris Management Plan for Site C Reservoir Filling. [Ref 3] However, BC Hydro will undertake active debris management for five years of operations from the start of reservoir filling. Long term debris management will be dependent on the actual accumulation of debris, and debris management plans will be submitted to Transport Canada for review four years after reservoir filling." Due to the anticipated initial instability of the reservoir slopes, shoreline erosion and landslides could add to the volume of debris in the short term. Large, mobile landslides originating above the reservoir shoreline are also expected to continue occurring periodically over the long term and have the potential to contribute additional debris to the reservoir. The specific hazard of landslides is addressed in Section 4.4.

4.2 Strong Currents and Undertow

The Site C Dam power intakes and spillway are located along an approach channel on the south bank (right bank) of the Peace River. Strong currents and undertow in front of these spillway and penstock intakes would be very hazardous to boaters. To physically prevent boaters from entering this approach channel, a dual-purpose Debris Management/Dam Safety Boom has been positioned in the reservoir 400m upstream of the approach channel. The Dam Safety Boom has an overall length of 875m spanning between the right bank and the earthfill dam. This boom will be a permanent feature of the Site C Dam and operated as needed.

4.3 Submerged Objects

BC Hydro has established a safe boater elevation of El 455.0m, which is 5m below the Min NRL. Given BC Hydro's operating experience, hazards that are below the Min NRL pose no hazard to public safety and do not need to be removed. The types of recreational watercrafts, including houseboats, that are expected to operate on the reservoir have a minimal draft. Pleasure boats up to 10m in length need less than 1m of water. A commercial boat 20m long or greater needs 2.2m, well within BC Hydro's safe boater elevation.

The boater safety elevation is applicable to the entire reservoir and was used to determine if any constructed structures needed to be removed before Reservoir Filling. To meet fisheries' requirements, littoral habitat zones have been created within the reservoir. These zones are located near the shoreline at various locations within the reservoir and are designed to a height of elevation 458m. These zones will be identified on the reservoir map located at the formal boat launches, which will indicate hazardous and dangerous areas within the reservoir.

A series of sloping bedding planes downstream of Peace Canyon Dam, referred to as the "Fingers", are between El 459m and 459.5m. Given the shallow submergence of these rock features, warning buoys have been installed on the Fingers to advise boaters of this hazard.

A total of 6.6km of remnant sections of Highway 29 near Lynx Creek, Farrell Creek, Halfway River, and Bear Flats/Cache Creek will remain between elevation 455m and 460m. These sections are either at the same elevation as the surrounding terrain or will be blended into the natural banks.

Trees that would intercept the boater safety elevation have been removed except in locations where the valley slopes are so steep or unstable such that workers would be exposed to unsafe conditions. In addition, small diameter trees that have grown into the boater safety zone in some areas since the first year of clearing will be retained. These small diameter trees are flexible and are not anticipated to pose a risk to boater safety.

Bathymetric mapping of the reservoir showing shallow areas will be posted at the formal boat launches and available on BC Hydro's website site once the reservoir is deemed safety for public use.

4.4 Large Waves

Waves can pose a hazard to boaters on the Site C reservoir. These waves can be generated from both strong winds and landslides into the reservoir.

Similar to all lakes and reservoirs in British Columbia, strong winds can generate waves that can pose a hazard to the public in small watercrafts. The east-west orientation of Site C reservoir and its long "fetch" increase the susceptibility of the reservoir to large wind-generated waves. Studies undertaken by Klohn Crippen Berger and SNC Lavalin for BC Hydro have indicated that these waves could be in the order of 1-2m high, with wave runups to 4m [Ref 4].

The valley slopes of the Site C reservoir have been subject to historical and ongoing erosion, land sliding in both bedrock, and overburden. The creation of the Site C reservoir is expected to increase the potential for erosion and landslides around the reservoir shoreline.

All landslides have the potential to create waves that may be a hazard to boaters. Typically, smaller landslides will generate smaller waves, which in most cases will not pose a hazard to boaters. However, large landslides have the potential to generate waves with a height exceeding 10m which will impact boaters if they are exposed to these waves.

For both Dam Safety and Public Safety, BGC Engineering has conducted detailed geological and geotechnical investigations for BC Hydro to identify slopes which could present the greatest risk [Ref 5].

An extensive reservoir-wide shoreline monitoring and surveillance program has been developed to understand changes occurring around the reservoir slopes and shoreline during reservoir filling and operations, with near-real time monitoring present at selected slopes. See Section 6.3 for the proposed control measures to reduce public safety risk to boaters on the reservoir from land-slide generated waves.

4.5 Collision with Highway 29 Bridge Piers

Seven sections of Highway 29 were reconstructed at a higher elevation to facilitate impoundment of the Site C reservoir. As part of this relocation, the following five new bridges were constructed at:

- Cache Creek,
- Halfway River,
- Lynx Creek,
- Dry Creek,
- Farrell Creek.

The 1,042m-long Halfway River Bridge with 12 piers is the longest bridge. These piers have the potential to impede safe boater navigation in low visibility conditions such as darkness and fog. To mitigate hazards, the piers have been marked with high visibility

markers (e.g., W-054s) in accordance with conditions of the approvals issued by Transport Canada for the construction of the bridges.

5. HAZARDS FOR PUBLIC RECREATION ALONG THE RESERVOIR SHORELINE

Shoreline recreation such as picnicking, sunbathing, shoreline fishing, and swimming are anticipated at the formal boat launches and at the numerous informal sites along the reservoir shoreline.

The reservoir level will fluctuate within a narrow range, which makes it ideal for shoreline recreation.

As described in Section 4.4, wind and landslide-generated waves can pose potential hazards to shore-based recreational activities. Landslides also have the potential to create waves that will run-up onto the Site C shoreline. Studies have been conducted at sites with a history of large volume landslides and where potential shoreline flooding could be high such as where low bank slopes are located across from high bank slopes on the opposite bank.

The measures to be implemented to protect the public on the shore from flooding, landslides and landslide-generated waves are detailed in Section 6.

6. PROPOSED CONTROL MEASURES TO REDUCE PUBLIC SAFETY RISK

Control measures, in increasing level of complexity, will consist of the following:

- reducing or eliminating the hazards,
- dual-purpose public safety and debris booms,
- reducing or eliminating the likelihood of occurrence,
- public awareness,
- effective signage,
- Shoreline Monitoring Program (Section 6.6)
- identifying unauthorized access.

These control measures will be implemented at the Site C reservoir and are further discussed below.

6.1 Reducing or eliminating the hazard

As described above, the main public safety hazards on the reservoir include:

- exposure to floating debris and submerged objects,
- large reservoir waves caused by landslides entering the reservoir quickly, which have the potential to generate large waves,
- collision with man-made structures such as bridge piers.

The Vegetation Clearing and Debris Management Plan (VCDMP) Ref 2 is the primary control for reducing or eliminating floating debris hazards in the reservoir. To reduce the volume of floating debris that may end up in the reservoir three-quarters of the vegetation within the reservoir footprint has been cleared. Larger debris which could impact dam or boater safety will be removed, burned, bucked into short logs, chipped, or mulched.

There are many areas around the reservoir that are steep and unstable, making vegetation clearing too hazardous for workers. These trees remain and may eventually contribute to the total floating debris in the reservoir. Debris will also be deposited by the tributary streams and rivers. In addition, small diameter trees that have grown into the boater safety zone in some areas since the first year of clearing have been retained. These small diameter trees are flexible and are not anticipated to pose a risk to boater safety.

When BC Hydro becomes aware of significantly new area of debris, such as a flood on the Halfway River that brings new debris into the reservoir, BC Hydro will advise the public through the media, and have it removed. BC Hydro will undertake active debris management for five years of operations from the start of reservoir filling. Long term debris management will be dependent on the actual accumulation of debris, and debris management plans will be submitted to Transport Canada for review four years after reservoir filling."

Navigational hazards will also be indicated on the reservoir maps referred to Section 4.3.

6.2 Dual-purpose Public Safety and Debris Booms

The Debris Management Plan for Site C Reservoir Filling submitted in accordance with CNWA Approval 2008-500822-001 provides information on the debris management system for the Peace River. This plan will be made available to EAO on request. Site C debris control facilities will operate at the dam site. A permanent boom is located at the upstream end of the approach channel for the powerhouse and spillway. This permanent debris boom also acts as a safety boom to physically prevent entry into the approach channel.

6.3 Reducing or eliminating the likelihood of occurrence

This control measure will involve restricting public access to the reservoir, both in watercrafts and on the shoreline, until the reservoir is deemed safe by BC Hydro for public access and boating. Boat and shoreline access in the vicinity of the dam, both upstream and downstream, will be permanently restricted through booms or posted signs.

Reservoir access will initially be restricted by keeping the three new boat launches and picnic sites at Hudson's Hope (located at the D.A. Thomas Recreational Site), Lynx Creek, and Halfway River closed. Gates have been installed and locked at all three sites with

signage indicating the boat launches are closed. All informal access routes to the reservoir have been identified, gated, signed and locked. Locks are code controlled and the codes are available to authorized users, including emergency responders.

BC Hydro recognizes that members of the public may find alternate means of accessing the reservoir. Therefore, the risk to the public will remain during reservoir stabilization.

6.4 Public Awareness

BC Hydro has a comprehensive public safety awareness program for the Site C Project. Before Reservoir Filling, the focus of this awareness program will be directed to reservoir boater safety. BC Hydro will communicate that the reservoir will not be safe for boating and other recreational activities for a period of time, providing time for the reservoir shoreline to stabilize (and be assessed) and for BC Hydro to remove most of the floating debris.

In accordance with the requirement of CNWA Approval 2008-500822, BC Hydro will form and chair a reservoir marine group in the year the public boat launches open. The marine group will communicate with the local boating community the hazards and precautions that need to take place, to ensure the safety of those in the reservoir.

BC Hydro's website will be used to announce the status of the reservoir and shoreline for public boating and use as it changes over time and with the seasons.

6.5 Warning Buoys and Effective Signs

Large warning signs have been installed at both the east and west ends of Highway 29 between Hudson's Hope and Attachie to advise the public of significant safety hazards and risks on the reservoir, and that access to and in the reservoir is not permitted. Additional signs have been posted at the three boat launches and all informal access routes to the reservoir.

A series of 10 large warning buoys have been installed 2km upstream of the Site C dam and approach channel with signs on each shore informing the public of the hazards and to stay away.

Once the reservoir is deemed safe for public access, new signs will be installed at those locations advising the public of hazards they could be exposed to, and the safety measures they should take to ensure their own safety.

6.6 Shoreline Monitoring Program

BC Hydro has established a comprehensive program to assess and monitor the reservoir shoreline and slopes.

The shoreline monitoring program consists of multiple, complementary methods for monitoring slope stability and shoreline erosion. Some monitoring tools will be used on a regular, planned schedule for general surveillance. The frequency of monitoring may be increased, or additional methods added, depending on results from the ongoing baseline monitoring program.

Table 1 identifies BC Hydro's planned monitoring methods. Other methods such as use of satellite-based InSAR, unmanned aerial vehicle (UAV) based lidar, and helicopter or UAV-based photogrammetry may be used to support the planned monitoring methods. BC Hydro's Dam Safety Engineer will make this decision in collaboration with BC Hydro's engineering consultants.

6.7 Surveillance Response Plans

Surveillance Response Plans are designed such that monitoring results which differ from baseline conditions will invoke an increase of the frequency of monitoring and increased communication between BC Hydro and the public, stakeholders and Indigenous Nations. Details regarding surveillance (compliance and effectiveness monitoring) are set out in the Local Operating Order (LOO) for Public Safety during Initial Operations. Local Operating Orders are internal BC Hydro documents that set out specific requirements for each generating station.

Table. Monitoring Methods.

Monitoring Method	Description and Frequency
Visual surveillance - ground inspections	Ground inspections of key slopes will be carried out twice a year. Results from ground inspections will be reported to the Dam Safety engineer who will determine if additional inspections are required based on changes relative to baseline conditions.
Aerial safety survey of the reservoir	An annual aerial survey of the reservoir will be conducted before the start of boating season. Any new hazards to boaters will be reported to Transport Canada and action taken by BC Hydro to mitigate the risk to boaters.
Visual surveillance - aerial inspection	Aerial inspections of the entire reservoir will be carried out annually. Results will be reported to the Dam Safety engineer who will determine if additional inspections are required based on changes relative to baseline conditions
Airborne LIDAR change detection	Airborne LIDAR can be used to detect, measure and map topographic change and shoreline erosion on the reservoir slopes. Airborne LIDAR change detection can detect movement on the order of 20 to 30 cm. Surveys planned to take place every two years until at least five years after Reservoir Filling.
Terrestrial LIDAR change detection	Terrestrial LIDAR can be used to detect, measure and map topographic change and shoreline erosion at a site-specific scale. Terrestrial LIDAR change detection can detect movement on the order of 10 to 20 cm. The plan is to survey specific slopes twice a year.
Slope inclinometer readings	On higher risk slopes that are monitored by slope inclinometers, manual readings will take place twice every year. Results will be reported to the Dam Safety engineer who will determine if additional manual readings are required based on changes relative to baseline conditions . Inclinometers monitored with automated data acquisition systems (ADAS) will have near real-time processing.
Piezometer readings	On higher risk slopes that are monitored by piezometers, manual readings or data downloads will take place twice every year. Results will be reported to the Dam Safety engineer who will determine if additional manual readings or data downloads are required based on

Monitoring Method	Description and Frequency
	changes to relative to baseline conditions. Piezometers monitored with ADAS will have near real-time processing.
Global navigation satellite system (GNSS) rovers	GNSS will be installed on selected slopes to measure 3D point displacements. They will operate constantly with near real-time processing. Data will be reviewed monthly unless trigger alerts are received.

BC Hydro will interpret the data from all the shoreline monitoring methods described below to assess the stability of the shoreline and provide guidance on the public use of the reservoir. If a developing situation is occurring where the public could be at risk, action will take place to reduce that risk.

6.8 Identifying Unauthorized Public Access

Recognizing that members of the public may access the reservoir during the stabilization period despite notification of hazards, BC Hydro has installed mobile electronic surveillance trailers at the boat launches and other strategic locations to identify unauthorized access and to warn the public to vacate the area.

7. PROVIDING PUBLIC ACCESS TO BOAT LAUNCHES

Providing public access through the BC Hydro boat launches will follow *Canadian Dam Association Public Safety Guidelines* and will receive a comprehensive risk assessment including an analysis of Shoreline Monitoring data, which is compliant with the regulatory requirements noted in Section 8 and discussion with Transport Canada.

8. WORKER QUALIFICATIONS AND TRAINING

Worker qualifications and training related to the Boater Safety and Shoreline Monitoring Plan will be in accordance with Section 5 of the Worker Safety and Health Management Plan (WSHMP). The WSHMP forms Appendix D of the overall OSMP. Section 5 outlines roles and responsibilities of workers, including training requirements.

9. REGULATORY REQUIREMENTS

BC Hydro is committed to meeting or exceeding the requirements of Transport Canada for boater safety in the reservoir. Surveys and reports identified below will be provided to the Environmental Assessment Office on request. The following are the requirements per CNWA Approval 2008-500822:

- Maintain an active debris management system for the first 5 years.
- Cut or remove submerged timbers that are potential hazards to navigation. Timbers to be cut to El. 455m unless otherwise approved by Transport Canada.

- Submit a draft Boater Safety and Shoreline Monitoring Plan 90 days prior to the filling of the reservoir for Transport Canada review. Submit a final plan 30 days prior to reservoir filling for Transport Canada approval.
- Conduct a safety survey of the reservoir post filling and prior to May 30th of the first year after reservoir filling and report the findings to Transport Canada. This information will be used to determine when full access for the public to use the reservoir will be granted.
- Conduct an annual safety survey of the reservoir before each boating season and report any potential navigation safety concerns to Transport Canada.
- Conduct a bottom survey of the Halfway River embayment to determine sediment deposition rates, bank to bank 1.5km upstream of the new bridge to the confluence at 10- and 15-year increments.
- Conduct an airborne LIDAR survey of the reservoir area post construction and clearing, but before Reservoir Filling.
- Produce and make publicly available a map or series of maps of the reservoir at a scale that is usable to vessel operators. Bathymetry contours shall be delineated. The shoreline will be El 461.8 m and datum for depth shall be the 460.0m. Navigational hazards shall be marked on the maps.
- Boater information signs shall be placed at the Halfway River, Lynx Creek and Hudson Hope boat launches.
- Establish and chair a reservoir marine group in the year that the public boat launches open. Hold a minimum of one meeting every year after that.
- Ensure that the public and emergency services can access a docking or landing facility at the dam site for emergency use. Signs at this facility shall have emergency contact information. First Responders are provided with the codes to all locked access routes to the reservoir.
- Construct three replacement boat launches before Reservoir Filling near Halfway River, at Lynx Creek and at Hudson's Hope.

These regulatory compliance tasks have either been completed prior to reservoir filling or will be implemented prior to the reservoir being deemed safe for public use.

10. REPORTING

Reporting will be completed in accordance with the requirements of Canadian Navigable Waters Act Approval 2008-50082. BC Hydro will:

- Conduct a safety survey of the reservoir post filling and prior to May 30th of the first year after reservoir filling and report the findings to Transport Canada. This information will be used to determine when the full access for the public to the reservoir is granted.
- Conduct an annual safety survey of the reservoir prior to the boating season and report any potential navigation safety concerns to Transport Canada.
- Conduct a safety inspection at any time for all or a portion of the reservoir and report the findings to Transport Canada upon request.

Reports will be made available on the Environmental Assessment Office on request.

11. PLAN REVIEW AND UPDATES

The Boater Safety and Shoreline Monitoring Plan will be reviewed for potential updates when the reservoir has been opened to the public for use and again after the first five years of operations.

12. QUALIFIED PROFESSIONALS

This plan was prepared by David Cattanach, Senior Public Safety Advisor.

13. REFERENCES

1. Canadian Dam Association (CDA) Guidelines for Public Safety Around Dams (2011)
2. Vegetation Clearing and Debris Management Plan, BC Hydro, Site C Clean Energy Project, Revision 3, July 15, 2019. https://www.sitecproject.com/sites/default/files/vegetation-clearing-and-debris-management.pdf
3. Debris Management Plan for Site C Reservoir Filling, BC Hydro, Site C Clean Energy Project, DRAFT, October 2021
4. Site C Reservoir – Flood Impact line Memorandum, Klohn Crippen Berger and SNC Lavalin, November 2012
5. Preliminary Reservoir Impact Lines [Report], BGC Engineering Inc., November 2012

APPENDIX A

Canadian Navigable Waters Act Approval 2008-500822

Available online:

https://www.sitecproject.com/sites/default/files/Approval-2008-500822-9-1-Dam-Spillway-Cofferdams-Diversion-Tunnels-Generating-Station-and-RSEM-R5b_0.pdf

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Appendix D
Worker Safety and Health Management Plan

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Site C Operations Worker Safety & Health Management Plan

Document Version:	2.1
Release Date:	October 3, 2024

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Document Revision History

Version	Release Date	Comments
0.0	January 13, 2023	First Draft – issued to BCH stakeholders
1.0	August 1, 2023	Submitted to regulators, agencies, Indigenous Nations for review
2.0	September 9, 2024	Updated in response to EAO comments.
2.1	October 3, 2024	Updated in response to EAO comment.

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1. INTRODUCTION

BC Hydro is committed to operating the Site C facility in a manner that protects worker and public safety and health. As part of the overall Operations Safety Management Plan, the objective of the Worker Safety and Health Management Plan (WSHMP) is to describe BC Hydro's safety management system processes and requirements for working in and around the Site C Generating Station (STC) and Dam. The plan seeks to create and maintain a workplace that minimizes risks and hazards, ensuring the safety and well-being of all employees and contractors. The plan has been developed in accordance with applicable provincial legislation, BC Hydro's safety policies, and with Condition 73 of the Project's Environmental Assessment Certificate. In particular, the plan describes:

- Legislative framework and BC Hydro policies
- BC Hydro safety governance
- Site C safety hazards and risk management
- Worker qualifications and training requirements
- Compliance and effectiveness monitoring
- Reporting requirements, and
- Process for revising and updating the plan

This plan is a summary of safety processes and requirements set out in other BC Hydro documents. This plan does not replace any safety plans or task specific requirements established through other BC Hydro safety practices or guidelines.

2. SCOPE OF PLAN

The Site C Generating Station and dam is the third hydroelectric facility on the Peace River, located downstream of BC Hydro's existing generating facilities at G.M. Shrum (GMS) and Peace Canyon (PCN) and the respective Williston Lake and Dinosaur Lake reservoirs. The scope of the WSHMP includes work tasks performed on the following Site C facility components:

- 500-kilovolt (kV) switchyard
- six-unit generating station (1,100 MW capability)
- dam, reservoir
- power intakes, penstocks, spillway
- associated structures and grounds/roadways

Figure 2.1 below shows the general arrangement of the earth fill dam and concrete structures. The WSHMP describes safety management processes and requirements related to work tasks in and around these structures. These tasks include, but are not limited to:

- Work planning and scheduling for executing maintenance and manual equipment operations
- Equipment switching, isolation, grounding and manual equipment operations
- Equipment inspection, cleaning, testing, measurements, repairs, calibration, fluid and filter changes, and troubleshooting
- Trades staff support for capital projects implementation

- Spillway field operations and water conveyance
- Safety inspections, emergency, and off-hours equipment trouble response

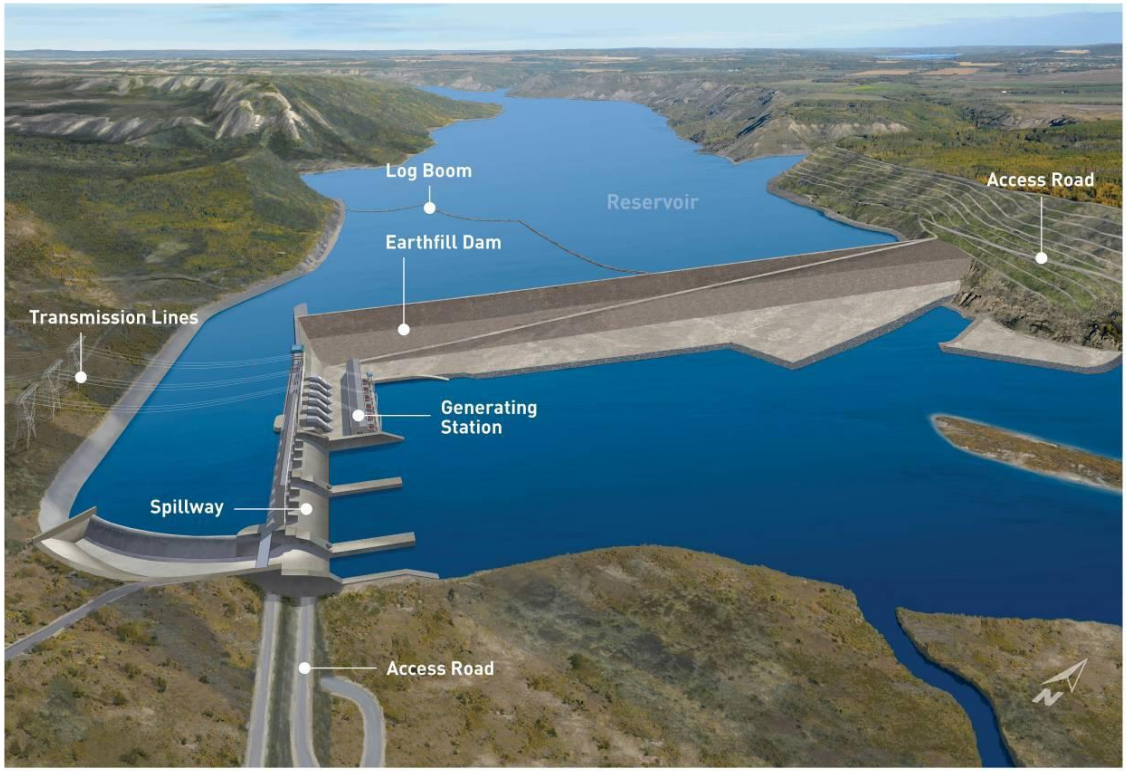

Figure 2.1 General Arrangement of Earthfill Dam and Concrete Structures

3. LEGISLATIVE FRAMEWORK

British Columbia's Workers Compensation Act (WCA)[1] is the predominant legislation that establishes responsibilities for employers to identify and manage occupational health and safety risks.

WorkSafeBC is the British Columbia provincial regulator for occupational health and safety. WorkSafeBC establishes the legal expectations for managing and controlling occupational health and safety risks through the Occupational Health and Safety Regulation (OHSR).

OHSR Section 19.16 is of critical importance to BC Hydro, as it sets out the requirements for work on high voltage electrical equipment.[2] This regulation requires high voltage equipment to be completely isolated, grounded, and locked out before any work can be done on that equipment. Section 19.16 also allows, however, work on energized equipment under certain circumstances if written safe work procedures acceptable to WorkSafeBC are followed.

[1] The WCA is available at: Table of Contents - Workers Compensation Act (gov.bc.ca)
[2] OHSR Section 19 regarding electrical equipment is available at: WorkSafeBC

BC Hydro requires the ability to perform work on energized, de-energized, and isolated equipment. BC Hydro's Safety Practice Regulations (SPR) provide direction on the safe performance of energized work. WorkSafeBC have recognized BC Hydro's SPR as acceptable procedures. Any worker trained and authorized to work on the Power System is required to comply with the appropriate safety protection protocol defined in BC Hydro's SPR.[3]

BC Hydro is subject to both the British Columbia WCA and OHSR and is committed to meeting or exceeding the requirements of this legislation.

As it pertains to occupational health and safety, BC Hydro is also subject to, but not limited to the following legislation:

- British Columbia Hydro and Power Authority Act
- Wildfire Act
- Transportation of Dangerous Goods Act and Transportation of Dangerous Goods Regulations
- Waste Management Act
- Safety Standards Act, in respect of electrical equipment
- Canadian Aviation Regulations
- Criminal Code
- BC Fire Code

4. BC HYDRO SAFETY FRAMEWORK

BC Hydro's Safety Framework is the foundation for safety and health in BC Hydro workplaces. It guides the development of our safety processes and programs and the execution of our work in a consistent, disciplined, and structured way to support improved safety outcomes and BC Hydro's vision.

The Safety framework has adopted five elements that are aligned with Canadian Standards Association (CSA) Z45001:19, the nationally recognized standard for occupational health and safety management systems. It is also benchmarked against the requirements of the British Columbia Workers Compensation Act and WorkSafeBC's Occupational Health and Safety Regulation.

Table 4.1 describes the five elements that comprise BC Hydro's Safety Framework: lead, plan, support, integrate & operate, and assure and improve.

BC Hydro's Safety Framework applies to occupational health and safety management across all aspects of BC Hydro's operation, including:

- All routine and non-routine activities of all individuals with access to the workplace
- All facilities and equipment at all workplaces owned and operated by BC Hydro
- BC Hydro activities at customer sites or third-party premises where BC Hydro workers perform work for BC Hydro
- Design, testing, production, assembly, construction, service delivery, and maintenance of equipment and assets

[3] BC Hydro's Safety Practice Regulations are available online at: 2020 Safety Practice Regulations (Updated April 2023) (bchydro.com)

Implementation of BC Hydro's framework is carried out by all BC Hydro employees, contractors, and partners is described below.

Table 4.1 BC Hydro Safety Framework

ELEMENT	THIS IS HOW (SOME EXAMPLES)	
1 : LEAD Demonstrate leadership and commitment, establish policy, governance, roles and responsibilities	○ Our mission: To safely provide reliable, affordable, clean electricity throughout B.C. ○ Our value: We are safe ○ Code of Conduct (Safety section) ○ Safety calls	○ Safety Governance Manual ○ General Safety Responsibilities ○ Safety Stop ○ Courage to Intervene and Just Culture
2 : PLAN Identify compliance and conformance requirements, evaluate safety risks and opportunities, set objectives, and establish plans	○ WorkSafeBC Regulations ○ Safety Practice Regulations ○ Goal of zero fatalities and permanent disabling injuries	○ Hazard identification and risk assessments ○ BC Hydro Annual Safety Plan ○ Business groups' Annual Safety Requirements Plan
3 : SUPPORT Establish programs, provide resources, ensure competency, ensure awareness, involve and communicate with workers and stakeholders	○ Safety Programs (e.g., Arc Flash, Asbestos, Confined Space) ○ OSH Specialists, Safety Advocates, Trades Training Instructors ○ New employee safety orientation ○ Site safety orientation and local component	○ Trades and safety training ○ Life Saving Rules competency assessments ○ Joint Health and Safety Committees, Technical Working Groups, local safety meetings ○ Monthly Safety Package
4: INTEGRATE & OPERATE Eliminate hazards, implement controls, manage changes, procurement, contractors and emergencies	○ Safety by Design ○ Job planning and tailboards ○ Hazard Barrier Reference Sheet ○ Safety Protection Guarantees ○ Work procedures	○ Personal protective equipment ○ Site safety coordination ○ Contractor Safety Program ○ Emergency plans and procedures
5: ASSURE & IMPROVE Monitor compliance and conformance, conduct audits, manage and learn from incidents, evaluate performance and effectiveness, conduct management review and continually improve	○ Safe Work Observations ○ Workplace inspections ○ Safety audits ○ Senior Safety Leadership Team meetings	○ Injury, near miss and good catch reporting, investigations and corrective actions ○ Safety pulse check reports

5. BC HYDRO ROLES AND RESPONSIBILITIES

BC Hydro places 'Safety Above All', meaning that safety is an overarching, organization-wide, core value at BC Hydro. Consistent with the organization's Code of Conduct policy, the intended outcomes of BC Hydro's Occupational Health and Safety (OH&S) Management system include:

- Continual improvement of OH&S performance
- Fulfilment of legal requirements and other requirements
- Achievement of OH&S objectives

Ultimate responsibility for safety at BC Hydro resides with the President and CEO. The Senior Vice President Safety & Chief Compliance Officer is responsible for the development and implementation of the Occupational Health and Safety Management System. The Director of Safety and the Safety Department support this system.

Each specific work location is responsible for implementing and complying with the directions outlined in BC Hydro's Occupational Health and Safety Management System. Overarching responsibility for the operations and maintenance of the Site C facility is directed by the Stations Field Operations (SFO), North Interior Stations Regional Manager located in Fort St. John. The SFO mandate is for the safe and efficient maintenance and operation of its stations assets to ensure reliability and maximize overall asset value.

Locally the site staffing is comprised of tradespersons (red seal ticketed) and technologist employees with Senior Field Manager, Field Managers, Engineers, Planner/Schedulers and administrative support for the trades and work management. Subsidiary support for the safety, health and skills development of the local staff are provided by an Occupational Safety and Health Specialist (OSHS), Safety Advocates and Trades Training Instructors.

Table 5.1 describes the key roles and safety responsibilities of BC Hydro employees, contractors and partners.

Table 5.1 BC Hydro Key Roles and Safety Responsibilities

ROLE DEFINITIONS	KEY SAFETY RESPONSIBILITIES	WHO (NOT EXHAUSTIVE)
Worker—everyone is a worker, regardless of their title or work environment.	Complete training and follow safety rules and procedures. Act safely in the workplace. Report unsafe conditions and refuse to carry out unsafe work.	Everyone from a Power Line Technician to our CEO; includes contractors
Supervisor—anyone who instructs, directs and controls workers or who has the most knowledge of a task.	Ensure the safety of all workers under your direct supervision. Know the applicable safety regulations and rules and make sure those requirements are met.	Manager, Trainer, Foreperson, Subforeperson, Crew Lead
Workforce Manager—anyone who has a direct reporting relationship with supervisors, workers, managers or team leads.	Ensure the safety of all workers on BC Hydro worksites. Ensure compliance with the Workers Compensation Act and applicable safety regulations.	Team Lead, Field Manager, General Manager, Project Manager, Construction Manager, people in management role
Contract Owner—anyone who hires another party to do work on behalf of BC Hydro.	Communicate and manage the safety risks associated with contract work. Ensure a Prime Contractor is assigned for any multiple employer workplace.	Project Manager, Construction Manager, or other Manager

Delivery Partner—anyone who identifies and packages work and allocates work packages.	Disclose to Contract Owners and Workforce Managers known information about hazards and safety risks associated with work.	Project Manager, Program Manager, Distribution Designer, Scheduler, Planner, Engineer, Engineering Lead
Asset Manager—anyone who is responsible for an asset that is part of our power system, used as a workplace or is used by a worker.	Provide and maintain assets in a manner that ensures the safety of people at or near the workplace. Disclose to employers or Prime Contractors known information about hazards and safety risks in or around the assets, sites and facilities.	Asset Manager, Properties Manager, Fleet Asset Manager, Front Line Manager (for tools)
Executive Team—anyone who is part of the executive team.	Set safety direction and ensure BC Hydro complies with all applicable acts and regulations related to safety.	President and CEO, Vice Presidents, other members of executive team

6. SAFETY PROGRAMS

BC Hydro has developed comprehensive safety programs and exposure control plans to manage the safety risks associated with specific hazards or types of work, such as work in confined spaces. Each program clearly states what must be done and who is responsible. These programs include but are not limited to:

- Arc Flash
- Asbestos
- Confined Space
- Ergonomics
- Fire safety
- First Aid
- Safety Clothing
- Personal Protective Equipment
- Power System Safety Protection
- Lead
- Silica
- Welding

These programs are described in the internal OH&S system which compiles information based on themes such as hazards, work type, job planning, PPE, Tools and Equipment, Rescue/Emergency and Incidents, Rules, Standards and Variances, Safety Management and Transportation, Aviation and Cranes. Safety programs and exposure control plans in this system will be made available to the Environmental Assessment Office on request.

7. ANNUAL SAFETY REQUIREMENTS PLAN

During operations, Site C Management and workers will be required to develop an Annual Safety Requirements Plan that assesses site-specific safety hazards or types of work, their associated risks and identifies the programs and control measures to be implemented.

The plan details specific activities such as risk assessments, inspections, document development / reviews, training, emergency response and safety equipment maintenance. BC Hydro may also direct corporate initiatives that are to be included in the local plan. The plan will prioritize all activities and will be developed and regularly monitored by the local Joint Health and Safety Committee, management, and workers.

During the year site specific procedures will be developed to provide workers the information they need to perform a specific job or task. These procedures list the required qualifications, training, tools and equipment, and provide step-by-step instructions for doing the work safely.

The Senior Field Manager is responsible for the development and adherence to the Annual Safety Requirements Plan. Each worker must understand and follow the rules and instructions that apply to their job and worksite covered by this plan.

Annual Safety Requirements Plans will be made available to the Environmental Assessment Office on request.

8. COMPLIANCE AND EFFECTIVENESS MONITORING

BC Hydro's safety efforts are supported through ongoing compliance, effectiveness monitoring and communications programs. These include:

- Safety Audits - provide senior management feedback on compliance, effectiveness monitoring and conformance status, improved understanding of safety requirements, and opportunities to improve safety performance.
- Safety calls - quarterly conference calls with the executive team to discuss safety-related questions, on-the-job safety and key safety updates.
- Safety learnings - A central resource of learnings from incidents (including near misses and good catches) and other events to prevent an identified issue from re-occurring.
- Safety reports - These self-serve year to date, monthly, weekly and daily reports provide overall results of safety incidents, safe work observations, corrective action completion and trends.
- Safety moments - This is a central resource of safety moment presentations developed by Safety, for use by anyone at BC Hydro to present to their team
- Safe Work Observations (SWO) are an opportunity for discussion and constructive feedback about safety responsibilities and safe work practices, behaviours, and conditions.
- Joint Health and Safety Committees (JHSC) is made up of workers and employers representatives working together. The JHSCs are intended for everyone at BC Hydro to raise health and safety concerns, and the employer to implement an effective system to address these issues, fostering a safe and healthy work environment.

All of the above noted compliance and reporting documents are reviewed and addressed through the JHSCs, Business Unit dashboards and incorporated (are tracked) in the local safety plans.

The above documents are confidential internal documents and will be made available to the Environmental Assessment Office on request for information purposes.

9. REPORTING

BC Hydro publishes annual reports that describe safety on a company-wide, rather than facility specific, basis. These reports are as follows:

- **Annual Service Plan Report:** BC Hydro publishes an annual Service Plan for the BC Legislature under the *Budget Transparency and Accountability* Act, which outlines our mission, goals, strategies and performance measures each year. One of the plan's performance measures focuses on safety, including a strategy of "empowering workers to share their knowledge and capably execute their work to improve how we learn from our safety performance and focus on preventing fatalities and permanently disabling injuries." Annual Service Plans are available on BC Hydro's website (here).

  BC Hydro's Annual Service Plan Report describes the results of our performance related to the forecasted targets stated in the service plan for the report year. The report includes an assessment of how BC Hydro delivered work safely, including information compiled from all operating facilities. Annual Service Plan Reports are available on BC Hydro's website (here).

- Environmental, Social and Governance Progress Report (ESG). BC Hydro produces an annual ESG Report which includes key metrics related to safety performance for all of our facilities combined. ESG reports are available here.

10. PLAN UPDATES

This Worker Safety and Health Management Plan will be reviewed for potential updates after the first five years of operations, and every five years thereafter. Documents referenced in this report are updated on an ongoing basis based on effectiveness monitoring as outlined in Section 8.0.

11. QUALIFIED PROFESSIONAL(S)

This plan has been prepared by Kim Symington, BC Hydro Occupational Safety and Health Specialist.