BC Hydro
Power smart

Fisheries and Aquatic Habitat Management Plan Annual Report: Jan 1, 2019 to Dec 31, 2019

Site C Clean Energy Project

March 31, 2020

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1.0 Introduction

1.1 Background

The Fisheries and Aquatic Habitat Management Plan (FAHMP, or the Plan) describes the measures that will be used to mitigate the adverse effects of the Site C Clean Energy Project (the Project) on fish and fish habitat during the construction and operation of the Project. The Plan has been developed in accordance with the conditions of the Project's provincial Environmental Assessment Certificate (EAC #E14-02, or the EAC), including the EAC's Schedule B, and Federal Decision Statement issued for the Project, dated October 14, 2014 and reissued November 25, 2014 (the FDS). FDS conditions 8.3 to 8.7 refer to "a fish and fish habitat management plan", while EAC condition 4 refers to "a Fisheries and Aquatic Habitat Management Plan". Each refers to similar requirements for fish and fish habitat. For simplicity, BC Hydro developed one plan, entitled "Fisheries and Aquatic Habitat Management Plan" (FAHMP, or the Plan) that satisfies the conditions of both the EAC and the FDS. Revision 1 of the FAHMP was submitted on June 1, 2015, and is available on the Project's website[1].

As described in the FAHMP Section 7 and per the reporting requirement in condition 8.7 of the FDS – Implementation and Reporting, BC Hydro will provide annual reports on the implementation of the Plan to the Canadian Environmental Assessment Agency, now named the Impact Assessment Agency of Canada (the Agency). Condition 8.7 states:

> The Proponent shall implement the plan and provide to the Agency an analysis and summary of the implementation of the plan, as well as any amendments made to the plan in response to the results, on an annual basis during construction and for the first ten years of operation and once every five years for the next 20 years.

This report is submitted to satisfy Condition 8.7. BC Hydro previously submitted to the Agency annual reports for earlier reporting periods of Project construction. The reporting period for this report covers January 1, 2019 through December 31, 2019.

This report is part of a broader set of information that BC Hydro reports to the Agency, per the FDS, on the Project's construction and environmental management. For example, BC Hydro provides to the Agency 'Monthly Environmental Monitoring Summary Reports' (the Monthly Reports) as follows:

> "Under Section 2.1 of the Construction Environmental Management Plan (CEMP), BC Hydro must submit monthly reports on construction and environmental monitoring activities for the Site C Clean Energy Project to the Independent Environmental Monitor (IEM), the BC Environmental Assessment Office (BCEAO), and the Canadian Environmental Assessment Agency (CEA Agency). The reports must summarize:
>
> - Weekly information provided by contractor Environmental Monitors to BC Hydro;
> - Results of BC Hydro field inspections;
> - Environmental incidents and applicable corrective actions; and
> - Compliance of construction activities with the Environmental Requirements for the Project."

[1] Available at: https://www.sitec project.com/document-library/environmental-management-plans-and-reports

The Monthly Reports include information on many aspects of the Project's construction and environmental management. This report is specific to the implementation of mitigation measures for fisheries and aquatic habitat that are required under FDS conditions 8.3 to 8.7.

1.2 Status of Project Construction

Construction activities during the reporting period included components described in the Project's Environmental Impact Statement (Volume 1 Section 4 Project Description, sub-section 4.4 Construction).

Construction began at the Site C Project on July 27, 2015 and has been ongoing since. River diversion is scheduled to commence in fall of 2020 with reservoir filling and operations beginning in 2023.

In 2019, substantive progress was made across the project. On the dam site, the main civil works contractor continued:

- excavation on the south bank,
- work on the spillway's roller-compacted concrete buttress,
- construction on the temporary fish passage facility
- construction for river diversion, specifically:
    - diversion tunnel excavation,
    - diversion tunnel lining process, and
    - construction of the inlet and outlet gate structures.

The generating station and spillways civil work contractor continued the placement of concrete in the powerhouse and started the assembly and installation of the penstocks and intakes.

Clearing of the future reservoir area continued on the north and south banks of the Peace River. Clearing has been completed up to the middle reservoir area, east of Halfway River. Merchantable timber is being hauled to local mills, while non-merchantable timber is being disposed of or removed from site.

The installation of debris management structures, specifically a debris pile structure, commenced on the Moberly River in late 2019.

Clearing and construction activities continued on the transmission line in 2019. 500 kV steel lattice towers were assembled and installed along the transmission line and transmission line stringing is underway. The upgrade to the Peace Canyon substation was completed in July 2019, making it the first official Site C asset in service. Construction continued on the Site C substation which is now substantially complete.

Construction commenced on segments of the Highway 29 realignment, including Cache Creek West, Halfway River and Lynx Creek.

Additional information on construction progress has been submitted to the Agency previously as part of BC Hydro's Monthly Reports. The Project's website[2] also provides information and regular updates on construction activities.

[2] Information on construction activities available at the: https://www.sitecproject.com/construction-activities/construction-bulletins

Construction of mitigation measures for fish and fish habitat continued in 2019. Construction of the fish habitat enhancement sites in side channels on the south bank of the Peace River downstream of the dam continued (described in Section 3.5 of this report) and contouring a mainstream bar at Site 108R (described in Section 3.4 of this report). Habitat enhancement at this site is described in the FAHMP Section 6.2.1.1, Peace River Channel Contouring and Side Channel Enhancement. Construction of the temporary upstream fish passage facility continued through 2019 (section 3.8 of this report). The construction and operation of the upstream fish passage facilities is described in the FAHMP Section 6.2.2.2, Upstream Fish Passage.

1.3 Summary

Per FDS Condition 8.7, this report documents the measures to mitigate the adverse effects of the Project on fish and fish habitat during the reporting period (Tables 1 and 2). Standard mitigation measures and Project-specific mitigation measures were implemented to mitigate potential effects on fish and fish habitat in accordance with the implementation schedules in the FAHMP. BC Hydro audits compliance with these requirements by reviewing contractor Environmental Protection Plans (EPPs) and conducting audits and inspections during construction to verify implementation of the mitigation measures outlined in EPPs. The effective implementation of these measures was documented during most inspections. Corrective actions, where required, were identified and implemented.

Annual reporting will continue to document the implementation of the FAHMP. In addition, monitoring of physical habitat, lower trophic levels, fish abundance, and community composition under the Fisheries and Aquatic Habitat Monitoring and Follow-up Program (FAHMFP) will provide information to evaluate the effectiveness of these measures to mitigate potential effects on fish and fish habitat over the longer term.

2.0 Fisheries and Aquatic Habitat Management Plan

The objective of this report (the Report) is to describe the mitigation measures implemented during this period to meet the reporting requirements of FDS condition 8.7. The Report follows the information in Section 7.0 Implementation and Reporting of the FAHMP.

Tables 1 and 2 outline the structure of the Report. These tables list the Conditions (and components of the Conditions), as well as the corresponding sections of the FAHMP that pertain to the Conditions. These tables also list whether components within the Conditions occurred or were implemented during the reporting period, and if so, the corresponding section in the Report that summarizes the implementation. Section 7 of the Report is an analysis of implementation of the Plan.

Table 1. Environmental Assessment Certificate Conditions and Relevant Plan Sections**.**

EAC Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
FISH AND FISH HABITAT				
4	The EAC Holder must manage harmful Project effects on fish and fish habitats during the construction and operation phases by implementing mitigation measures detailed in a Fisheries and Aquatic Habitat Management Plan.	Described in rows below.	Described in rows below	Not Applicable
	The Fisheries and Aquatic Habitat Management Plan must be developed by a QEP	No. Occurred prior to the reporting period.	Not Applicable	This condition is addressed in FAHMP Section 8.0 Qualified Professionals
	The Fisheries and Aquatic Habitat Management Plan must include at least the following:	Described in rows below.	Described in rows below	Described in rows below

EAC Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
	• Remove temporary structures as soon as they are no longer required.	Yes	Section 3.1	These conditions are addressed in Construction Environmental Management Plan (CEMP) Section 4.5, Fisheries and Aquatic Habitat Management.
	• Maintain a 15 m machine free zone adjacent to watercourses during reservoir clearing (as measured from the Ordinary High Water Mark).	Yes	Section 3.2	
	• Place material relocation sites (R5a, R5b, and R6) 15 m back from the mainstem to avoid affecting Peace River fish habitat.	Yes	Section 3.3	
	• Contour mainstream bars to reduce potential for fish stranding, as advised by FLNR.	Yes	Section 3.4	This condition is addressed in FAHMP Section 6.2.1.1, Peace River Channel Contouring and Side Channel Enhancement.
	• Incorporate fish habitat features into the final capping of material relocation sites upstream of the dam.	No, planned for implementation during subsequent stage of construction.	Not Applicable	This condition is addressed in FAHMP Section 6.2.3.4, Dam Site Material Relocation Site Enhancement.

EAC Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
	• Contour and cap with gravels and cobble substrate the spoil area between elevations 455 m and 461 m to provide a productive fish habitat that will be available to fish during the operation phase.	No, planned for implementation during subsequent stage of construction.	Not Applicable	This condition is addressed in FAHMP Section 6.2.3.4, Dam Site Material Relocation Site Enhancement.
	• Include fish habitat features (e.g., shears, large riprap point bars, etc.) in the final design of the north bank haul road bed material that would be placed in the Peace River.	No, constructed and reported during previous reporting period.	Not Applicable	This condition is addressed in FAHMP Section 6.2.1.2, River Road Habitat Enhancement.
	• Incorporate fish habitat features into the final design of the Highway 29 roadway that would border the reservoir, east of Lynx Creek.	No, planned for implementation during subsequent stage of construction.	Not Applicable	This condition is addressed in FAHMP Section 6.2.3.2, Highway 29 Realignment Fish Habitat.
	• Construct the Hudson‘s Hope shoreline protection with large material that will provide	No, planned for implementation during subsequent	Not Applicable	This condition is addressed in FAHMP Section 6.2.3.3, Hudson’s Hope Shoreline

EAC Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
	replacement fish habitat.	stage of construction.		Protection Fish Habitat.
	• Incorporate additional fish habitat features (e.g., shear zones and point bars) into the final design of the Hudson‘s Hope shoreline protection.	No, planned for implementation during subsequent stage of construction.	Not Applicable	This condition is addressed in FAHMP Section 6.2.3.3, Hudson’s Hope Shoreline Protection Fish Habitat.
	• Contour Highway 29 borrow sites prior to decommissioning to provide littoral fish habitat in the reservoir.	No, planned for implementation during subsequent stage of construction.	Not Applicable	This condition is addressed in FAHMP Section 6.2.3.1, Site C Reservoir Shoreline Enhancement.
	• Cap material repositioning areas with gravel and cobble, and contour to enhance fish habitat conditions.	No, planned for implementation during subsequent stage of construction.	Not Applicable	This condition is addressed in FAHMP Section 6.2.3.4, Dam Site Material Relocation Site Enhancement.
	• Plant a 15 m wide riparian area along the reservoir shoreline adjacent to BC Hydro-owned farmland where necessary to provide riparian habitat and bank stabilization except as	No, planned for implementation during subsequent stage of construction.	Not Applicable	This condition is addressed in FAHMP Section 6.2.3.5, Reservoir Shoreline Riparian Planting.

EAC Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
	approved by the onsite environmental monitor.			
	• Increase wetted habitat by creating new wetted channels and restoring back channels on the south bank island downstream of the dam.	Yes	Section 3.5	This condition is addressed in FAHMP Section 6.2.1.1, Peace River Channel Contouring and Side Channel Enhancement.
	• Enhance side channel complexes between the dam site and the confluence of the Peace and Pine rivers during low flows.	Yes	Section 3.5	This condition is addressed in FAHMP Section 6.2.1.1, Peace River Channel Contouring and Side Channel Enhancement.
	• Manage reservoir fluctuation within a 1.8 m maximum normal operating range from the maximum operating level of 461.8 m.	No. Will occur during Project operations.	Not Applicable	
	• If the reservoir deviates from the normal operating range, the EAC Holder must report the event in accordance	No. Condition applies to Project operations.	Not Applicable	

EAC Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
	with water licence requirements.			
	The EAC Holder must manage construction footprints to reduce the harmful Project effects on fish and fish habitat, in accordance with the conditions of the applicable *Fisheries Act* authorization(s) and direction provided by FLNR.	Yes. Construction footprints were in accordance with the conditions of the applicable *Fisheries Act* authorizations.		
	This draft Fisheries and Aquatic Habitat Management Plan must be provided to FLNR, MOE and Aboriginal Groups for review a minimum of 90 days prior to commencement of construction.	No. Occurred prior to the reporting period.	Not Applicable	This condition is addressed in FAHMP Section 2.3 Consultation
	The EAC Holder must file the Final Fisheries and Aquatic Habitat Management Plan with EAO, FLNR, MOE and Aboriginal Groups a minimum of 30 days prior to commencement of construction.	No. Occurred prior to the reporting period.	Not Applicable	
	The EAC Holder must develop, implement			

EAC Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
	and adhere to the Final Fisheries and Aquatic Habitat Management Plan, and any amendments, to the satisfaction of EAO.			

Table 2. Federal Decision Statement Conditions and Relevant Plan Sections.

FDS Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
8.	**Fish and Fish Habitat**			
8.1	The Proponent shall undertake efforts to avoid or minimize adverse impacts to fish and fish habitat to ensure the continued availability of fisheries resources in the Local Assessment Area.	Yes, see rows below.	See rows below.	
8.2	The Proponent shall prepare and submit to the Agency an annual schedule identifying the location and timing of construction activities that may impact fish or fish habitat 90 days prior to such activities	Yes	Not applicable	Submitted under separate cover.

FDS Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
	occurring.			
8.3.	The Proponent shall prepare, in consultation with Fisheries and Oceans Canada, Reservoir Area Aboriginal groups and Immediate Downstream Aboriginal groups, a fish and fish habitat management plan.	No. Occurred prior to the reporting period.	Not applicable	These conditions are addressed in the Fisheries and Aquatic Habitat Management Plan (FAHMP).
8.4	The Plan shall include:			
8.4.1.	Identification of baseline conditions for fish and fish habitat in the Local Assessment Area;	No. Occurred prior to the reporting period	Not applicable	This condition is addressed in FAHMP Section 4.0, Fish and Fish Habitat Baseline Conditions.
8.4.2.	Measures to mitigate potential effects on fish and fish habitat during construction and operation of the Designated Project including:	Yes, see rows below.	See rows below.	This condition is addressed in FAHMP Section 6.0, Fish and Fish Habitat Mitigation.
8.4.2.1.	Erosion and sediment control measures, riparian zone avoidance measures, best practices for watercourse crossings, in-stream work guidelines, and in-stream work timing windows;	Yes	Section 3.6	These conditions are addressed in CEMP Section 4.5, Fisheries and Aquatic Habitat Management.

FDS Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
8.4.2.2.	Measures to avoid or reduce fish stranding;	Yes	Section 3.7	This condition is addressed in CEMP Section 4.5, Fisheries and Aquatic Habitat Management. See also FAHMP 6.2.1.1, Peace River Channel Contouring and Side Channel Enhancement.
8.4.2.3.	Operational practices, technologies and design features that minimize downstream fish entrainment past the dam site;	No, planned for implementation during subsequent stage of construction.	Not Applicable	This condition is addressed in FAHMP Section 6.2.2.1, Fish Entrainment.
8.4.2.4.	Measures to mitigate the effects of Total Dissolved Gas concentrations in tailwater on fish; and	No, planned for implementation during subsequent stage of construction.	Not Applicable	This condition is addressed in FAHMP Section 6.2.2.3, Mitigation of Total Dissolved Gas.
8.4.2.5.	Measures to mitigate obstructed upstream fish passage for bull trout and, as appropriate and feasible, other migrating fish species;	No, planned for implementation during subsequent stage of construction.	Section 3.8	This condition is addressed in FAHMP Section 6.2.2.2, Upstream Fish Passage.
8.4.3.	An approach to monitor changes to fish and fish habitat baseline	Yes	Section 3.9	The approach is summarized in FAHMP Section 2.2, Scope as well

FDS Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
	conditions in the Local Assessment Area;			in the monitoring programs listed in Appendix D. Further information on monitoring is provided in the Fisheries and Aquatic Habitat Monitoring and Follow-up Program.
8.4.4.	An approach to monitor and evaluate the effectiveness of mitigation or offsetting measures and to verify the accuracy of the predictions made during the environmental assessment on fish and fish habitat; and	Yes, monitoring and evaluation occurred per the approach in the Project's Fisheries and Aquatic Habitat Monitoring and Follow-up Program.	Section 3.9	The approach is summarized in FAHMP Section 2.2, Scope as well in the monitoring programs listed in Appendix D. Further information on monitoring is provided in the Fisheries and Aquatic Habitat Monitoring and Follow-up Program.
8.4.5.	Any other requirements identified by Fisheries and Oceans Canada in support of its application for an authorization under the *Fisheries Act*.	Not applicable	Section 3.10	To date, Fisheries and Oceans Canada has not identified other requirements in support of an application for an authorization under the *Fisheries Act*. Should DFO identify other requirements, these will be taken into account in

FDS Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
				amendments to the plan, as described in condition 8.7
8.5.	The Proponent shall submit a draft copy of the plan to the Agency, Fisheries and Oceans Canada, Reservoir Area Aboriginal groups and Immediate Downstream Aboriginal groups 90 days prior to submitting its application for authorization under the *Fisheries Act*.	No. Occurred prior to the reporting period.	Not Applicable	This condition is addressed in FAHMP Section 2.3 Consultation
8.6.	The Proponent shall submit to the Agency the final plan a minimum of 30 days prior to submitting its application for authorization under the Fisheries Act. When submitting the final plan, the Proponent shall provide to the Agency an analysis that demonstrates how it has appropriately considered the input, views or information received from Fisheries and Oceans Canada, Reservoir Area Aboriginal groups and Immediate Downstream Aboriginal groups and shall describe how it has taken the plan into consideration as part of its application for an	No. Occurred prior to the reporting period.	Not Applicable	This condition is addressed in FAHMP Section 2.3 Consultation

FDS Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
	authorization under the Fisheries Act.			
8.7.	The Proponent shall implement the plan and provide to the Agency an analysis and summary of the implementation of the plan, as well as any amendments made to the plan in response to the results, on an annual basis during construction and for the first ten years of operation and once every five years for the next 20 years.	Yes	This report, addressed Condition 8.7	This condition is addressed in FAHMP Section 7 Reporting
8.8	The Proponent shall develop an offsetting plan, in consultation with Fisheries and Oceans Canada, to offset residual serious harm to fish and monitor the effectiveness of offsets.	No, plan developed during a previous reporting period.	Section 3.11	Offsetting plans were submitted as a component of the applications for authorization under the Fisheries Act. Information from offsetting plans was submitted to CEAA as described under FDS Condition 8.9.
8.9	The Proponent shall conduct an analysis for any physical fish habitat offsets proposed in the offsetting plan, in consultation with Transport Canada, Environment Canada, Reservoir Area Aboriginal groups and Immediate Downstream	No, occurred during a previous reporting period.	Section 3.12	These conditions were met in a separate analysis.

FDS Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
	Aboriginal groups, that includes:			
8.9.1	the effects on migratory birds and their habitats;			
8.9.2	the effects on terrestrial species and their habitats;			
8.9.3	the effects on species at risk and species at risk habitat;			
8.9.4	the effects on current use of lands and resources for traditional purposes by Aboriginal peoples;			
8.9.5	identification of navigation impacts; and			
8.9.6	identification of potential sources of contamination (e.g. mercury).			

FDS Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
8.10	The Proponent shall submit to the Agency the results of the analysis in condition 8.9, including a description of how the input, views or information received have been taken into account in finalizing its fish habitat offsetting plan.	No, occurred during a previous reporting period.	Section 3.12	This condition was met in a stand-alone document that was submitted to CEAA on June 24, 2016 prior to implementing the offsetting plan.

3.0 Summary of Plan Implementation

Section 3.1 "Remove temporary structures as soon as they are no longer required."

Temporary bridges used to access areas for reservoir clearing were removed once clearing activities were completed. In some circumstances, components of temporary instream structures are retained. This occurs when retaining the structure is assessed to provide a potential benefit to fish and fish habitat, and/or removing the structure would cause additional disturbance to fish habitat.

During a July 19, 2019 BCEAO inspection there were observations of two locations within side channels / back channels of the Moberly River where temporary crossing material was left instream. The material likely originated from a log fill crossing as part of the logging activities along the lower reaches of the Moberly River over the winter of 2018/2019.

BC Hydro responded to the BCEAO that one of the clearing crossings in question was constructed inside a bear den buffer (the tree-den was discovered after the crossing was built) so decommissioning this structure was not possible as BC Hydro demobilized from the area when the den was still active. BC Hydro responded by dispatching a helicopter with a logging grapple to remove the in-stream log structures at the two locations. The BCEAO confirmed that the identified noncompliance had been adequately addressed.

Section 3.2 "Maintain a 15 m machine free zone adjacent to watercourses during reservoir clearing (as measured from the Ordinary High Water Mark)."

Reservoir clearing occurred during the reporting period. In February 2019, BC Hydro received an EAC amendment (EAC Amendment #4) allowing for the use of machines adjacent to watercourses during reservoir clearing when worker safety prohibits manual tree falling and vegetation removal methods. Works must be addressed in a site-specific prescription prepared and endorsed by a QEP. The rationale for the safety exemption must be documented in the prescription.

Section 3.3 "Place material relocation sites (R5a, R5b, and R6) 15 m back from the mainstem to avoid affecting Peace River fish habitat."

Development of Relocated Surplus Excavated Material (RSEM) areas R5a, R5b and R6 commenced greater than 15 m back from the mainstem to avoid affecting Peace River fish habitat.

Section 3.4 "Contour mainstream bars to reduce potential for fish stranding, as advised by FLNR."

Peace River Channel Contouring and Side Channel Enhancement (described in FAHMP Section 6.2.1.1) are scheduled to occur over many years, per the schedule in the FAHMP. Contouring of some bar areas occurred during previous reporting periods. Construction works to contour a mainstream bar at Site 108R in the Peace River occurred during the reporting period. As well, physical and biological monitoring of the previously contoured bar occurred during the reporting period, in accordance with the FAHMFP.

Section 3.5 "Increase wetted habitat by creating new wetted channels and restoring back channels on the south bank island downstream of the dam. Enhance side channel complexes between the dam site and the confluence of the Peace and Pine rivers during low flows."

Construction of the fish habitat enhancement sites in side channels on the south bank of the Peace River downstream of the dam site began in 2018. Habitat enhancement at this site is described in the FAHMP Section 6.2.1.1, Peace River Channel Contouring and Side Channel Enhancement. Construction of phase 1 was complete in December 2019.

Section 3.6 "The Plan shall include: Erosion and sediment control measures, riparian zone avoidance measures, best practices for watercourse crossings, in-stream work guidelines, and in-stream work timing windows."

These measures are listed in the CEMP Section 4.5, Fisheries and Aquatic Habitat Management. The CEMP specifies the requirements for site-specific EPPs that are developed for specific components of work. BC Hydro audits compliance with this requirement by reviewing contractor EPPs and conducting environmental audits during construction to verify implementation of the EPPs. In addition, BC Hydro has implemented an enhanced site-wide erosion and sediment control program that requires assessment of sites and preparation of detailed prescriptions by Qualified Erosion and Sediment Control Professionals and overseeing installation of measures by these professionals and ongoing re-inspections. Environmental issues and associated corrective actions reported during environmental monitoring and compliance auditing are described in the BC Hydro Monthly Environmental Monitoring Summary Reports. Monthly reports for 2019 have been submitted to the Agency, with the exception of reports for November and December which were being finalized at the time of writing this report.

Suspended sediment levels in the Peace River, as well as inputs to the Peace River as a result of construction, were monitored during the reporting period and indicated that construction inputs were low relative to the background suspended sediment levels. These results are consistent with past years and predictions in the Project's Environmental Impact Statement (EIS). Baseline suspended sediment load in the Peace River at the dam site is estimated at 1,136,000 tonnes / year, and increases to 3,540,000 tonnes / year downstream of the Pine River confluence (Table 5.3 and Fig 5.3a of the EIS, Vol 2 Appendix I Fluvial Geomorphology and Sediment Transport Technical Data Report). Over the ten-year construction phase, fine sediment inputs related to instream construction activities would represent an estimated increase of 0.2% to 0.3% above mean annual baseline sediment load immediately downstream of the Site C dam site (EIS Volume 2 Appendix I).

During the reporting period there were environmental incidents and near misses related to fish and fish habitat (summarized in Table 4). No adverse effects on fish and fish habitat resulted from these incidents.

Table 4: Environmental incidents and near misses related to fish and fish habitat in 2019.

Incident Date	Description of Events/Corrective Actions
March 19, 2019	During the deactivation of a reservoir clearing crossing a single rig mat dropped into the Moberly River and due to environmental and safety concerns the rig mat was irretrievable.
August 27, 2019	Downstream flows were not maintained by transmission line access road construction crew installing a culvert at a ≤3m non-fish-bearing stream crossing. A waddle was installed downstream and the upstream flow was plugged with mud while an excavator was working to smooth the banks for installation. Work was stopped, and environmental controls implemented immediately to reduce downstream sediment releases. The stream bed was lined with poly, turbidity readings were taken upstream and downstream, and the plug was released. Downstream flows were restored, and turbidity readings returned to an acceptable range for the protection of aquatic life. Proper completion of the culvert installation was rescheduled for August 30, 2019.
September 5, 2019	A bulldozer mistakenly walked into a reservoir clearing Riparian Vegetation Management Area (RVMA), however, backed out immediately. The blade was up and no work or additional ground disturbance occurred within the area.
October 22, 2019	Diesel fuel leaked (estimated 15 L to ground and 5 L to water) from a bulldozer to an isolated and fish salvaged area of a Peace River side channel. The bulldozer, working near the water in the Peace River Channel Contouring and Side Channel Enhancement construction area, was immediately relocated away from water and the leak isolated using a spill kit. A spill kit was used to contain and clean up the release including absorbent pad placement and booms used to clean up the surface water sheen.
October 31, 2019	Within the dam site construction area, an excavator working adjacent to the Peace River suffered a mechanical failure resulting in spill of approximately 30-50 L of biodegradable oil to the compacted road material. The operator moved the machine upslope away from the river to prevent release to water and spill response (deployment of spill pads and drip trays) initiated.
November 4, 2019	A boulder slipped and stuck a high-pressure hydraulic line on an excavator working in the Peace River Channel Contouring and Side Channel Enhancement construction area. The machine was immediately shut down and spill response was initiated. The excavator was situated on the bank and spray from the leak directed away from the channel. The excavator, tracks and surrounding area including boulders were wiped down with absorbent pads.

November 6, 2019	A feller-buncher cleared approximately 0.06 ha within a reservoir Riparian RVMA. Review of the types and meaning of flagging were clarified with the operator.
November 14, 2019	A bulldozer partially removed surface vegetation within an approximately 2 m area within a reservoir clearing RVMA prior to RVMA ribbon being hung. The machine was told to stop work until the RVMA was established. The bulldozer back bladed the disturbed area to reshape the disturbed area. Ribbon was then hung and operators advised that no machinery is to be inside it.
November 28, 2019	A feller buncher working in a reservoir clearing area crossed a frozen ditch using a log fill rather than culvert. The logs were removed and reshaped to support culvert installation.

Section 3.7 "The Plan shall include: Measures to avoid or reduce fish stranding."

The contouring of mainstem bars (described in the Section 3.4) has reduced the risk of fish stranding by reducing the area of the bars that dewaters when discharge in the Peace River fluctuates.

Section 3.8 "Measures to mitigate obstructed upstream fish passage for bull trout and, as appropriate and feasible, other migrating fish species."

Construction of the temporary upstream fish passage facility continued through 2019. The construction and operation of the upstream fish passage facilities is described in the FAHMP Section 6.2.2.2, Upstream Fish Passage.

Section 3.9 "The Plan shall include: An approach to monitor changes to fish and fish habitat baseline conditions in the Local Assessment Area.

An approach to monitor and evaluate the effectiveness of mitigation or offsetting measures and to verify the accuracy of the predictions made during the environmental assessment on fish and fish habitat."

BC Hydro developed and implemented the FAHMFP[3] to monitor changes in habitat conditions in the Local Assessment Area and the effectiveness of mitigation and offsetting measures, and to verify the predictions made during the environmental assessment. The general monitoring approach in the FAHMFP is to monitor changes in baseline conditions in the Local Assessment Area for physical habitat, lower trophic levels, fish abundance, and community composition. This information will be used to evaluate the effectiveness of Project mitigation or offsetting measures and verify the accuracy of predictions made during the Environmental Assessment. Monitoring under the FAHMFP in 2019 will be summarized in BC Hydro's report: Fisheries and Aquatic Habitat Monitoring and Follow-up Program Annual Report: Jan 1, 2019 to Dec 31, 2019. Previous reports under the FAHMFP are available on the Project website[4].

[3] Available at: https://www.sitecproject.com/document-library/environmental-management
[4] Available at: https://www.sitecproject.com/sites/default/files/report-annual-fahmfp-2017-20180301.pdf

Section 3.10 "The Plan shall include: Any other requirements identified by Fisheries and Oceans Canada in support of its application for an authorization under the Fisheries Act."

Fisheries and Oceans Canada has not identified other requirements in support of an application for an authorization under the *Fisheries Act* in addition to those in the FAHMP.

Section 3.11 "The Proponent shall develop an offsetting plan, in consultation with Fisheries and Oceans Canada, to offset residual serious harm to fish and monitor the effectiveness of offsets."

Offsetting plans were developed in consultation with Fisheries and Oceans Canada, and are described in:

1. "Section 9.0 Offsetting Plan" of the document titled "DFO – Application for Authorization Site Preparation – Site C Clean Energy Project British Columbia Hydro and Power Authority"
2. "Section 9.0 Offsetting Plan" of the document titled "DFO – Application for Authorization Dam Construction, Reservoir Preparation, and Filling – Site C Clean Energy Project British Columbia Hydro and Power Authority"

Section 3.12 Conditions 8.9 and 8.10 refer to "an analysis for any physical fish habitat offsets proposed in the offsetting plan."

The analysis of physical fish habitat offsets[5] was completed and submitted to the Agency during a previous reporting period.

[5] "Site C Clean Energy Project, Site Preparation: Environmental Analysis of Physical Fish Habitat Offsets" dated Aug 5, 2015 and "Site C Clean Energy Project, Dam Construction, Reservoir Preparation and Filling: Environmental Analysis of Physical Fish Habitat Offsets" dated June 24, 2016.

4.0 Analysis of Plan Implementation

The FAHMP describes the following categories of measures:

- Standard mitigation measures during construction activities described in the CEMP (e.g., erosion and sediment control measures); and
- Project-specific mitigation measures described in the FAHMP (e.g., habitat enhancements for reservoir shoreline habitat enhancement works, capping of dam site material relocation site with fish habitat features).

During the reporting period, both standard mitigation measures and Project-specific mitigation measures were implemented to mitigate potential effects on fish and fish habitat.

Monitoring of physical habitat, lower trophic levels, fish abundance, and community composition under the FAHMFP will provide information to evaluate the effectiveness of these measures to mitigate potential effects on fish and fish habitat over the longer term.

5.0 Revisions to the Plan

No revisions to the Fisheries and Aquatic Habitat Management Plan have been required since Revision 1 dated June 1, 2015.

6.0 Qualified Professionals

This report was prepared by the following Qualified Individuals:

Qualified Individual	Expertise
Brent Mossop, MRM, RPBio	Fisheries
Dave Hunter, RPBio	Fisheries

Figure 1. Contractors maintain a 15 m machine free zone adjacent to the Moberly River during reservoir clearing activities (January 3, 2019).

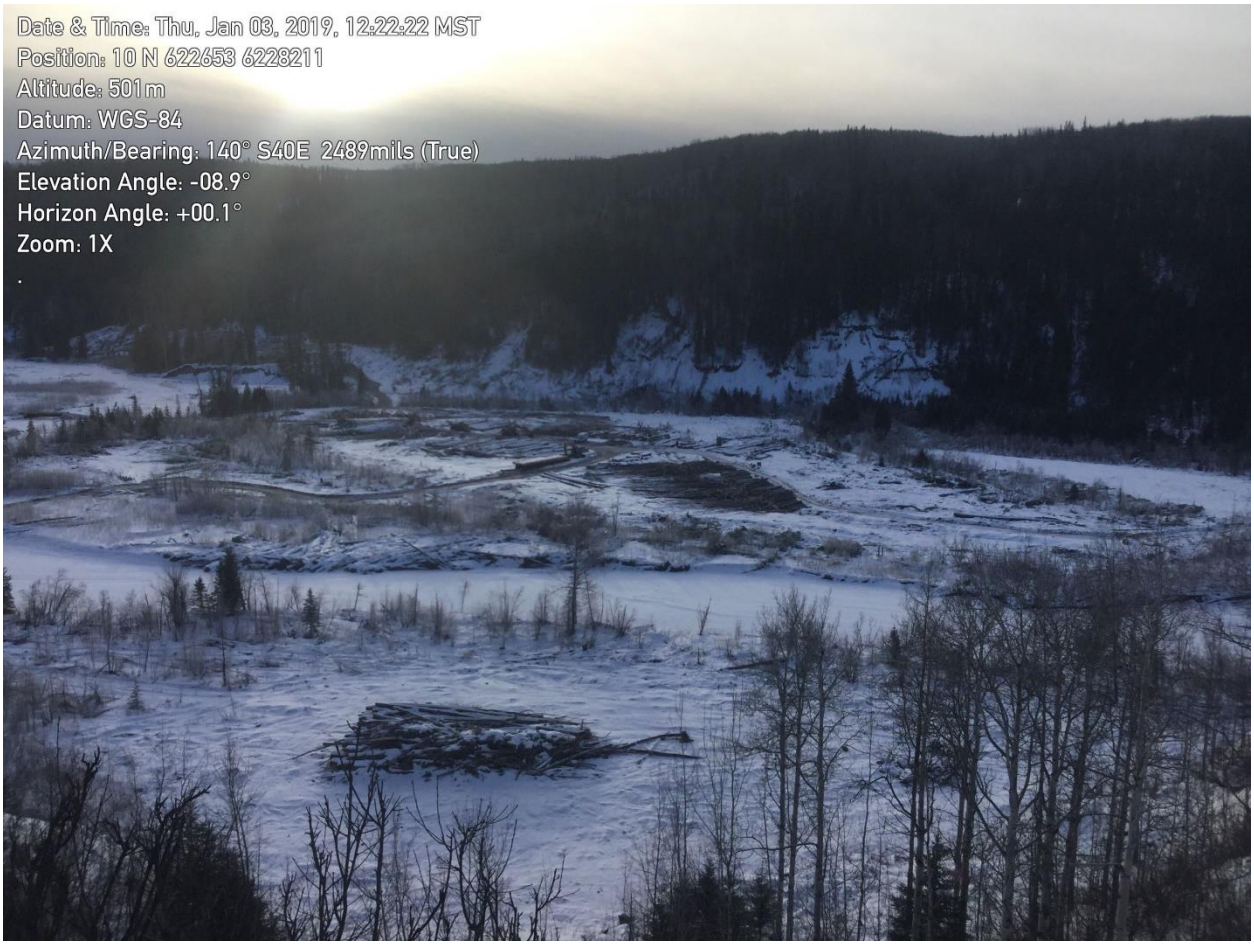
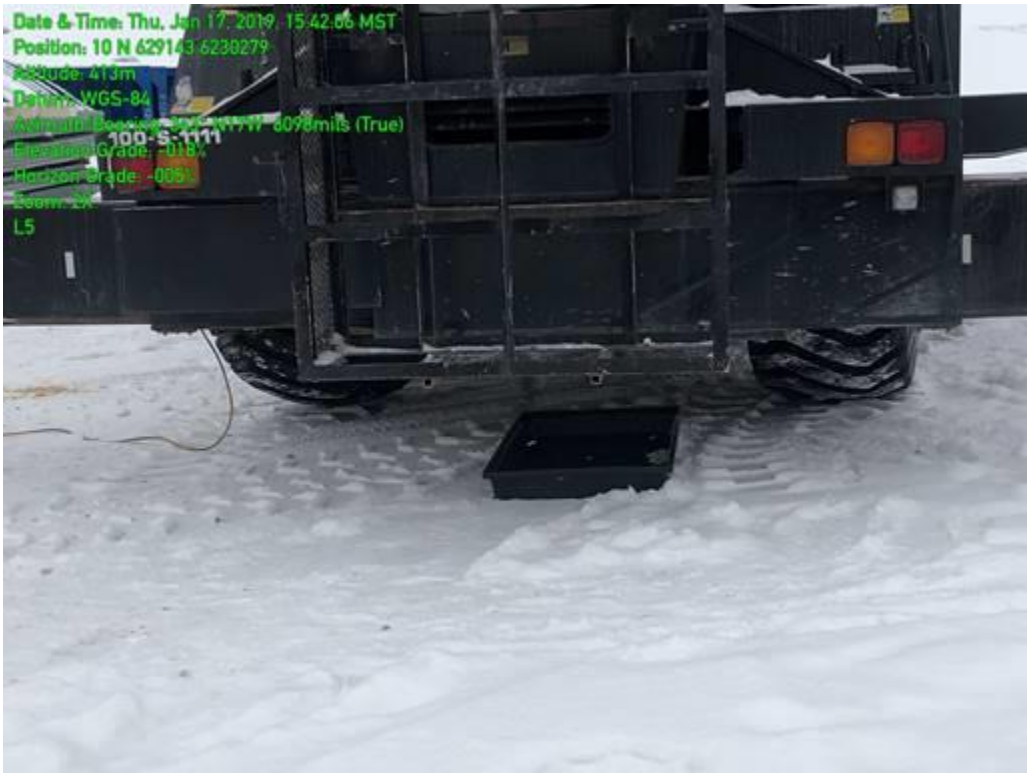


Figure 2. Crews ensure drip trays are placed under machinery parked less than 30 meters from the high-water mark at the diversion outlet cofferdam (top; January 8, 2019) and RSEM L5 (bottom; January 17, 2019).



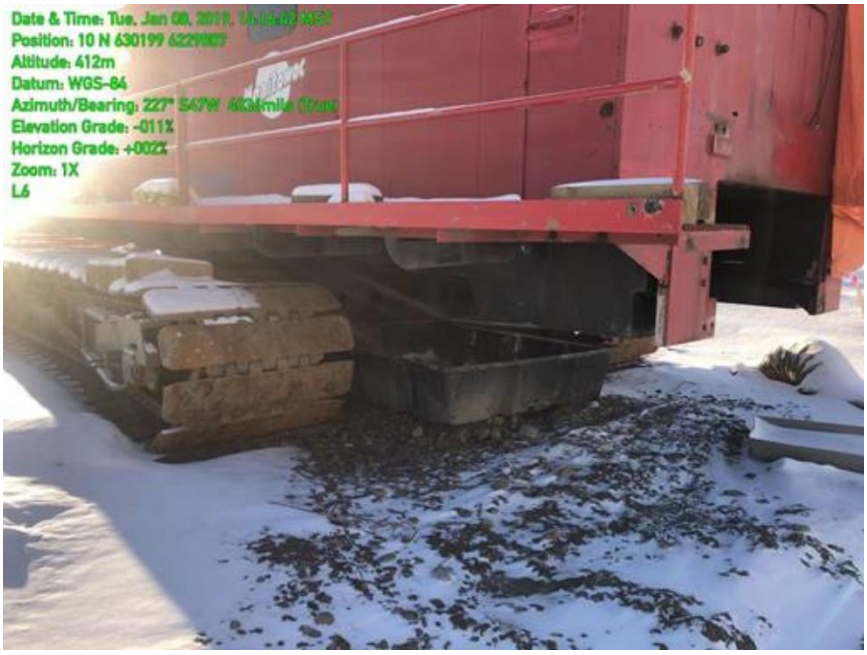


Figure 3. An excavator uses biodegradable hydraulic oil at Cache Creek during reservoir clearing activities (January 21, 2019).

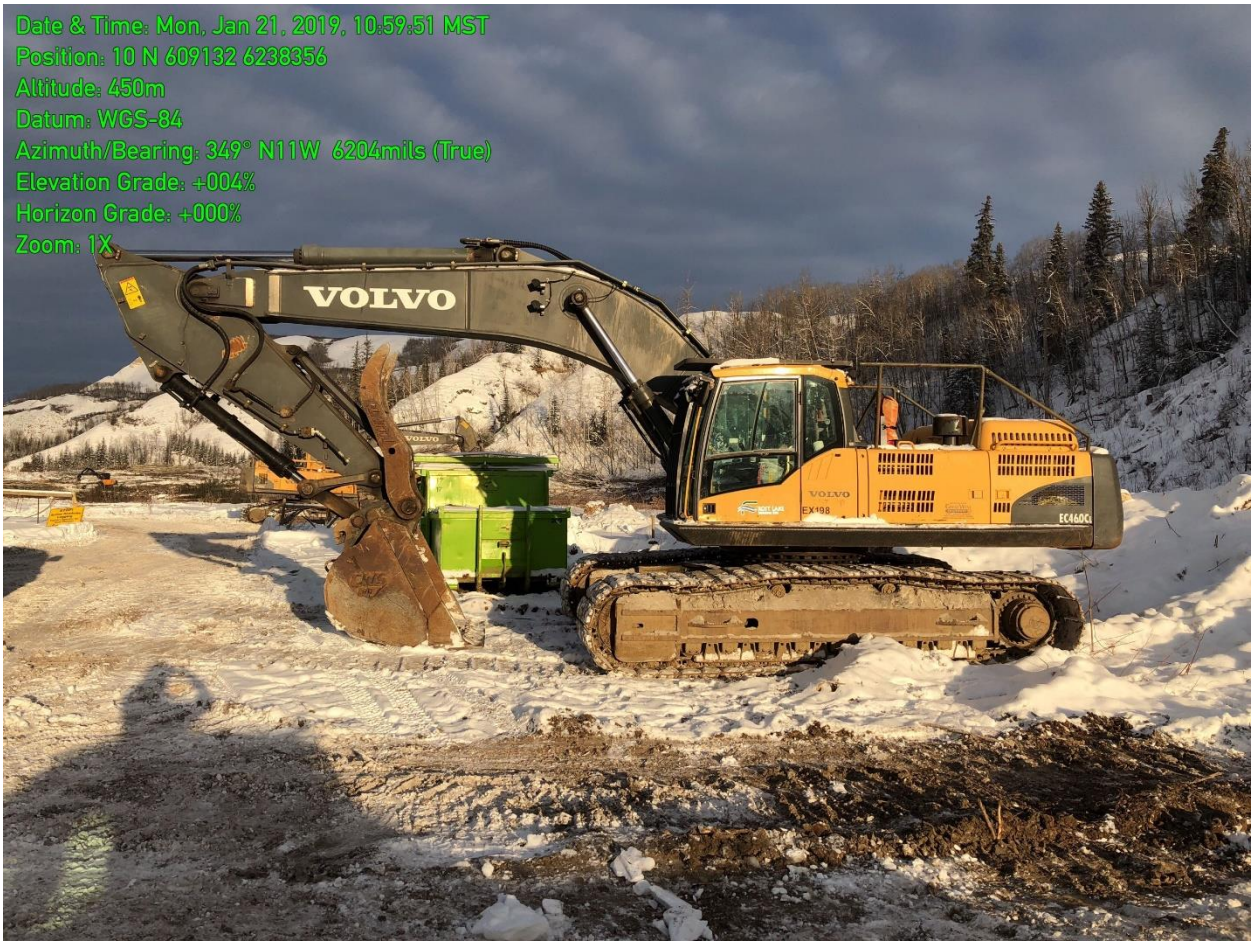


Figure 4. An excavator works to contour a bar in the Peace River at Site 108R to reduce potential for fish stranding. The excavator works in a slow, controlled and continuous manner to scare and exclude fish from the work area (April 24, 2019).

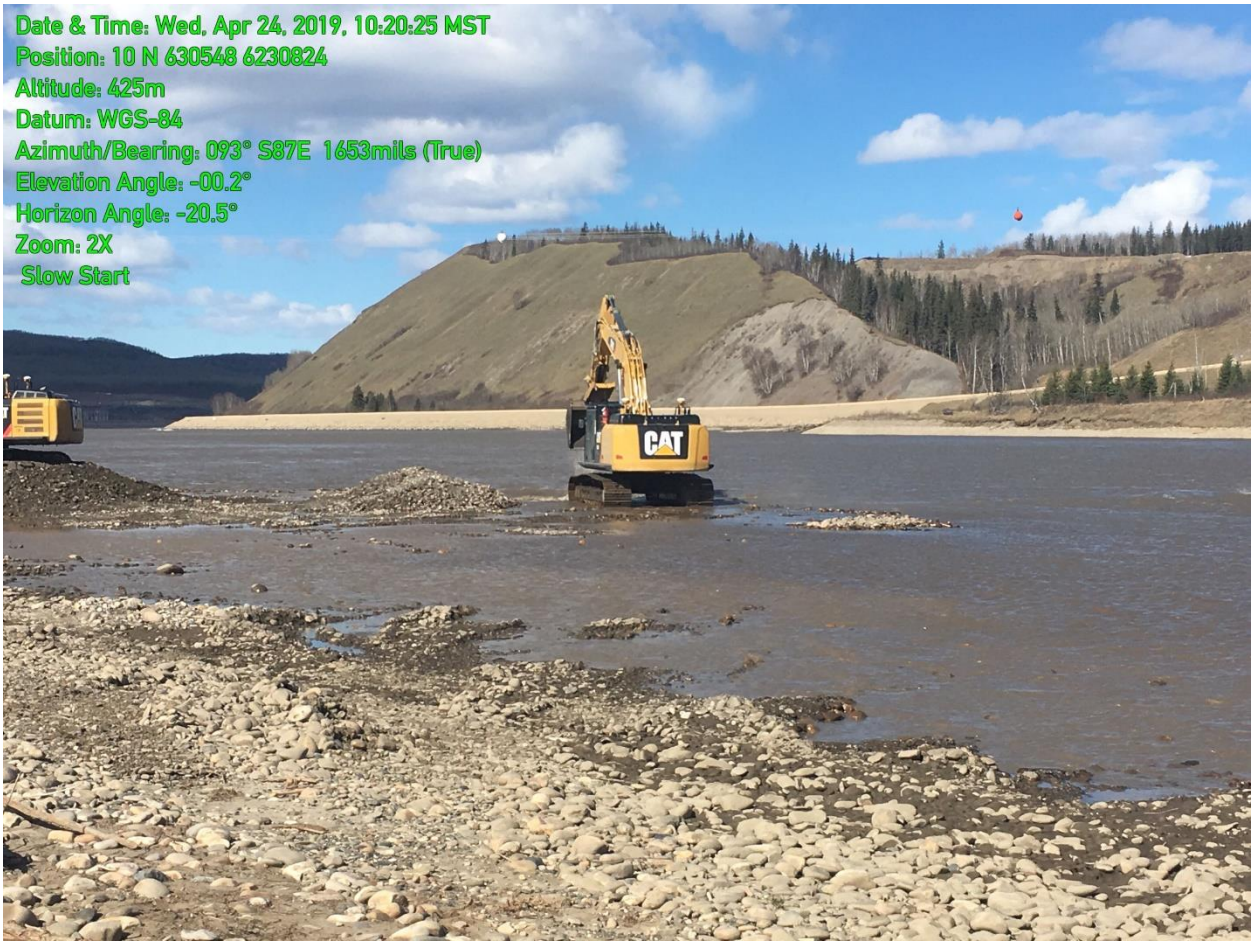


Figure 5. Absorbent and containment booms are on-site and available for deployment in the event of a spill at RSEM L5 (April 5, 2019).

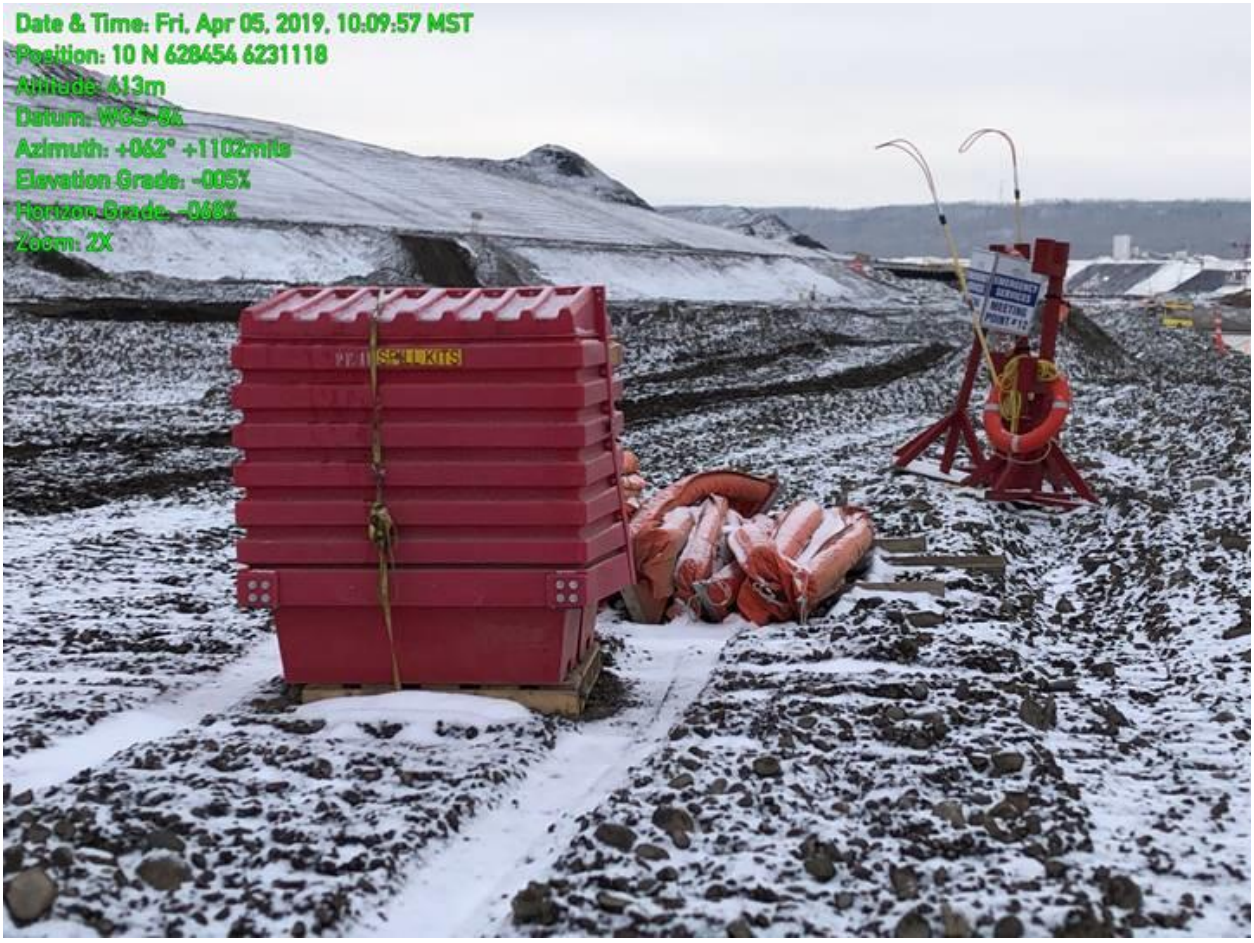


Figure 6. Debris and sediment are prevented from entering the Peace River at RSEM L5 (looking east) using rip rap and liner with mesh armouring (August 15, 2019).