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REPORT

Ministry Of Environment and Climate Change Strategy

Hatzic Emergency Works Program Carratt Creek



FEBRUARY 2024



Platinum
member

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TABLE OF CONTENTS

SECTION	PAGE NO.
Table of Contents	i
List of Tables	iii
List of Figures	iv
1 Introduction	1
1.1 Purpose Of Report	1
1.2 Background	1
1.3 Location & Scope	1
1.4 Project Team	2
2 Design	3
2.1 Site Condition	3
2.2 Design Objective	4
3 Permitting & Approvals	4
3.1 First Nations Consultation	4
3.2 Environmental	4
3.3 Archeological	5
3.4 Other Approvals	5
4 Construction	5
4.1 Contract Award	5
4.2 Approach to Construction	5
4.3 Quality Control	6
4.4 Changes During Construction	7
4.5 Construction Monitoring	7
4.6 Project Completion	9
4.7 Summary of Key Dates	10
5 Project Costs	11
 5.1 Construction Cost	11
6 Future Considerations	11
6.1 Operation & Maintenance	11
6.2 Monitoring	11
Certification Page	12
Appendix A – Site Assessment Tech Memo	1
Appendix B - Design Sketches/Drawings	1
Appendix C - Environmental Approval Documents	1

Ministry Of Environment and
Climate Change Strategy

Appendix D - Archeological Permits	1
Appendix E - Contractor Assessment	1
Appendix F - Contract Document	1
Appendix G - Access Agreement	1
Appendix H - Field Review Reports	1
Appendix I - Substantial Performance	1
Appendix J - Final Progress Payment and Closeout Documents	1
Appendix K - Contractor Payment Support Information	1
Appendix L - Before and After Construction Photographs & Paragraph of Works for ENV	1
Appendix M - Record Drawings	1
Appendix N - Environmental Monitoring Report	1
Appendix O - Archeological Monitoring Report	1

LIST OF TABLES

PAGE NO.

Table 4-1	Non-compliant issues	8
Table 4-2	Summary of Key Dates	10
Table 5-1	Construction Cost	11

LIST OF FIGURES

PAGE NO.

Figure 1-1 Carratt Creek Overview

2

1 INTRODUCTION

1.1 Purpose Of Report

This report documents the completion of emergency construction and sediment removal works on Carratt Creek immediately upstream of Carratt Road, Fraser Valley, BC.

Associated Engineering (B.C.) Ltd, (Associated) was retained by the BC Ministry of Environment (ENV) to lead the technical aspects of this project, with PwC acting as ENV's client representative.

Note that the works are located on crown land and private property.

1.2 Background

Sediment deposition, bank erosion and flood damage occurred along Carratt Creek, near Carratt Road, BC, during the November 2021 regional flood event, resulting from multiple atmospheric rivers through southwest BC. Local residents were evacuated by helicopter as roads were overtopped by floodwaters.

The heavy rainfall on the mountainous upper watershed of Carratt Creek resulted in a debris flow event; BGC estimates that the debris-flow was a size Class 4 event (classification from Jakob, 2005), or between 10,000 and 100,000 m³, with a best estimate of 50,000 m³ (BGC Engineering, December 2022).

This material was deposited within the watercourse and outside of the channel due to a channel avulsion and overtopping of the Carratt Creek dike.

In addition to the material deposition, large, mobilized boulders formed a debris blockage of the primary channel approximately 800 m upstream of the Carratt Creek bridge. Streamflows and mobilized debris were diverted against the right channel bank of the channel, resulting in a stream avulsion of the primary channel. Avulsion flows and mobilized debris established a new channel through the forest, resulting in damage to the adjacent private property caused by errant debris and streamflows.

ENV commissioned QP assessments and tech memos (**Appendix A**) that outlined the need for emergency sediment removal and flood recovery work. This work was subsequently approved and completed under the technical direction of Associated with oversight from PwC. The intent of this work was to restore conditions to "pre-flood conditions" as closely as practical.

1.3 Location & Scope

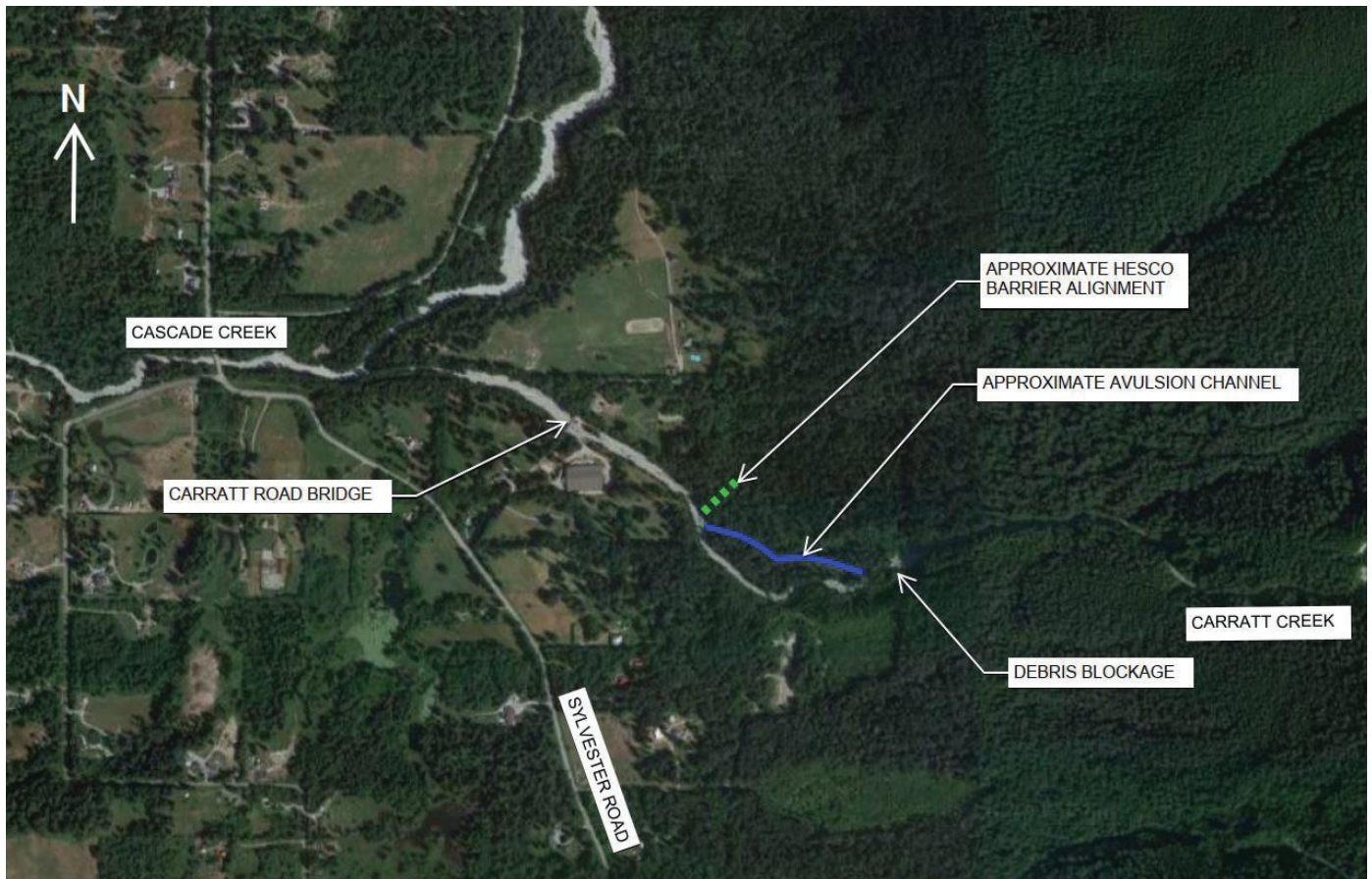
The scope of work for this project is generally described as follows:

- Sediment and debris removal.
- Bank repair.
- Temporary Flood Barrier Installation.

Bank repairs in areas with existing dikes were not completed as part of this emergency works project due to permitting, ownership, and funding concerns by provincial agencies. Dike repairs may need to be completed as part of future works.

Sediment removal works were performed throughout nearly 800 metres of channel immediately upstream (east) of Carratt Road bridge, located approximately 49°15'46.1" N 122°13'05.8" W. Upstream sediment removal works terminated at the upstream debris blockage; refer to **Figure 1-1** below for a site overview.

Figure 1-1 Carratt Creek Overview



In addition to the sediment removal, emergency works included repair of the avulsed channel bank to re-establish clear water flows in the primary channel, and installation of a temporary HESCO barrier alignment for additional flood protection. Refer to **Figure 1-1** above for location of the avulsion channel and HESCO barrier installation.

1.4 Project Team

The Associated project team included:

- Program Manager – Jamie Fitzgerald, ASCT, P.Eng.
- Senior Technical Advisor – Michael MacLatchy, Ph.D., P.Eng.
- Engineer of Record – Andrew Wiens, P.Eng.
- Project Coordinator – Dianna Christopoulos.
- Field Engineer – Trevor Friedmann, P.Eng.
- Contract Administrator – Eric Finney, P.Eng.

- Environmental Scientist - Naomi Sands, R.P.Bio.
- Lead Site Inspector – Oscar David.
- Assistant Site Inspector – Hoyeon Lee.

Subconsultant support was provided by Leq'a:mel First Nation with the following staff:

- Rick McKamey.
- Tina Pederson.
- Jason Thompson.

The prime contractor for the work was Jakes Construction Ltd., with the following key staff:

- Derrick Bisschop – Project Manager.
- Derek Bryce – Superintendent.
- Brent Durie – Foreman.
- Jeff Barry – Safety Representative.

Richco Contracting Ltd. was also engaged to assist with construction activities at the site, with the following key staff:

- Rich Van Geel – General Manager.
- Mark Van Geel – Foreman.

The environmental monitor was Aqua Silva Resource Management Ltd., subcontracted to Richco, with the following key staff:

- Patrick Ehnes.
- Jennifer Heldt.

On behalf of the client, project direction was provided by the following:

- PwC Project Manager – Tim Stanley.
- PwC Sediment Program Manager - Fred Bjork.
- ENV Thyren Jacobs.

2 DESIGN

2.1 Site Condition

Prior to commencement of work, the channel bank height upstream of Carratt Road ranged from 1.5 to 2.5 m above the existing channel invert. The limited bank height was not expected to contain additional sediment deposition and design streamflow's, thereby presenting a hazard to surrounding properties; deposited debris and sediment appeared to have aggraded the channel bed, resulting in the apparent reduction of channel capacity.

Additionally, the avulsion channel conveyed all of the observed streamflow's following the avulsion occurrence; the avulsion channel profile degraded, resulting in a lowered thalweg, and streamflow connection to the primary channel was further blocked by deposited debris and sediment. The downstream avulsion channel banks did not appear

capable of containing significant streamflow events, often less than one metre in height; the limited bank height would likely result in streamflow's overtopping the channel banks and spilling towards the downslope private properties. Further to the observed streamflow within the avulsion channel, significant debris and sediment deposition was observed adjacent to the avulsion channel alignment. The deposited material is strewn throughout the forest on the alluvial fan and appears to serve as an on-going deposition area for large rock debris.

The lower segment of Carratt Creek emergency works, up to approximately 550 m upstream of the Carratt Road bridge, is listed as a Local Authority's Non-Standard Dike. The avulsion channel re-entered the Carratt Creek primary channel in two locations, approximately 330 m and 520 m upstream of Carratt Road, both within the dike extents. The downstream most location was conveying observed streamflow's; the confluence of the avulsion channel and primary channel is shown at the west extents of the avulsion channel alignment in **Figure 1-1**.

2.2 Design Objective

The general design objective was to restore the site/location/works to pre-flood conditions as nearly as practical, while also ensuring protections of the private properties were in place.

Given the site conditions mentioned above, the key design objectives were:

- Repair of the channel capacity by removing sediment.
- Avoid changes to the existing dike armouring, slopes, and general integrity.
- Restore the channel bank at the channel avulsion location with a low-height bank to allow avulsions into the forest during future debris flow events.
- Reduce the likelihood of private property damage from errant streamflow's during frequent rainfall events.

3 PERMITTING & APPROVALS

3.1 First Nations Consultation

Due to the nature of the Emergency Works, First Nations Consultation was provided during the Hatzic Area – Task Force Meetings with ENV and PwC.

3.2 Environmental

The Fisheries Act is the main federal legislation for Canadian fisheries management through the conservation and protection of fish and fish habitat (RSBC 1985, c.F-14), and is administered by Fisheries and Oceans Canada (DFO). In accordance with Sections 34.4(2)(c) and 35(2)(c) of the Act, an authorization is required for any activity that may result in death of fish and harmful alteration, disruption or destruction of fish habitat. Sediment removal and bank protection works were anticipated to result in a HADD of habitat for fish in Carratt Creek, and an emergency *Fisheries Act* Authorization was issued by DFO on October 27, 2022 for all 12 impacted sites in the Hatzic Valley (22-HPAC-01308; Appendix Xi).

The provincial *Water Sustainability Act* protects the quality of water, fish and wildlife habitat, and the rights of licensed water users (SBC 2014, c15) and is administered by Ministry of Forests (FOR). Under Section 11 of the Act, any activities that result in "changes in or about a stream" require notification or approval. A Change Approval for Changes In and About a Stream on Carratt Creek was granted by FOR on November 16, 2022 (2010103; Appendix Xii).

All instream works were to be conducted under the oversight of a Qualified Professional and in accordance with regulatory authorizations and approvals, the Carratt Creek – Sediment Removal and Bank Protection Environmental Management Plan (Associated Environmental 2022), applicable DFO Codes of Practice, and provincial guidance in the “Requirements and Best Management Practices for Making Changes In and About A Stream in British Columbia” (2022).

3.3 Archeological

Leq’a:mel First Nation:

- Provided cultural, archeological and environmental monitors to review the work daily, keeping records and submitting daily reports.

3.4 Other Approvals

Activities along Carratt Creek occurred on both private land, for which permission from the landowner was obtained (Appendix Xiii), and crown land. A Permit over Crown Land was included in the provincial Change Approval application for instream works and access to the east extent of the project area.

4 CONSTRUCTION

4.1 Contract Award

The Province set the following requirements for contractor selection. The contractors were to be:

- Qualified to undertake instream work, with
- Preferences for:
 - Local companies.
 - Indigenous companies and employees.

Additionally, we had identified the work as high priority and urgent due to expected precipitation pattern changes with the seasonal shift to fall.

For these reasons, we recommended two contractors be awarded to complete the work, Richco Contracting Ltd. and Jake’s Construction Ltd. These two contractors had immediate availability, are both local companies, and have suitable experience in the expected type of work.

Both contractors signed separate contracts with the Province, however, the workspace was shared, and Jake’s Construction Ltd. was identified as the prime contractor.

Both contracts and the award justification letters are included in the appendices.

- GS23EPFLOOD0085 – Richco Contracting Ltd.
- GS23EPFLOOD0084 – Jakes Construction Ltd.

4.2 Approach to Construction

The main goals of the project were to remove sediment and increase capacity of the lower sections of Carratt Creek, and to address the avulsed channel in the upstream sections of the creek.

Generally, sediment removal was split into two sections; Richco Contracting Ltd. (Richco) performed sediment removal from Carratt Road to approximately 20 m upstream of the HESCO barrier alignment. Jakes Construction Ltd. (Jakes) performed sediment removal from the Richco upper work extents to the upstream debris blockage. The depth of sediment removal varied throughout the channel reach and was determined on-site to re-establish pre-flood channel bed elevation. Channel bank toes were field-fit to tie-in to existing bank slopes.

Given the limited construction access route available to Jakes, rock trucks were used to haul excavated material downstream to the Richco material stockpile. Richco then loaded tandem axle dump trucks for off-site disposal at the Eng Road pit, including sediment materials from both Jakes and Richco. A thin layer of stockpiled material was left in place during removal to ensure the existing dike armour and embankment slopes remained undisturbed by excavation equipment. Upstream of the dike extents, Jakes placed excavated materials against over steepened bank slopes, where possible, to help reduce material export volumes.

Further to the sediment removal, Richco performed installation of the HESCO barrier alignment. Jakes was responsible for bank repair and the corresponding upstream diversion of flow into the primary channel. Diversion of flow occurred once removal of stockpiled sediment was effectively complete in order to ensure remobilization of in-stream sediment did not occur. The repaired channel bank tie-in to existing slopes was field-fit on site.

4.3 Quality Control

Associated:

- Provided daily inspection, engineering direction and review of the engineering components of the work
- Tracked construction activities to support progress payment development
- Provided engineering input and decision-making support
- Kept daily reports of construction activities and contractor forces

Jake's Construction:

- Prime Contractor responsible for site management, safety, coordination, and overall delivery of the construction.

Richco Contracting:

- Managed internal forces, and subcontracted environmental monitoring through AquaSilva Resource Management Ltd.

AquaSilva Resource Management (AquaSilva):

- Developed Construction Environmental Management Plan
- Provided spill response
- Designed and implemented environmental measures for protecting aquatic life, managing spills, providing erosion and sediment control, and monitoring of water quality parameters.
- Kept daily records of work completed and pertinent information.

Leq'a:mel First Nation:

- Provided cultural, archeological and environmental monitors to review the work daily, keeping records and submitting daily reports.

Construction reports from Associated, AquaSilva, and Leq'a:mel are provided in the appendices.

4.4 Changes During Construction

The following changes from design were implemented during construction:

- The HESCO barrier alignment was field fit to re-direct minor surface flows from the channel avulsion area back into Carratt Creek instead of private property. The HESCO barrier is a temporary measure and is not intended to mitigate risks related to high-flow events or debris flow events. capture all areas observed to have experienced streamflows during the November 2021 flood events, including debris deposition. A permanent solution should assess extending the alignment further north to higher ground, in the event of other upstream channel avulsions.
- Riprap protection was not installed along the channel banks in order to maintain the existing dike conditions due to permitting, ownership, and funding concerns by provincial agencies.
- Bank repair dimensions for the channel avulsion bank repairs were determined to be:
 - 1.5 m bank height to retain streamflows while also allowing for debris deposition,
 - 2.5 H : 1 V minimum foreslope,
 - Minimum 4.0 m channel width adjacent to the bank repairs,
 - Minimum 5.0 m bank crest width,
 - Minimum 3 H : 1 V backslope,
 - Maximum of 0.5 m diameter materials to be used in construction of the bank repair, in order to prevent large voids from encourage seepage through the embankment, while also allowing for failure of the bank repairs in the event of an extreme debris flood.

In addition to the design changes implemented, the contractual changes implemented include:

- Jake's Construction Ltd. (GS23EPFLOOD0084):
 - Change Order 1 – Inclusion of new line items for unit rates not originally in contract.
 - Change Order 2 – payment for invoices and inclusion of new line items for unit rates not originally in contract.
- Richco Contracting Ltd. (GS23EPFLOOD0085):
 - Change Order 1 – Inclusion of new line items for unit rates not originally in contract.
 - Change Order 2 – Invoices for materials and unit rates not originally included in contract, costs related to environmental permitting and equipment use.
 - Change Order 3 – additional scope for environmental completion reporting to satisfy environmental permitting requirements.

4.5 Construction Monitoring

Environmental

Full time environmental monitoring was conducted by Aqua Silva Resource Management (AQS) during instream works and audited by Associated Environmental. As the environmental monitor (EM), AQS was responsible for working with the Contractor(s) to develop measures to protect the environment and to respond to environmental incidents as they occurred. The responsibility of the auditor was to protect the interests of the owner by ensuring that the EM and the

Contractor adhered to the requirements of the Construction Environmental Monitoring Plan (CEMP) (prepared by AQS and reviewed by Associated), environmental permit conditions and any applicable regulations.

Environmental Inspection Reports (EIR) were prepared by AQS and submitted to Associated every couple of days, and were augmented by Daily Environmental Monitoring Reports submitted by Leq'á:mel First Nation.

A total of two audit inspections were completed during construction at Carratt Creek, occurring on December 1st and 14th, 2022. Non-compliant issues noted during the audit inspections, and resolutions provided by AQS are summarized in **Table 4-1**.

Table 4-1 Non-compliant issues

Issue	Date Observed	Resolution	Date Resolved
No record of completion for the Contractor Environmental Orientation	December 1, 2022	Environmental orientation conducted on Dec 14 and documented in the EIR.	December 14, 2022
Environmental Inspection Reports were deficient on detail including fish salvages completed and rationale for change in relocation sites.	December 1, 2022	Report format updated and rationale for change in protocol documented.	December 14, 2022
Excavated material temporarily stockpiled within creek channel, in contravention of permit conditions and CEMP	December 1, 2022	Documented rationale for change in protocol – material continually trucked out with no significant stockpile left overnight.	December 13, 2022
No waste containers onsite.	December 1, 2022	EIR documented that waste is stored in vehicles and taken away at end of each day.	December 13, 2022
Reported machinery oil leaks, inconsistent use of drip trays overnight. Refuelling station(s) are not specified on a plan or identified onsite.	December 1, 2022	Routine inspection of machinery for leaks and placement of drip trays overnight. Locations of refuelling stations provided in updated CEMP.	December 14, 2022
Turbidity event reported by Leq'á:mel First Nation in the daily monitoring report; however it was not reported in the EIR, nor any record of how it was	December 1, 2022	No further turbidity events reported.	-

Issue	Date Observed	Resolution	Date Resolved
resolved or would be prevented from occurring again.			
Insufficient measures in place to mitigate the spread of invasive species onsite and at the disposal site. Specifically, material may have come in contact with knotweed at Eng Pit and was relocated to the Carratt Creek site without being washed.	December 1, 2022	Implemented a protocol to manage the potential spread of invasives from Eng Pit, including wash station, and updated CEMP. Assessment conducted to potentially identify invasive species where Carratt Creek works abut Eng Road pit – no species observed.	December 15, 2023
High volume of sand and fine sediment noted in the channel in advance of re-introducing flow creating a risk to downstream fish and fish habitat.	December 14, 2022	Excavation of stockpiled sediment materials effectively completed in advance of re-introducing flow to help prevent excess mobilization.	December 19, 2023

Archaeological – Leq'á:mel First Nation

Engineering Field Direction – Associated

- Directed Richco and Jakes to refrain from all alterations to the existing dike banks, including sediment removal at dike toes to prevent over steepening or undermining of existing slopes. Richco stockpiled materials against the existing bank – an offset from the existing slopes was maintained while excavated stockpiled material to refrain from damaging slopes.
- Directed location of HESCO Barrier alignment; alignment selected to encompass all visible streamflow paths and debris deposition resulting from the upstream channel avulsion.
- Provided bank repaired dimensions.
- Provided direction on sediment removal depth corresponding to apparent pre-flood conditions, based on sectional topography and distinct changes in streambed materials.

4.6 Project Completion

A final walkthrough was completed on December 19th, 2023 by representatives of Jake's Construction, Richco Contracting, and Associated.

Substantial completion of each contract occurred on January 6th, 2023 for Richco Contracting, and January 19th, 2023 for Jake's Construction. Certificates of completion were issued those same days and notices posted to site in accordance with the BC Builder's Lien Act.

Record survey data was provided by Terra Remote Sensing (topographic survey) and record drawings were produced (see Appendix M)

4.7 Summary of Key Dates

Table 4-2 Summary of Key Dates

	Jake's Construction (GS23EPFLOOD0084)	Richco Consulting (GS23EPFLOOD0085)
Contract signed	November 7 th , 2022	November 1 st , 2022
Construction Start	November 24 th , 2022	November 24 th , 2022
Site Walkthrough	December 19 th , 2022	December 19 th , 2022
Certificate of Completion Issued	January 19, 2023	January 10, 2023
Lien Holdback Release	March 15, 2023	March 6, 2023

CERTIFICATION PAGE

This report presents our findings regarding the Ministry Of Environment and Climate Change Strategy Hatzic Emergency Works Program Carratt Creek. The services provide by Associated Engineering (B.C.) Ltd. in the preparation of this report were conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions. No other warranty expressed or implied is made.

Respectfully submitted,

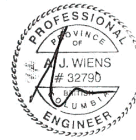
Associated Engineering (B.C.) Ltd.
Engineers & Geoscientists BC Permit Number 1000163

Prepared by:



Trevor Friedmann, P.Eng.
Water Resources Engineer

Reviewed by:



Feb. 5 2024

Andrew Wiens, P.Eng.
Discipline Lead, Water Resources

TF/AW/ia

APPENDIX A – SITE ASSESSMENT TECH MEMO

Initial site assessment reports for areas of immediate concern (AIC) to allow the Province of BC to review and consider risks, potential consequences, and to prioritize urgent mitigation measures, including removal of sediments introduced by the 2021 Atmospheric River event (and other potential mitigation measures).

Please see folder for further information.

APPENDIX B - DESIGN SKETCHES/DRAWINGS

Design drawings submitted as part of the regulatory applications.

Please see folder for further information.

APPENDIX C - ENVIRONMENTAL APPROVAL DOCUMENTS

All the required environmental permits for this work including DFO, WSA Section 11 ,etc. are contained in this appendix.

Please see folder for further information.

APPENDIX D - ARCHEOLOGICAL PERMITS

The Province of BC obtained a Heritage Investigation Permit for flood recovery activities.

This Multi-Assessment Permit (MAP) will support government's response to and recovery from the widespread damage caused by 2021's catastrophic rain events and resulting flooding and landslides in the south and coastal regions of British Columbia. Various Provincial Ministries and Local Governments are tasked with responding to emergency events, restoring infrastructure, cleaning up debris and environmental contamination, and maintaining public health.

Please see folder for further information.

APPENDIX E - CONTRACTOR ASSESSMENT

This letter summarizes the process selecting and recommending suitable contractors for the flood recovery work.

Please see folder for further information.

APPENDIX F - CONTRACT DOCUMENT

Major Works contract between the Contractor and The Ministry of Environment and Climate Change Strategy.

Please see folder for further information.

APPENDIX G - ACCESS AGREEMENT

Land access agreement between the landowners/homeowners and The Ministry of Environment and Climate Change Strategy.

Please see folder for further information.

APPENDIX H - FIELD REVIEW REPORTS

All construction field reports from the Contractor, AE, Cultural Monitor and Environmental Monitor.

Please see folder for further information.

APPENDIX I - SUBSTANTIAL PERFORMANCE

- Certificate of Substantial Performance
- Deficiencies Letter
- Builders Lien Act (BLA) Certificate of Completion
- Notice of BLA Certificate of Completion

Please see folder for further information.

APPENDIX J - FINAL PROGRESS PAYMENT AND CLOSEOUT DOCUMENTS

- Release of Builders' Lien holdback (final progress payment)
- Certificate of Total Performance

Please see folder for further information.

APPENDIX K - CONTRACTOR PAYMENT SUPPORT INFORMATION

Progress claims from the contractor to The Ministry of Environment and Climate Change Strategy. Progress payment certificates prepared by AE.

Please see folder for further information.

APPENDIX L - BEFORE AND AFTER CONSTRUCTION PHOTOGRAPHS & PARAGRAPH OF WORKS FOR ENV

Before and after photos of the construction works.

Please see folder for further information.

APPENDIX M - RECORD DRAWINGS

Final record drawings of the completed construction work.

Please see folder for further information.

APPENDIX N - ENVIRONMENTAL MONITORING REPORT

Environmental Monitoring Reports from the contractors environmental monitor.

Please see folder for further information.

APPENDIX O - ARCHEOLOGICAL MONITORING REPORT

The project relied on a chance find procedure. Leqamel First Nation staff were engaged to monitor the site during construction and identified chance finds when found. This appendix contains their Inspection Reports.

Please see folder for further information.

Appendix A

June 24, 2022
AE File: 2022-2462-00

TEL: 604.293.1411
FAX: 604.291.6163
www.ae.ca

Fred Bjork, P.Eng.
Price Waterhouse Coopers
Submitted via email: fred.bjork@pwc.com

**Re: PRELIMINARY SITE ASSESSMENT OF POTENTIAL AREAS OF IMMEDIATE CONCERN
PWC SITE ID: S-CR-28 - CARRATT CREEK AT CARRATT RD BRIDGE, HATZIC, BC**

Dear Mr. Bjork:

The purpose of this high level and preliminary assessment of identified potential Areas of Immediate Concern is to allow the Province of BC to review and consider risks, potential consequences, and to prioritize urgent mitigation measures, including removal of sediments introduced by the 2021 Atmospheric River event (and other potential mitigation measures). The objective is to avoid hydraulic restrictions in the waterways and associated flooding due to the upcoming 2022 spring freshet, which may cause additional damage to riverbeds, banks, and infrastructure, and pose a significant threat to the safety of people, properties, infrastructure, and the environment.

1 SITE INFORMATION

Site ID: S-CR-28
Location: 49.262427, -122.217317
Site description: Carratt Creek at Carratt Road Bridge, Hatzic, BC
Local Government Agency: Fraser Valley Regional District (FVRD)
Waterbody: Carratt Creek

The site location is shown in **Figure 1** and **Figure 2** located at the end of the letter.

2 SITE HAZARD

2.1 HAZARD ASSESSMENT METHODOLOGY

The assessment, as summarised in this Memo for the noted Area of Immediate Concern, follows the following general methodology and approach:

1. High level senior engineering level experience and judgement, review of available relevant reference information, site visits and visual inspections, and communication with relevant stakeholders;
2. Risk assessment; and
3. Identification and advice on prioritized and appropriate mitigation measures (if any), their required timing, and further work required to validate such advice.

For this site, Associated Engineering (AE) completed a high-level, qualitative assessment of the above-noted site, based on a site visit completed on April 5, 2022 and a review of background data noted in [Section 3](#).

2.2 HAZARD ASSESSMENT SUMMARY

The November 2021 Atmospheric River resulted in significant flooding and widespread sediment deposition throughout Carratt Creek. Sediment from the steeper upstream portions of the Stove Lake watershed was transported and deposited downstream throughout the low gradient reaches, including Carratt Creek.

An assessment of the Carratt and Cascade Creek Dyke system completed by Golder Associates in March 2022 notes that sediment deposition is a regular occurrence in this watershed, particularly under high flow conditions (Golder, 2022). High flow conditions are generated during fall and winter storms, such as an atmospheric river event, rather than a freshet (snowmelt) event.

During our assessment of the Carratt Road Bridge, we noted the following:

1. Sediment deposition throughout the width of the channel, has resulted in minimal freeboard under the Carratt Road Bridge under low flow conditions (< 0.5 m).
2. There is significant debris upstream of the Carratt Road Bridge that could be washed downstream during high flow conditions, further restricting the hydraulic capacity below bridge.

In our opinion, the available hydraulic capacity beneath the bridge is inadequate for a small rainfall or small freshet events and requires immediate attention. Depending on the magnitude of the velocities and flow in the creek, there is the potential for further impacts to the local property owners on either side of the creek.

3 PRELIMINARY RISK EVALUATION

The Preliminary Risk Evaluation for the site is shown in [Table 3-1](#). The risk key is enclosed for ease of reference ([Enclosure A](#)).

Table 3-1:
Preliminary Risk Evaluation

Category	Preliminary Risk Evaluation	Anticipated Consequence
Public Health and Safety	Very High	A channel avulsion is possible in multiple locations. This would result in flows impacting adjacent properties and buildings with little to no warning. Public safety is a significant concern.
River Capacity	Very High	The channel is full of sediment and has almost no capacity. The bridge opening is almost complete filled with sediment. Immediate action required.
Environmental	Low	Some impact to vegetation is anticipated but is expected to re-establish over time. The presence of rare vegetation or culturally significant sites is unknown.
Infrastructure	Very High	Loss of the Carratt Creek bridge would prevent emergency evacuation of residents and delay emergency responders.

Based on the preliminary risk evaluation noted above, we assess the risk to be **Very High**. On this basis, we confirm that the site rating remains an Area of Immediate Concern.

The Preliminary Risk Evaluation is based on the following currently available information:

1. Background Reports:
 - a. Golder. (2022, March 28). *Carratt Creek and Cascade Creek Dikes. Field Assessment of Dike Condition*.
2. Site Assessment completed on April 5, 2022 (See **Enclosure B** for Site Photos).
3. Google Satellite Imagery.
4. Hydrology mapping provided by Emergency Management BC.
5. Operations and Maintenance information provided by FVRD.
6. Discussions with FVRD staff.

4 SITE OPINION AND ADVICE

Based on the hazard and risk assessment, it is our opinion that Site S-CR-28 is an Area of Immediate Concern (AIC), requiring further assessment, emergency work and potential mitigation measures to be implemented as soon as possible:

Emergency Works (ASAP):

1. Remove deposited sediment and debris at the bridge site and upstream areas to re-establish channel capacity. Extents of sediment removal to be confirmed through additional site investigations.
2. Repair channel avulsion approximately 900 m upstream of bridge, based on recommendations provided by Golder (2022).

Long-Term Holistic Solutions (to current Codes and Standards):

1. Complete a hydraulic capacity assessment of the channel.
2. Complete additional sediment removal, bank restoration and installation of erosion protection as determined by the hydraulic capacity assessment.

5 CLOSURE

Please contact Andrew Wiens at 403-863-4009 if there are additional questions or concerns.

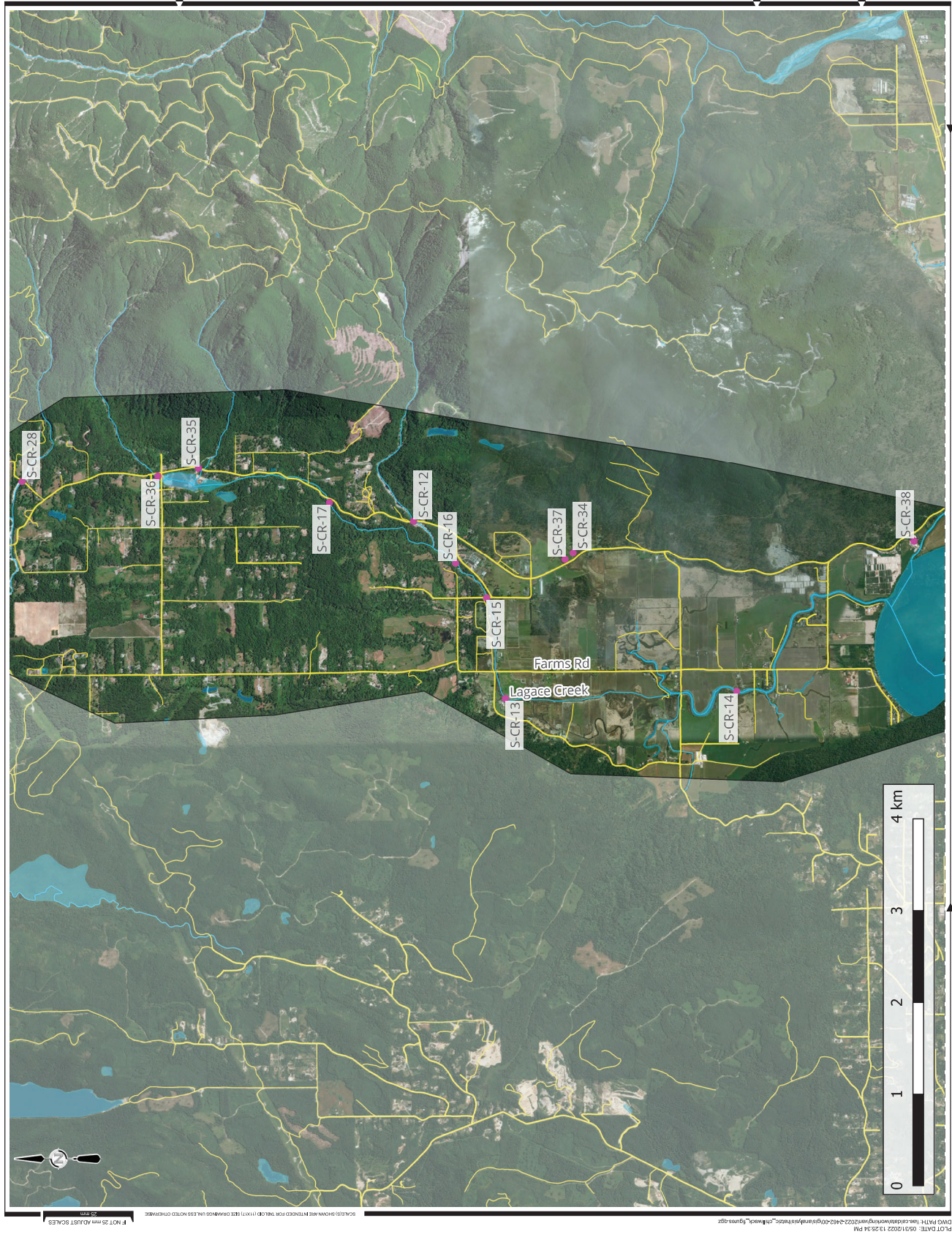
Yours truly,

Prepared by:

Reviewed by:

Carmen Janzen, P.Eng. (Alberta)
Project Engineer
CJ/AW/fd/kc

Andrew Wiens, P.Eng. (BC)
Senior Water Resources Engineer





AES
BEST
PRACTICES
FOR
ENGINEERING
COMPANIES
MEMBER

Associated
Engineering

Legend

- Roads
- Watercourses
- Waterbodies
- Problem Location (Site)

NOTE: AERIAL IMAGERY PROVIDED BY BING
AERIAL MAY NOT REFLECT CURRENT CONDITIONS
DUE TO FLOOD EVENTS SINCE THE DATE OF
COLLECTION

PROJECT LOCATION



FIGURE 2

PRICewaterhouse COOPERS	AE PROJECT No.	20222462-00
BC MINISTRY OF ENVIRONMENT	SCALE	AS SHOWN
WATERWAY SEDIMENT ASSESSMENT	APPROVED	A. WIENS
PWC SITE S-CR-28	DATE	20200502
CARRATT CREEK AT CARRATT CREEK RD BRIDGE	REV	A
	DESCRIPTION	ISSUED FOR FINAL



1: NOT TO SCALE
20 000

SCALED TO SHOW ARE INTENDED FOR 100% (0.0) (1:1000) SIZE CHANGES UNLESS NOTED OTHERWISE

PLOT DATE: 05/02/2022 13:08:47 PM
DRAWN BY: [unintelligible]
CHECKED BY: [unintelligible]
DATE: 05/02/2022 13:08:47 PM

Enclosure A – Risk Matrix

Risk Evaluation and Response						
	Consequence Rating	Very Low	Low	Medium	High	Very High
Indices	Public Health and Safety	Minor disruption to few.	Minor, short term disruption to local community or moderate disruption to few.	Moderate disruption to local community, or substantial disruption to few.	Moderate, long term disruption to local community.	Substantial, long term disruption to region.
	River Capacity	Flow contained within the channel	Flow temporarily floods adjacent land	Flow floods adjacent lands resulting in prolonged flooding	Partial avulsion of flow resulting in flooding, erosion and scour damage to adjacent land and infrastructure	Full avulsion of flow resulting in flooding, erosion and scour damage to adjacent land and infrastructure
	Environmental	No noticeable loss or deterioration of habitat, species, unique landscapes, or culturally valued sites.	Small, short term loss or deterioration of important, unique, rare, or endangered habitat, species, landscapes, or culturally valued sites. Moderate, recoverable loss or damage of less valued habitat, species, landscapes, or sites.	Moderate temporary or small permanent loss or deterioration of important, unique, rare, or endangered habitat, species, landscapes, or culturally valued sites. Moderate loss or damage of less valued habitat, species, landscapes, or sites.	Moderate permanent loss or deterioration of important, unique, rare, or endangered habitat, species, landscapes, or culturally valued sites.	Major permanent loss or deterioration of important, unique, rare, or endangered habitat, species, landscapes, or culturally valued sites.
	Infrastructure	No infrastructure impacted	Impacts to infrastructure (minor erosion or scour, some debris accumulation, partial infilling, etc.) are not expected to have an impact of the operation of the infrastructure.	Impacts to infrastructure (erosion or scour, debris accumulation, infilling, etc.) leave infrastructure vulnerable	Impacts to infrastructure (erosion or scour, debris accumulation, infilling, etc.) should be repaired post-freshet	Impacts to infrastructure (erosion or scour, debris accumulation, infilling, etc.) will likely result in failure or irreparable damage to the infrastructure - repairs should commence pre-freshet
	Annual Exceedance Probability	Very Low	Low	Medium	High	Very High
Very Likely	>0.2	M	H	H	VH	VH
Likely	0.2-0.1	L	M	H	H	VH
Moderate	0.1-0.02	L	L	M	H	H
Unlikely	0.02-0.005	VL	L	L	M	H
Very unlikely	<0.005	VL	VL	L	L	M
Risk Key		VH	Very High	Risk is unacceptable short-term (before next flood season); Risk reduction required		
		H	High	Risk is unacceptable medium-term; Risk reduction plan must be developed and implemented in a reasonable time frame		
		M	Medium	Risk may be tolerable; more detailed review required		
		L	Low	Risk is tolerable; monitor		
		VL	Very Low	Risk is broadly acceptable; no further review needed		

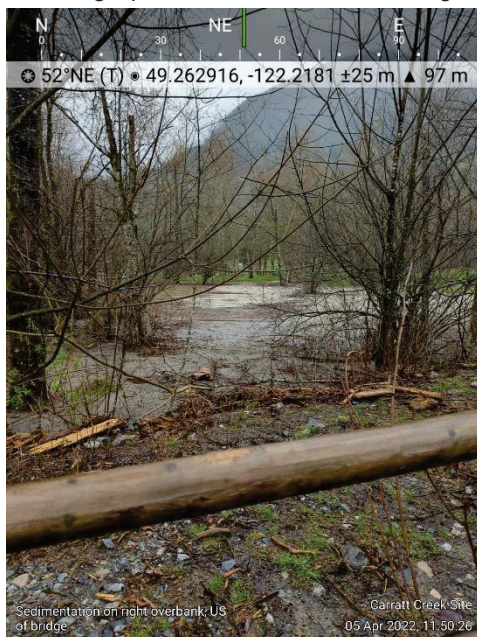
Enclosure B – Site Photos



Carratt Creek:
Viewing Upstream from Carratt Rd Bridge



Carratt Creek:
Viewing Downstream from Carratt Rd Bridge



Sediment Deposition beyond Right Bank upstream
of Carratt Rd Bridge



Carratt Rd Bridge:
Viewing Downstream from Upstream Left Bank

Appendix B

DRAWING INDEX			
SHEET	DRAWING NAME	REVISION	DRAWING TITLE DRAWING DESCRIPTION
GENERAL			
1	2462-00-G-2001	0	COVER SHEET
CIVIL			
2	2462-00-C-2101	0	PLAN
3	2462-00-C-2001	0	DETAILS
EMERGENCY WORKS			

WATERWAY SEDIMENT ASSESSMENT PROPOSED DESIGN WORK S-CR-28 CARRATT CREEK

PLOT DATE: 2022-09-14 2:00:07 PM
SAVE DATE: 2022-09-14 1:57:13 PM SAVED BY: WHITEJ
DWG PATH: I:\2022\2462-00_Sediment-as-28\Carratt-00-9-2001.dwg



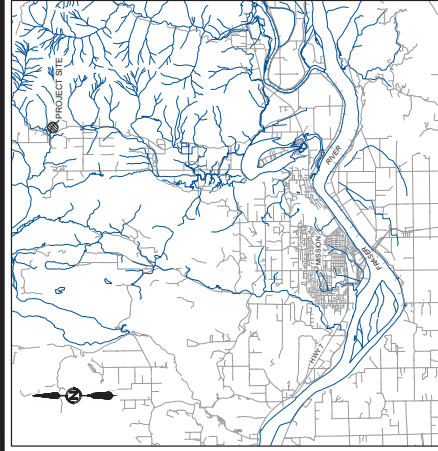
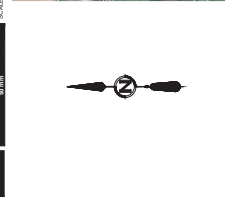
PRICEWATERHOUSE COOPERS
BC MINISTRY OF ENVIRONMENT
WATERWAY SEDIMENT ASSESSMENT
PROPOSED DESIGN WORK
S-CR-28 CARRATT CREEK
2022-2462-00

DRAFT

REV	DATE	DESIGN	DRAWN	DESCRIPTION
DRAWING				
2462-00-G-2001				REVISION
				0
				SHEET
				1

IF NOT DIMENSIONED

SCALES SHOWN ARE INTENDED FOR AND TO BE USED IN THE DRAWING. ALL DIMENSIONS SHALL BE IN METERS UNLESS NOTED OTHERWISE.

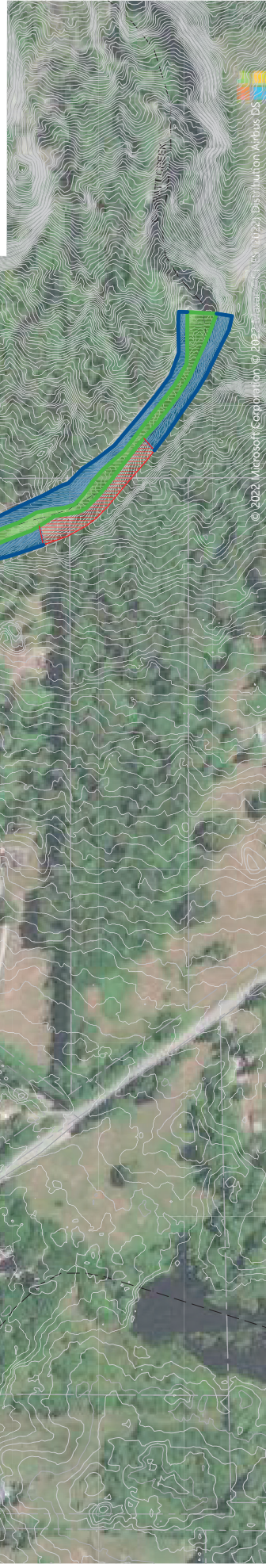


LOCATION PLAN
NOT TO SCALE

NOTES:

1. ACTUAL EXTENTS OF EMERGENCY WORKS WILL BE CONFIRMED IN THE FIELD BY THE ENGINEER AS PART OF THE EMERGENCY WORKS.
2. ALL DIMENSIONS IN METERS UNLESS OTHERWISE NOTED.
3. THE CONTRACTOR SHALL VERIFY LEVELS ON-SITE USING SURVEY.
4. IT SHOULD BE EXPECTED THAT THIS DESIGN WILL HAVE TO BE FIELD-FIT ON SITE WHEN ACCURATE SURVEY CAN BE PROVIDED. ELEMENTS THAT COULD REQUIRE FIELD-FITTING INCLUDE: BRAP, SEDIMENTATION LOCATIONS, AND DESIGN FOR SEDIMENT REMOVAL.

- EROSION PROTECTION AREA
- BANK RESTORATION AREA
- SEDIMENT AND DEBRIS REMOVAL AREA





Associated Engineering

PRICEWATERHOUSE COOPERS
BC MINISTRY OF ENVIRONMENT

WATERWAY SEDIMENT ASSESSMENT
PROPOSED DESIGN WORK
S-CR-28 CARRATT CREEK
2022-2462-00

PLAN
EMERGENCY WORKS

REV

DATE

DESIGN

DRAWN

DESCRIPTION

0

2022-09-14

MARK

J. WHITE

SEAL FOR APPROVAL

2462-00-C-2101

0

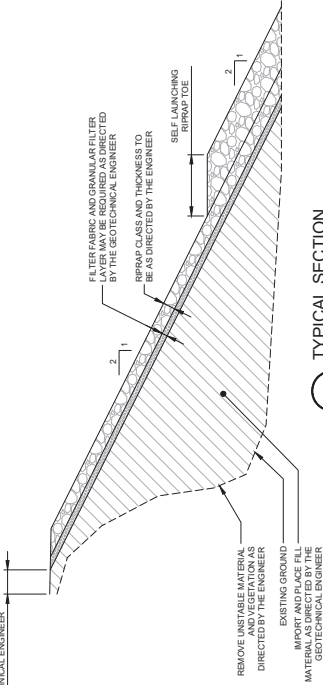
2

SCALE: 1:1500

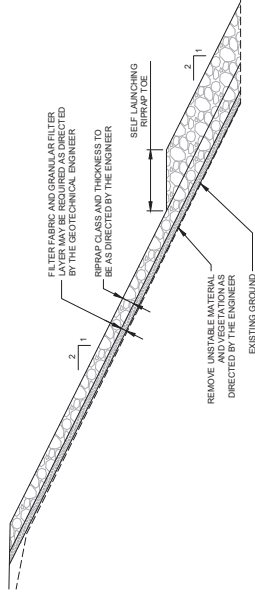
IF NOT DIMENSIONAL SCALES

SCALES SHOWN ARE INTENDED FOR AND USE ONLY. SCALE SHOWN VALUES NOTED OTHERWISE

CONSTRUCT TO MINIMUM
WATER FLOW CAPACITY
ALLOW FOR COMPACTION
AS DIRECTED BY THE
GEOTECHNICAL ENGINEER



1 TYPICAL SECTION
BANK RESTORATION



2 TYPICAL SECTION
EROSION PROTECTION

REFER TO TYPICAL SECTION 1 & 2
FOR BANK RESTORATION AND
PROTECTION (BOTH BANKS)

EXISTING GROUND
SEDIMENT, DEBRIS, AND LOGS
IN CHANNEL
EXCAVATE TO MINIMUM
AS DIRECTED BY THE ENGINEER
EXCAVATED DEPTH MAY VARY
UP TO A MAX. OF 2.0 m.

3 TYPICAL SECTION
SEDIMENT REMOVAL - ENTIRE CHANNEL FILLED

REFER TO TYPICAL SECTION 1 & 2
FOR BANK RESTORATION AND
PROTECTION (BOTH BANKS)

EXISTING GROUND
SEDIMENT, DEBRIS, AND LOGS
IN CHANNEL
EXCAVATE TO MINIMUM
AS DIRECTED BY THE ENGINEER
EXCAVATED DEPTH MAY VARY
UP TO A MAX. OF 2.0 m.

4 TYPICAL SECTION
SEDIMENT REMOVAL - PARTIALLY FILL CHANNEL



DRAFT



PRICEWATERHOUSE COOPERS
BC MINISTRY OF ENVIRONMENT
WATERWAY SEDIMENT ASSESSMENT
PROPOSED DESIGN WORK
S-CR-28 CARRATT CREEK
2022-2462-00
SCALE: AS SHOWN

DETAILS
EMERGENCY WORKS

REVISION	REVISION	SHEET
0	0	3

Appendix C



November 21, 2022

Job Number: 2010103

Ministry of Environment and Climate Change Strategy
PO BOX 9047 STN PROV GOVT
VICTORIA BC V8W 9E2

Dear Ministry of Environment and Climate Change Strategy,

Re: Change Approval - Changes In and About a Stream on Carrott Creek

A Change Approval for the above application has been granted and a *Water Sustainability Act* Section 11(1) Changes In and About a Stream Approval document verifying this is attached.

This Approval is to support urgent flood recovery works following the November 2021 Atmospheric River event which caused numerous issues including channel avulsions within Carratt Creek, erosion of protection berms along the watercourse, and damage of nearby properties. The works authorized herein are to address further threats to property and public safety.

This Change Approval does not authorize entry onto private or Crown owned land. Permission of the affected landowner must be obtained and should be in writing for your protection.

This approval does not constitute authority of any other agency. The holder of this approval shall have the necessary permits from other agencies concerned prior to the commencement of the works authorized herein. The permit holder is required to adhere to all other applicable Provincial and Federal Regulations.

A copy of this Approval (and associated plans/drawings listed on this Approval) must be available for inspection, upon request, at any location where the authorized changes in and about a stream are being undertaken.

This Approval requires the oversight of an appropriately Qualified Professional. For the purposes of this authorization, that professional must be an applied scientist or technologist, acting alone or together with another qualified professional. He or she must be registered and in good standing in British Columbia with an appropriate professional organization constituted under an Act, acting under that association's code of ethics and subject to disciplinary action by that association.

The holder of this approval shall ensure that any proposed development and/or changes do not impact traditional or special sites in accordance with the Heritage Conservation Act or the ability of First Nation community members to participate in traditional activities on the land and water.

Archaeological sites (both recorded and unrecorded) are protected under the Heritage Conservation Act and must not be altered or damaged without a permit from the Archaeology Branch. The holder of this approval must advise everyone who will be involved in ground-disturbance and construction that if archaeological materials are encountered, activities must be halted, and the Archaeology Branch contacted at 250-953-3334 for direction.

Section 105 of the Water Sustainability Act gives the recipient of this notice the right to appeal my decision. You may file an appeal within 30 days of the date indicated on this letter. Information on filing an appeal can be found on the Environmental Appeal Board WEB site at <http://www.eab.gov.bc.ca/>.

If you have any questions or concerns regarding the document issued or the content of this letter, please feel free to contact the South Coast Office at WaterActReferrals.LowerMainland@gov.bc.ca.

Sincerely,



Malissa Smith
Assistant Water Manager

Enclosure(s)



November 21, 2022

File Number: 2010103

APPROVAL

WATER SUSTAINABILITY ACT - Subsection 11(1) and 11(2)
(Changes in and about a stream)

The Ministry of Environment and Climate Change Strategy

is hereby authorized to make changes in and about a stream as follows:

- (a) The name of the stream is Carratt Creek.
- (b) The Changes to be made in and about the stream are:
 - 1. Excavate approximately 65,000 cubic meters of sediment and debris over an area of approximately 32,700 square meters over the full width of the channel to an average depth of approximately 2 meters along a 260 meter reach downstream of the bridge and 900 m upstream of the bridge;
 - 2. Removal of debris Jam;
 - 3. Bank restoration using imported fill placed at a slope of 2 horizontal to 1 vertical;
 - 4. Dike Restoration;
 - 5. Construction of a berm at the location of the channel avulsion;
 - 6. Approximately 700 meters of riprap erosion protection; and
 - 7. Installation of a temporary HESCO barrier on Crown Land to redirect surface flows into Carratt Creek.

All Within Lot 6, Plan 38835; and Lots 14 and 15, both within Plan 52158; and Lot 7, Except: Parcel A (Exp Plan 39603), Plan 38835, all within Section 31, Township 31; and Legal Subdivision 14, Section 33, Township 3, Range 2, W6M, Except Part Subdivided by Plan 24872, all within New Westminster District; as held under the attached Permit Over Crown Land No. 29581.

- (c) The works authorized in this Approval shall be completed on or before March 31, 2023.

- (d) Work in the stream and stream channel shall occur only during the periods outlined below, so that the fisheries interests are protected:
1. Instream work during the reduced risk instream work window shall occur during the period of August 1 to September 15; or
 2. Based on project justification and risk, instream work outside of the reduced risk instream work window (as stated above), subject to the following:
 - i) An appropriately qualified professional shall provide advice to the holder of this Approval on the timing of the work based on the nature of the works, environmental values (including fish, amphibians, wildlife, any listed species present), water quality, channel stability, weather conditions, water levels, and any other relevant factors); and
 - ii) The Qualified Professional shall also provide additional construction mitigation advice to the holder of this Approval, and daily or full-time supervision of all work in or near the stream; and
 - iii) Work must be timed and planned appropriately, the stream must be completely dry or have marginal flows for the duration of the construction activities; and
 - iv) The advice of the Qualified Professional on construction timing (as per (i) above) and mitigation measures (as per (ii) above), as well as the timing of work and the presence of the Qualified Professional, must be documented in writing. This documentation must be submitted as part of the post construction reporting for this project.
- (e) All works shall be completed within the designed project footprint and in accordance with the following:
1. Preliminary Site Assessment of Potential Areas of Immediate Concern PWC Site ID: S-CR-28 – Carratt Creet at Carratt Road Bridge, Hatzic, BC, prepared by Associated Engineering, June 24, 2022
 2. Revised for Section 11 Approvals Engineered Drawings Titled Waterway Sediment Assessment Proposed Emergency Work S-CR-28 Carratt Creek, prepared by Associated Engineering, dated November 4, 2022
 3. Environmental Management Plan, prepared by Associated Engineering, dated October 2022
- (f) All work shall be carried out in accordance with the “Requirements and Best Management Practices for Making Changes In and About A Stream in British Columbia” (2022). The Provincial guidance document can be found at the

following link: <https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/wsa-cias-requirements-bmps.pdf>

- (g) The holder of this Approval must hire an appropriately Qualified Professional to conduct Environmental Monitoring on all in-stream works authorized under this Approval. The Qualified Professional is responsible for observing the methods of construction and preparing information and reports on the compliance of the construction activities. The Qualified Professional shall:
1. Ensure all best management practices and mitigation measures are in place to avoid and minimize environmental impact on the land and on fish and fish habitat of the stream.
 2. Where applicable, assist in the isolation of the stream prior to the commencement of works.
 3. Implement and ensure erosion and sediment control measures are constructed, installed, and maintained appropriately for the full duration of instream works.
 4. Supervise all instream works authorized under this Approval.
 5. When the works involve temporary diversions to isolate the work site,
 - i) Monitor all diversion works daily to ensure pumps & flow bypasses are in proper working condition;
 - ii) Ensure diversion works that include pump intakes be screened for fish and aquatic species in accordance with the “Interim code of practice: End-of-pipe fish protection screens for small water intakes in freshwater” (Fisheries and Oceans Canada, 2020); and
 - iii) Ensure fish are prevented from entering the works.
 6. When the works involve dewatering or isolation of flow and the stream is known or suspected to contain fish and/or amphibians,
 - i) Attend the site prior to conducting any instream works to complete fish and wildlife search and salvage(s);
 - ii) Obtain any permits needed prior to undertaking the salvage(s); and
 - iii) Inspect the extraction area for fish stranding at least once after water levels have declined.
 7. Be granted authority to stop the work authorized under this Approval if deemed necessary to address risks to the environment. The Qualified Professional or their designate (specified in writing) must be on site during all phases of construction in and around the stream to ensure this component is upheld.
 8. Report any spills including detailed information such as time of day, staff involved, nature, cause, and degree of spill, recovery process deployed, and agencies notified which must include the Dangerous Goods Incident Report 24-hour phone line at 1-800-663-3456.

9. In the event of an environmental incident or non-compliance with any of the terms or conditions of this Approval, an appropriately Qualified Professional must immediately mitigate the situation. Within 48 hours, each incident must be reported to the Water Manager at SouthCoastWSAReporting@gov.bc.ca with the approval number in the subject line. The incident report shall describe mitigation measures employed and a rationale as to why works have resumed, or the next steps required before works may resume. The holder of this approval must follow the advice of the appropriately Qualified Professional.
- (h) Upon commencement of the project, work shall be pursued to completion as quickly as possible.
- (i) All proposed works shall be completed in isolation of the stream flows.
- (j) All equipment and machinery used in or near the stream channel:
1. Must be in good operating condition and free of leaks, excess oil and grease;
 2. Must have a spill containment kit readily accessible on-site; All staff must be trained in handling and applying a spill kit appropriately to any spills/incidents;
 3. Refueling must occur a minimum of 30 metres away from all streams; and
 4. Must use environmentally sensitive hydraulic fluids which are non-toxic to aquatic life and which are readily or inherently bio-degradable.
- (k) Sediment and Erosion Control measures to prevent the release of silt, sediment or sediment-laden water must be in place before starting works that may result in sediment mobilization the satisfaction of the environmental monitor, or if the channel is dry, erosion and sediment control materials must be on site and ready for deployment if required.
- (l) Care shall be exercised during all phases of the work to prevent the release of silt, sediment, sediment-laden water, raw concrete, concrete leachate, or any deleterious substances. All control measures must meet or surpass the Requirements and Best Management Practices for Making Changes in and About a Stream in British Columbia (2022). and the "Land Development Guidelines for the Protection of Aquatic Habitat" (Fisheries and Oceans Canada and the British Columbia, 1993).
- (m) All excavated material and debris shall be removed from the site or placed in a stable area above the high water mark of the stream. Mitigative measures must be applied to protect the excavated material and debris from erosion and reintroduction into the watercourse. These measures may include covering the

material with erosion blankets, seeding and planting with native vegetation, or as otherwise directed by a Qualified Professional.

- (n) All disturbed areas of the banks of the stream shall be restored using native vegetation suitable for the site conditions.
- (o) All rock used in the works shall be clean and free of sediment producing material, durable, non-acid generating and suitably graded.
- (p) The Creek alignment should be maintained and in no case should the excavation increase the overall width of the channel. No over excavation of the channel is permitted.
- (q) The finished channel should have a gentle U or V shape in the cross section with the stream bed left in a reasonably smooth state with no depressions that could strand fish.
- (r) The final bottom substrates should consist of minus 6-inch gravel similar to the composition of the excavated material. If fine grained soils such as clays and silts are encountered in the stream bed they should not be disturbed, and the depth of excavation should be adjusted to maintain a layer of gravel covering these substrates.
- (s) Large boulders and large woody debris should be retained in the channel for fish habitat where possible and under the direction of a qualified professional.
- (t) The holder of this Approval must provide a detailed post-construction report no later than December 1 in every year that works were completed. The report must be submitted by email to SouthCoastWSAReporting@gov.bc.ca and to the People of the River Reporting Office, with the approval file number listed in the subject line of the email and the title of the report. The report shall include a signed statement from an appropriately Qualified Professional summarizing:
 - 1. The in-stream works undertaken;
 - 2. The timing of those works;
 - 3. The total in-stream area directly affected, including a map highlighting the specific areas sediment was removed in each year;
 - 4. As-built drawings of the final works constructed;
 - 5. The quantity of gravel removed;
 - 6. Representative site photographs;
 - 7. Summary of aquatic species salvaged, if/where relevant;

8. Whether or not they observed or were otherwise aware of any non-compliance with the terms and conditions of this Approval; and
9. A description of any environmental incidents, non-compliance or other difficulties, and how these were addressed and reported.



Malissa Smith
Assistant Water Manager



Province of British Columbia

Water Sustainability Act

PERMIT AUTHORIZING THE OCCUPATION OF CROWN LAND

Permit No.: 29581

The holder of this permit, Ministry of Environment and Climate Change Strategy (14475), whose Change Approval authorizes changes in and about a stream (Mechanic Creek), is hereby authorized to occupy Crown Land by constructing, maintaining and operating the works as authorized in the Change Approval 2010103.

- (a) The Crown land which is authorized to be occupied under this permit is a portion of Lot 6, Plan 38835; and Lots 14 and 15, both within Plan 52158; and Lot 7, Except: Parcel A (Exp Plan 39603), Plan 38835, all within Section 31, Township 31; and Legal Subdivision 14, Section 33, Township 3, Range 2, W6M, Except Part Subdivided by Plan 24872, all within New Westminster District, the location of which is shown approximately on the plan attached to the said Change Approval.
- (b) The approximate dimensions of the Crown Land authorized to be occupied under this permit, are for: Works 2000 metres in length by 3 metres in width, having an area of .6 hectares.
- (c) Prior to cutting, destroying or clearing of any timber necessary to construct, maintain and operate the said works or the clearing of the said lands which may be flooded, the permittee shall apply for and obtain a licence to cut timber from the Ministry of Forests, District Manager. The amount of stumpage, royalty and/or compensation payable to the Crown in respect of trees, including merchantable or young growth, cut, removed, damaged, or destroyed by the permittee, shall be the sum or sums fixed by the Forest Service of the Province of British Columbia.
- (d) This permit is appurtenant to the land, mine, or undertaking to which the aforesaid Change Approval is appurtenant.
- (e) This permit shall become void if the Change Approval with respect to which the permit is issued should terminate, be abandoned or cancelled, or amended so as to render this permit unnecessary.
- (f) This permit is issued and accepted on the understanding that the permittee shall indemnify and save harmless the Government of the Province of British Columbia for all loss, damage to works, cost or expense suffered by the permittee by reason of the Crown

land or any portion thereof being submerged or damaged by erosion or otherwise affected by flooding.

- (g) The holder of this permit shall not be entitled to compensation if the Crown grants permits to other persons to occupy the land affected by this permit.
- (h) In the event of a dispute at any time with respect to the area or boundaries of the land affected by this permit, the holder shall, at his own expense, have the said land surveyed by a duly authorized surveyor.

A handwritten signature in black ink, appearing to read 'Malissa Smith', with a large, stylized loop at the end.

Malissa Smith
Assistant Water Manager

Appendix D



HERITAGE CONSERVATION ACT

APPLICATION FOR HERITAGE INVESTIGATION PERMIT

The undersigned hereby applies for a permit, under **Section 12.2** of the *Heritage Conservation Act*, to carry out a Heritage **Investigation** in accordance with the information requested on the reverse of this form.

Name: Sarah Fraser, A/Associate Deputy Minister	Company: Ministry of Forests, Lands and Natural Resource Operations and Rural Development (FLNRORD)
Address: 4th Floor, 545 Superior Capital Park, Victoria BC V8V 0C5	
Phone: 250-953-3334 (Archaeology Branch)	Email: Archpermitapp@gov.bc.ca

Permit expiry date:	May 31, 2023
Permit deliverables¹ due:	May 31, 2023

Financial responsibility for the assessment is assumed by the following proponent(s):

Name: Jeff Sheldrake, A/Assistant Deputy Minister, Coast Area	Company: FLNRORD
Address: 4th Floor - 2975 Jutland Road, Victoria, BC V8T 5J9	
Phone: (778) 974-5826	Email: Jeff.Sheldrake@gov.bc.ca

Name: Brent Persello, Environmental Services Manager	Company: Ministry of Transportation and Infrastructure (MoTI)
Address: 477 Columbia Street, Kamloops, BC V2C 2T3	
Phone: 778-362-4522	Email: Brent.Persello@gov.bc.ca

☒ Other Provincial Government or Local Government proponents with responsibilities for flood recovery activities may be added to this permit without an amendment, pending submission of a client certification and client endorsement, as appropriate, to the Archaeology Branch.

¹ Deliverables include: report(s), site records, shapefiles, repository acceptance as required – see Section 8

PERMIT APPLICANT'S CERTIFICATION

I certify that I am familiar with the provisions of the *Heritage Conservation Act* of British Columbia, and that I will abide by the terms and conditions listed herein, or any other conditions the Minister may impose, as empowered by said *Act*.

Permit Applicant's Certification

Date: December 14, 2021	Permit Applicant Name and title: Sarah Fraser A/Associate Deputy Minister, FLNRORD	Signature: 
--------------------------------	---	---

APPLICATION FOR HERITAGE INVESTIGATION PERMIT

Briefly summarize the project: This Multi-Assessment Permit (MAP) will support government's response to and recovery from the widespread damage caused by 2021's catastrophic rain events and resulting flooding and landslides in the south and coastal regions of British Columbia. Various Provincial Ministries and Local Governments are tasked with responding to emergency events, restoring infrastructure, cleaning up debris and environmental contamination, and maintaining public health.

The Associate Deputy Minister of the Ministry of Forests Lands and Natural Resource Operations (FLNRORD), South Area will hold the permit. Proponents will include representatives from FLNRORD and the Ministry of Transportation and Infrastructure (MoTI). Additional government proponents may be added to the permit without amendment. To expedite work, Ministries may undertake work for each other where that is more practicable (e.g., FLNRORD for MOTI projects).

The original permit study area is defined by the fifteen Natural Resource Districts affected by flooding (Figures 1-7):

Table 1. Natural Resource Regions and Districts included in permit

Area	Region	District	Figure(s)
North	Skeena	Coast Mountains	1
Coast	West Coast	North Island – Central Coast	1
		Campbell River	1
		South Island	1 & 2
	South Coast	Sunshine Coast	1
		Sea to Sky	1
		Chilliwack	1 & 3
South	Thompson-Okanagan	Cascades	1 & 4
		Okanagan-Shuswap	1 & 5
		Thompson Rivers	1

Area	Region	District	Figure(s)
South	Kootenay-Boundary	Selkirk	1 & 5
		Rocky Mountain	1 & 6
	Cariboo	100 Mile House	1
		Cariboo-Chilcotin	1 & 7
		Quesnel	1 & 7

As of November 26, 2021, the province has identified 14 landslides and 102 flood events (Figures 1-7) impacting MoTI infrastructure. While additional projects may be added to the permit by Notice of Intent by the Delegated Archaeologist, emergent situations with immediate threats to public or environment health and safety can be added to this permit by proponents without notice of intent, following approval by the Archaeology Branch.

The permit authorizes the investigation of archaeological sites, and areas suspected to contain archaeological sites, which may be impacted by ongoing weather-related impacts requiring emergency impact management, or by recovery work. Recovery work includes but is not limited to:

- relocation of debris and soil,
- slope and bank stabilization,
- removal of contaminated sediments and materials,
- cleaning and repair of infrastructure (i.e., fences, poles, ditches, culverts, road, bridges),
- clean-up of surface debris,
- geotechnical investigation,
- repair or construction of dykes or levees,
- construction of temporary structures, roads and facilities while repairs are completed,
- blasting, and
- gravel extraction.

Specifics about the nature and extent of works and affected infrastructure will be identified in the Notice of Intent, or, if in response to significantly emergent work, in the report summarizing the assessment.

The permit scope is broad, recognizing the nature of impacts and required work is not fully understood at the time of this application, but will unfold through the winter season. This is balanced with the need complete timely infrastructure repairs and clean up. The use of Archaeological Overview Assessments (AOAs) and Preliminary Field Reconnaissances (PFRs) to support and prioritize Archaeological Impact Assessment (AIA) efforts are encouraged in light of the volume of work that needs to be done. To support analysis of the impacts the 2021 floods had on archaeological sites, the final report will include the results of AOAs and PFRs. When appropriate, archaeologists have flexibility around the timing, nature and methods of the assessment (i.e., emergency, in advance, during

monitoring work, or on a post-impact basis) depending on the local conditions, type of site, safety, visibility and/or contamination. These considerations should be part of a workplan.

The permit structure is unique but considers the lessons and approaches of the Wildfire permits (2018-0375 and 2020-0034), to facilitate archaeological assessments following natural disasters on a provincial scale. This investigation permit, held by the Province, allows for assessments as and when-needed; government agencies who sign on as proponents may hire any number of eligible archaeologists to work under the permit. The archaeologist, referred to as a delegated archaeologist, is responsible for all of the permit's terms and conditions related to their contracted scope of work. Delegated archaeologists must meet eligibility requirements. Field Directors and Supervisors (per Bulletin 17) may be utilized by the delegated archaeologist, who is responsible for their work.

Where feasible, new land alterations will require assessment prior to construction/earth moving. If infeasible, a program of concurrent monitoring or post-impact assessment should be completed under this permit.

The Archaeology Branch must review and approve mitigation plans for all sites, including recommendations for systematic data recovery or additional HCA permits.

Table of Contents

1. FIELD PERSONNEL	7
2. PROPOSED PROJECT	7
2.1 Location	7
2.2 Proposed Study Area	8
3. RELATED STUDIES	9
4. GOALS AND OBJECTIVES	13
4.1 Goals and Objectives	13
4.2 Significance of Proposed Project	14
4.3 Expected Outcomes:.....	14
5. METHODS	14
5.1 Archaeological Potential.....	15
5.2 Field Recording.....	16
5.3 Survey Coverage	16
5.4 Subsurface Testing	17
5.5 Wet Sites.....	19
5.6 Machine-Assisted Investigations	19
5.7 Winter Assessments	21
5.8 Site Recording.....	22
5.9 CMT Survey.....	23
5.10 Evaluative Units	24
5.11 Ancestral Remains and Burial Features.....	25
5.12 Rock Art	26
5.13 Significance Evaluation Scheme	26
5.14 Assessing Impacts.....	26
6. METHODS AND TECHNIQUES FOR DATA ANALYSIS	27
6.1 Artifact and Faunal Analysis	27
6.2 Sample Analysis	28
7. DISPOSITION OF CULTURAL MATERIALS	29
8. REPORTING	30
8.1 Site Records	30
8.2 Reports	30
8.3 Schedule of deliverables.....	32
9. APPLICANT	32
10. NOTICES	33
NOTICE REGARDING COPYRIGHT	33

NOTICE REGARDING OTHER PERMITS.....	33
11. REFERENCES.....	34
GENERAL TERMS AND CONDITIONS OF PERMIT.....	36
FIGURES	38
FIGURE 1: PERMIT OVERVIEW	38
FIGURE 2: MIDRANGE SOUTH ISLAND.....	39
FIGURE 3: MIDRANGE CHILLIWACK	40
FIGURE 4: MIDRANGE CASCADES.....	41
FIGURE 5: MIDRANGE OKANAGAN SHUSWAP & SELKIRK.....	42
FIGURE 6: MIDRANGE ROCKY MOUNTAIN	43
FIGURE 7: MIDRANGE QUESNEL & CARIBOO-CHILCOTIN	44
Appendix 1: Landslides and Floods impacting MoTI infrastructure.....	45
Appendix 2: Archaeological Sites and MoTI infrastructure	48
Appendix 3: Project Tracking.....	54

Tables

Table 1. Natural Resource Regions and Districts included in permit.....	2
Table 2. Location of Permit Area	8
Table 3. Natural Resource Districts of Permit.....	9
Table 4. AOAs within Permit Area	11
Table 5. Previous Field Studies Relevant to the Proposed Study.....	14
Table 6. Previously Recorded Sites Relevant to Proposed Study	14
Table 7. Mitigating Impacts to Sites	28
Table 8. Permit Repository	30
Table 9. Schedule of Deliverables	33
Table 10. MoTI Infrastructure impacted by Landslides and Flood Events	43
Table 11. Summary of recorded archaeological sites within 1 km of impacted MoTI infrastructure by Natural Resource District	45
Table 12. Recorded sites within 1 km - South Island Natural Resource District	45
Table 13. Recorded sites within 1 km - Chilliwack Natural Resource District	46
Table 14. Recorded sites within 1 km - Cascades Natural Resource District	48
Table 15. Recorded sites within 1 km - Selkirk Natural Resource District	50
Table 16. Recorded sites within 1 km - Rocky Mountain Natural Resource District	50

1. FIELD PERSONNEL

The Archaeology Branch (the 'Branch') may approve the addition of Delegated Archaeologists without an amendment to the permit. Documentation of personnel roles by the Delegated Archaeologist will comply with [Bulletin 17](#) (e.g., roles and dates assumed).

Given the size and scope of the impacts, government agencies who sign onto the permit may contract a number of archaeologists to conduct assessments to work under permit to support the response to the 2021 fall floods. The archaeologists are referred to as delegated archaeologists because the responsibilities under the permit are delegated from the Province, who holds the Heritage Investigation Permit. Consequently, delegated archaeologists must be qualified and eligible to hold HCA permits in the project areas.

The proponents and delegated archaeologist(s) will consider comments from First Nations when making in-field decisions and management recommendations.

Additional comments: At the time of application, no Field Directors had been added to this permit.

Delegated archaeologists must be qualified and eligible to hold multiple permits in the culture area they are working in (i.e., not a novice permit holder; no overdue obligations).

2. PROPOSED PROJECT

This project is for:

☐

Research

☒

Resource Management

Maps that comply with Provincial [standards](#) are attached to this application. Attached maps include appropriate information (e.g., location of previous field studies, previously recorded archaeological sites, and/or modeled archaeological potential) as available.

Sector: Emergency Environmental Response

2.1 Location

Select land ownership type(s) and describe below.

Table 2. Location of Permit Area

Land Ownership	Description
☒ Other	<i>Locations affected by flooding and landslides under repair and remediation within the following Natural Resource Districts (Table 3; Figures 1-7), which may include private and Crown land</i>

Table 3. Natural Resource Districts of Permit

Area	Region	District	Figure(s)
North	Skeena	Coast Mountains	1
Coast	West Coast	North Island – Central Coast	1
		Campbell River	1
		South Island	1 & 2
	South Coast	Sunshine Coast	1
		Sea to Sky	1
		Chilliwack	1 & 3
South	Thompson-Okanagan	Cascades	1 & 4
		Okanagan-Shuswap	1 & 5
		Thompson Rivers	1
	Kootenay-Boundary	Selkirk	1 & 5
		Rocky Mountain	1 & 6
	Cariboo	100 Mile House	1
		Cariboo-Chilcotin	1 & 7
		Quesnel	1 & 7

2.2 Proposed Study Area

Describe project: Inventory and assessment of archaeological sites impacted by flooding and landslides as a result of 2021's catastrophic rainfall in southern and coastal British Columbia.

Are all locations to be assessed defined in this application?

☐ **Yes.** All spatial data (kml/kmz, shapefiles) submitted to the Branch via APTS.

☒ **No.** Explain how First Nations with an interest will be notified of proposed investigation areas:

The assessment locations are based on the extent of impacts from flooding, including areas adjacent required for repairs or clean up. At the time of application, additional "atmospheric rivers" are forecast, and further flooding events are anticipated in winter 2021/2022. As of November 26, 2021, the Province identified 15 landslides and 101 flood events, impacting MoTI infrastructure (Appendix 1; Figures 2-7), and more may be added as the extent of damage is identified.

Notifications will take the form of a "Notice of Intent" (NOI in accordance with the [Multi-Assessment Permit Policy](#)), with a minimum 30-day referral period, unless one of the following conditions occurs:

- 1) A project requires immediate action to support public or environmental health and safety,
- 2) A local consultation process with First Nations is established that waives or reduces the 30-day notification period

Note the following **additional requirements** for NOIs for this permit:

1. The NOI will clearly indicate the length of referral period.
 - Requests for expedited reviews will include a rationale.
2. NOIs will include a summary of recorded sites and related past archaeological studies. The summary will identify any concerns with the existing site record(s) for the project area.
3. NOIs will be sent to Indigenous Communities in the format they prefer, using their tracking numbers (when known), as well as via email to Archpermitapp@gov.bc.ca and archsitereform@gov.bc.ca, with the subject line “2021 Flood -NOI -**2021-0453**– Company - Project - <<Optional: unique identifier for company>>” to allow Branch staff to confirm the accuracy of the Provincial records in the vicinity of the project.
4. When AOAs or PFR studies have been conducted in response to these floods and landslides, a summary of those assessments will be included with the NOI, including mapping.
 - Non-permitted assessments relevant to the NOI (accessible by the delegated archaeologist) should also be included in NOIs.

☒ **Additional comments regarding permit area:** n/a

3. RELATED STUDIES

The following studies are known to exist within or near the proposed permit area: ☒

An Archaeological Overview Assessment (AOA):

- ☒ An archaeological predictive model

Details: Table 4 lists the GIS-based AOAs which can be accessed using the Remote Access to Archaeological Data (RAAD) by NRD. An AOA, developed for the Okanagan-Shuswap Natural Resource District, is under Provincial review, and an AOA for the Cariboo District, is under development and anticipated in 2023).

Table 4. AOAs within Permit Area

Area	Region	District	Archaeological Overview Assessment	Year
North	Skeena	Coast Mountains	An Archaeological Overview of the North Coast Timber Supply Area	2000
Coast	West Coast	North Island – Central Coast	AOA of Tree Farm License 25	2000
			Central Coast Land and Resource Management Plan AOA	1999
			GIS Modelling of Archaeological Potential for the TFL Forest Ltd. - Johnstone Strait Operation Area	2002
		Campbell River	Campbell River Forest District AOA	2007
		South Island	AOA Tree Farm License 44 Archaeological Potential Model	2009
			Archaeological Potential Modelling for the Capital Regional District	2008
			Checleset Bay and Outer Kyuquot Sound Cultural Heritage Resource Overview	2007
			City of Langford Archaeological Overview Assessment - Phase 1 Baseline Mapping	2007
			Archaeological Overview and Inventory of a Portion of Ditidaht First Nation	2001
			Hul'qumi'num Treaty Group AOA	2005
	South Coast	Sunshine Coast	n/a	n/a
		Sea to Sky	AOA of the Squamish Forest District	1997
		Chilliwack	Chilliwack Forest District AOA	1999
South	Thompson -Okanagan	Cascades	An AOA of Coldwater and Spius Landscape Units	2008
			Archaeological Overview Assessment Lillooet Forest District	1999
			Upper Similkameen Indian Band (USIMIL) AOA	2007
			AOA of a Portion of the Williams Lake Forest District	1998

Area	Region	District	Archaeological Overview Assessment	Year
South		Okanagan-Shuswap	Okanagan Timber Supply Area AOA (Salmon)	1997
			Okanagan Timber Supply Area AOA (Vernon)	1997
			Okanagan Timber Supply Area AOA (Penticton)	1997
		Thompson Rivers	AOA Northern Secwepemc Traditional Territory	1998
	Kootenay-Boundary	Selkirk	Archaeological Potential Mapping in Landscape Unit K11 Kootenay Lake Forest District	2009
			Arrow Timber Supply Area AOA	1996
			Boundary Timber Supply Area AOA	1997
			Columbia Forest District AOA	2008
			Columbia Forest District AOA	2007
			Columbia Forest District AOA	2008
			Columbia Forest District AOA	2006
			Landscape Unit K12 & K26 Meadow Creek AOA	2006
		Rocky Mountain	AOA of Landscape Units K12 and K26, K16-18 and K20-24, Kootenay Lake Forest District	2007
			AOA of Landscape Unit C20, Rocky Mountain Forest District	2008
			Cranbrook Timber Supply Area AOA	1997
			Moyie Lake AOA	2007
	Cariboo	100 Mile House	AOA Northern Secwepemc Traditional Territory	1998
		Cariboo-Chilcotin	Chilcotin Forest District AOA	1998
			AOA Northern Secwepemc Traditional Territory	1998
			AOA of a Portion of the Williams Lake Forest District	1998
		Quesnel	Quesnel Forest District GIS Model of Archaeological Potential	2009

☒ A desk-based assessment **Details:** See additional comments.

☒ Field studies. **Details:** Numerous studies have taken place within this area and will be considered in desktop assessments and field visits; see additional comments below.

AOAs and field studies which consider information from Indigenous Communities may contain more comprehensive information relevant to adequately assessing potential. Further, Indigenous Communities may have traditional knowledge and/or ethnographic studies [bookmark7](#) to share with archaeologists.

Additional comments:

Desk-based AOAs: It is expected that development-specific reviews will be used to evaluate and prioritize field visits and that those assessments will, at a minimum, check the Provincial Heritage Register (PHR), and regional AOAs by accessing RAAD, and previous permitted assessments (accessed via the Provincial Archaeological Report Library – PARL). Archaeologists are encouraged to contact the Branch's Inventory section (archsiteform@gov.bc.ca) for unprocessed site records. The results of previous assessments that overlap with the development should be incorporated into desk-based AOAs.

PFRs: AOAs may be informed by PFRs conducted by non-field directors who have appropriate archaeological training and experience. PFRs involve field survey of the project area to precisely map areas of archaeological sensitivity. Areas of archaeological sensitivity are defined by the observation of either:

- a) Archaeological sites (i.e., artifacts or features)
- b) Areas of Potential (AOPs), which likely to contain buried archaeological resources.

Archaeological sites and AOPs may be submitted to the Branch based on the results of a PFR². Archeological sites recorded as a result of the PFR must be reviewed by a field director to ensure that the appropriate information is collected to register the site

AOA/PFR Reporting: AOA or PFR reports used to identify recommend AIAs will be provided to the Branch and affected Indigenous Communities, and the results incorporated into the AIA report. For areas not assessed in the field due to a low potential assessment based on desktop and/or AOA model results, a rationale will be provided, for inclusion in the final report.

² Refer to the Branch's Site Form Guide (2021) and Mapping and Shapefile Requirements (2021) for additional details.

Table 5. Previous Field Studies Relevant to the Proposed Study

Type of Study	Direct Overlap with Development? (Y/N)	Distance, Direction from Proposed Development	Year Assessed	HCA Permit #	Comments Relevant to the Study
Investigation	Y	Various	2018-2020	2018-0275	Wildfire permits: adapting approach to support Province's responsibilities under HCA
Investigation	Y	Various	2020-Ongoing	2020-0034	

Additional comments: Numerous studies have taken place within this area and will be considered in desktop assessments and field visits.

Table 6. Previously Recorded Sites Relevant to Proposed Study

Proposed Development Component	Borden Number	Direct Overlap with Development? (Y/N)	Distance and Direction from Proposed Development ²	Site Type	Permit # of Previous Visits ¹⁰

Additional comments: As of November 26, at least 101 recorded sites are located within 1 km of MoTI infrastructure impacted by landslides and floods (Appendix 2: Archaeological Sites and MoTI infrastructure); while MoTI's projects do not presently overlap with any recorded sites, protected (unrecorded) resources may be present.

4. GOALS AND OBJECTIVES

4.1. Goals and Objectives

Specify proposed research goals:

This permit will support Provincial and Local Governments' response to manage and protect archaeological sites during remediation of lands affected by flooding and landslide events from 2021's catastrophic rainfall. Archaeological sites will be identified and assessed for significance and impacts, and management recommendations made. Emergency impact management response to ongoing impacts, or to support infrastructure, may be initiated without delay. The impacts of recovery from 2021's catastrophic flooding will be summarized in the final report. Archaeological assessments will be completed in advance of development or recovery activities where feasible. Given the post-impact environment, impacts to public and environmental health and safety, and challenges with worker safety and site visibility, the delegated archaeologist is authorized to implement the most effective

timing and methods for investigation.

4.2 Significance of Proposed Project

Describe significance of study: This permit approach is novel, by authorizing multiple proponents and archaeologists. This approach is intended to remove barriers associated with permitting for a project of unprecedented scope and urgency, allowing multiple government agencies to work together using several archaeological firms to mitigate impacts to archaeological sites. The final report will serve to summarize the impacts and consequences of the 2021 floods on archaeological sites.

4.3 Expected Outcomes:

Describe anticipated results: The assessments may result in the identification of new sites, as well as record the impacts to known sites. Management recommendations will be made for ongoing impacts, and the assessments will consider the impacts of future remediation actions. Salvage may be undertaken of sites under threat.

It is not expected that sites will be fully analyzed under this permit, unless flood clean-up efforts or infrastructure rehabilitation will result in permanent, unavoidable impacts to archaeological sites, and conditions allow for assessment.

5. METHODS

The delegated field director(s) will consider and document comments and concerns from Indigenous Communities when making in-field decisions and developing management recommendations under this permit.

Describe how areas will be selected for investigation:

All assessments are conducted at the request of the proponent(s), in accordance with a contracted scope of work, at locations impacted by flooding, landslides, or other events following the 2021 atmospheric rains.

Emergency response will be initiated to address ongoing, direct impacts to archaeological sites from flooding that must be undertaken to mitigate ongoing destruction. Projects may be prioritized based on public safety.

Other projects will be selected for assessment using a combination of GIS-based AOAs, desk-top AOAs, PFRs, advice from Indigenous Communities or archaeologists, or upon advice from the Branch. Ideally, areas identified to have high potential for archaeological sites will be surveyed in advance of remediation activities. If the PFR is completed by an experienced technician, any archaeological sites recorded as a result of the PFR should be reviewed by a field director to ensure that the appropriate information is collected to register the site. Similarly, under the direction of a field director, diagnostic

artifacts, formed tools, and other cultural material may be collected.

It is anticipated most assessments will be limited to a defined development footprint (e.g., bridge replacement, fenceline, salvage polygon) in areas of high archaeological potential.

The field director is responsible to determine, implement, and document the methods employed and timing of assessment. For emergency works, the field director will determine the most effective site mitigation measure in consultation with the Archaeology Branch.

For remediation works such as removing debris or mud, the field director will determine the appropriate timing and method of inspection based on existing field conditions, taking safety and site visibility into consideration. If the local conditions do not allow for pre-impact inspection, then it is appropriate to monitor or conduct a post-impact assessment once the material has been cleared. If debris is suspected to contain archaeological material, it should be sampled as practical. The report will include a rationale for the timing of the assessment, and evaluation of the methods. Examples of factors considered to affect site visibility and worker safety include previous disturbance, debris, danger trees, mud deposit, moisture conditions, or soil stability. Assessments may also be delayed for those infrastructure projects requiring immediate replacement or remediation (e.g., installation of temporary bridges) to support public safety.

5.1. Archaeological Potential

Is archaeological potential a consideration?

☒ **Yes**

The assessment locations will be driven by flood and landslide recovery activities in conflict with known archaeological sites and areas evaluated to contain high potential. All in-field decisions about archaeological potential will be documented. Areas with low potential for archaeological resources may also be examined.

Potential for archaeological resources will be consider the following criteria.:

- Geological, terrain, or microtopographical features
- Proximity to potable water
- Slope
- Aspect
- Elevation
- Forest cover
- Soil drainage
- Proximity to sheltered areas (from wind or rain)
- Proximity to areas of potential cultural significance
- Shore lines
- Proximity to cultural resources (e.g., trails; berry patches; fishing sites; travel corridors)
- Any of the above conditions that existed in the past that are not present today (e.g., paleo landscapes, landforms obscured by agricultural practices)
- Previously recorded archaeological or heritage sites
- Areas identified by First Nations or other interested parties
- Significant disturbance

- Timber with potential for CMT sites
- Other (e.g., GPR)

5.2. Field Recording

Field notes will record in-field observations. Survey coverage and points of interest will be recorded (e.g., with a GPS or total station). A camera will be used to document in-field observations. When sites are identified, they will be mapped per Branch [requirements](#)³.

Notes will document information provided by First Nations and observations to support the rationale behind in-field decisions regarding survey coverage, subsurface testing methods, and preliminary management recommendations for sites.

Polygons of negative subsurface test locations and areas of potential will be created for submission to the Branch. Notes will sufficiently describe sites to include necessary information to complete a site form⁴ to Provincial standards.

5.3. Survey Coverage

Does this study include survey coverage? ☒ **Yes**

The study area will be surveyed for archaeological features (e.g., cultural depressions, trees with modifications that may pre-date AD 1846), and areas exhibiting potential for archaeological resources (e.g., landforms and exposures). Surveyed terrain will be mapped in relation to the development footprint and described in the report.

Survey coverage will minimally address areas of anticipated archaeological potential identified by the AOA study (where they exist) and may be modified based on in-field observations. Areas of potential that are not surveyed will be mapped and rationale provided for why the area was not assessed and why it was evaluated to contain potential.

Select all that apply:

- ☒ Traverses or transects with crew members spaced at 10 m intervals or less in areas of high potential; at less than 25 m intervals in areas of moderate potential; at 10-40 m intervals in areas of low archaeological potential. **Additional details regarding approach:**
- ☒ The entire development will be surveyed with crew members spaced in less than 5 m intervals. **Additional details regarding approach:**
- ☒ Areas with high potential for surface artifacts will be surveyed with crew members spaced at 1-5 m intervals. **Additional details regarding approach:**
- ☒ Areas with terrain that has low potential for archaeological resources other than CMTs will be surveyed with crew members spaced at 5-50 m intervals. **Additional details regarding approach:**

³ Defining Archaeological Site Boundaries & Protection Status: https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/archaeology/forms-publications/defining_archaeological_site_boundaries_protection_status.pdf

⁴ Notes and photos are required by repositories and may be recalled by the Branch

☒ Areas of low archaeological potential may not be surveyed or will be surveyed en route to areas of high archaeological potential. **Additional details regarding approach:**

☒ **Other (provide details and rationale):** Areas subject to mass wasting events may not be accessible for systematic survey and/or sediments containing archaeological material displaced. The field director will develop a survey sampling plan to address local conditions.

Additional comments: Safety and environmental conditions will influence appropriate survey strategies. The Field Director will explain why the survey coverage is appropriate, based on local conditions. It is understood that the project area may be loosely defined, based on the nature of the impacts (e.g., debris flow). The following guidance is intended to inform scope and level of effort:

- Where site material is found, inspection traverses and testing may be expanded up to 25 meters beyond the immediate permit area, except where impractical due to safety concerns or the limit of the permit authorization is reached (i.e., private or federal land), or where the level of assessment will extend the intent of this permit (e.g., 25 m along a linear development).
- If site material is observed to continue beyond the scope of the project area (e.g., 25 meters), detailed site mapping should stop and the boundary estimated, with recommendations for future work and appropriate AOP established.
- If site material is not observed in areas of adjacent potential, an AOP should be established.

It is recognized that pedestrian survey may not be feasible in flooded areas, and that surveys may require boats or other means to access or view project areas. Images from drone footage may be incorporated into PFRs.

Further to issues of access to subsurface deposits, the use of remote sensing technology such as ground penetrating radar may be considered in consultation with the Archaeology Branch.

5.4 Subsurface Testing

All AOPs and negative Subsurface Test Areas (STAs) will be mapped and shapefiles will be provided to the Branch, per the [Mapping and Shapefile Requirements](#) (i.e., shown as polygons with the number of tests, or each individual test shown).

Stratigraphic and subsurface descriptions will be recorded in the field and summarized in the report(s). Special attention will be paid to significant results, variations, and/or changes.

Reports will describe why the Field Director determined the sediments are culturally sterile. When the depth of culturally sterile deposits in the test was not determined, a rationale must be provided in the report.

The effectiveness of testing at each STA will be determined by a quantitative and/or qualitative evaluation of research. Assumptions about the type, size and artifact density of potential target sites will be described in this evaluation. Given the scope and intention of this permit, some STAs will not be fully assessed, but the full area should be reported as an AOP.

While the Branch generally recommends subsurface testing Areas of Potential (AOPs), they may be an appropriate approach under this permit. When not subjected to testing, reports will describe observations (e.g., microtopography, nearby drainages, vegetation); indicate how these characteristics affected the evaluation of potential; and provide management recommendations to avoid impacts to the AOPs until they can be fully assessed.

Select as appropriate:

- ☒ Tests will minimally measure 0.123 m² (e.g., 35 cm a side shovel test). Sediments will be screened through ¼" mesh or smaller. Tests will be excavated until culturally sterile sediments are confirmed (e.g., glacial till). **Additional details regarding approach:** none
- ☒ Soils believed to contain cultural materials will remain within the site boundary⁵ and described in the site form and report. **Additional details regarding approach:** none
- ☒ STAs will be tested at 5 m intervals or less, within the STA. The field director will provide a rationale in instances where a different interval of testing is employed. **Additional details regarding approach:** none
- ☒ Soil probes may be used to confirm the presence of cultural deposits (e.g., midden; stratigraphy within cultural depressions). However, only mechanical augers or shovel testing can be used to demonstrate cultural deposits are not present to support site boundary definition. **Additional details regarding approach:** none
- ☒ Mechanical augers may be employed. **Describe approach:** Augers will be up to 40 cm in diameter, all sediments will be screened.
- ☒ Other methods will be followed. **Describe:** Given the variety of impacts and settings anticipated by the permit, the Field Director will consult with the Archaeology Branch if alternate methods are proposed.

Additional comments: Where wet screening is appropriate (e.g., waterlogged sediments) all displaced sediments will be screened through an appropriate sized screen (e.g., 1/4" or smaller). Sediments will be placed in the screen and washed through using a hand-held hose with a variable control nozzle. Contextual information will be maintained to ensure that levels, layers, and features are separated within evaluative units or shovel tests and cultural material recovered in the screens will be bagged by level, layer, and unit/test. Care must be taken to avoid environmental degradation from siltation in the screening area.

⁵ Cultural deposits must be kept within site boundary and permit area

5.5 Wet Sites

Are wet sites anticipated?

- ☐ No. **Provide rationale:**
☒ Yes. **Describe specific methods:**

Additional comments: In the event a wet site is encountered, and safety conditions allow, the location will be stabilized and kept in a water-logged state in place until a research plan can be developed and appropriate stabilizing treatment of artifacts and repository confirmed (see Bernick 2019 for examples).

If the materials cannot be left in place due to risk of damage, they will be recovered and preserved by suitably qualified personnel with access to facilities for the recovery and passive conservation of materials pending permanent stabilization treatment. Wet site Specialists must be identified in advance. The Archaeology Branch will be contacted immediately to provide advice on procedures and consultation with First Nations when wet sites are found.

5.6 Machine-Assisted Investigations

Would you like to include provision for mechanical excavation (i.e., backhoes)?

- ☒ Yes (see below).

Machine-assisted inspection will comply with appropriate WorkSafe BC Requirements.

Machine-assisted inspections will be directed by a qualified archaeologist (i.e., field director).

In the event ancestral remains are identified, methods are described in Section 6.

Select as appropriate:

- ☒ Toothed buckets may be used to remove obstructions (pavement, boulders, etc.) prior to reaching potentially culture-bearing sediments. **Additional details regarding approach:** none
- ☒ Potentially culture-bearing sediments will be removed with a finishing bucket, in maximum 10 cm vertical lifts, to allow the archaeologist to observe any exposed features or intact deposits and collect artifact provenience in the most precise manner possible. The horizontal extent of lifts will not exceed 3 m. **Additional details regarding approach:** Field Director will document the extent of lifts, and describe circumstances where these increments are exceeded.
- ☒ The Field Director may use discretion to determine the amount of material to be processed; the report will include a summary of methods and the rationale behind in-field decisions. **Additional details regarding approach:** Processing will be limited to post-glacial deposits, where discernable. It is expected that at least 25% of material will be processed, unless required for immediate return to the location.

- ☒ In the event intact archaeological deposits or features are identified, mechanical excavation will cease, and excavation will proceed by hand or other methods in consultation with the Branch. **Additional details regarding approach:** Manual excavation will only proceed where safe and practical to do so. Site avoidance or other methods of investigation should be considered to make the area accessible.
- ☒ When non-intact archaeological deposits are identified, up to 3m³ sediments will be excavated by hand. **Additional details regarding approach:** Where deposits are in excess of 3 m³, manual excavation should be conducted on a sampling basis with 100% of excess mechanically excavated site material screened or raked.
- ☒ When greater than 3 m³ of archaeological deposits are identified, the Branch and First Nations will be contacted. Work may not proceed without Branch approval. **Rationale and additional details regarding approach:** Given the variety of site types that may be encountered, it is expected that methods and approach will be vetted by the Archaeology Branch prior to implementation.
- ☒ Mechanically-displaced deposits will be inspected for cultural material (e.g., screening). **Describe methods:** Sediments suspected to contain archaeological material will be screened or raked on a sampling basis not to exceed 25% of post-glacial sediments. Sediments known to contain archaeological material will be 100% screened, except where midden deposits and/or human remains are encountered. Stockpiling Archaeological sites is not an ideal long term management option. It is expected that stockpile sites will not be created except in circumstances such as ancestral remains, or where First Nations support the use of a stockpile, or in emergency situations to support project feasibility.
- ☒ Alternate methods. **Provide detail:** Drill and auger flights will be 100% manually inspected. Geotechnical testing, such as mechanical test pitting, will be monitored and sample screened up to 25% of post-glacial sediments
- ☒ This section requires further discussion not outlined elsewhere in this section of the application. **Describe:** While standard methods may be followed, due to the nature of disturbed sediments resulting from floods and landslides, the Field Director is authorized to modify methods as deemed appropriate and provide a rationale in reports.

The preferred option for machinery type depends on local conditions. Rubber-tire mounted machinery is typically of lower impact than tracked machines but may be less effective for rutting in wetted areas, slopes or loose soils. Track-mounted machinery may be equally effective where vegetation is present, and conditions are dry, or may be necessary for safety. The archaeologist will consider local conditions and proposed machine works when designing the assessment plan.

5.7 Winter Assessments

Will winter assessment be employed?

☐ No (delete rest of the text in this section and proceed to next subsection)

☒ Yes. **Choose as appropriate:**

☒ Where test locations were initially visited under snow and frost-free conditions and evaluated to contain archaeological potential for subsurface archaeological resources. Methods may include evaluative units and systematic data recovery using artificial heating or other methods approved by the Branch to create snow and frost-free conditions.

☒ Winter survey may occur in areas evaluated to contain low potential for all archaeological resources, except culturally modified trees.

☐ This project is located within the Fort Nelson and/or Peace Natural Resource Districts (i.e., the Northeast Natural Resource Region).

☒ **Other:** Winter assessments may be authorized for the purpose of geotechnical testing. Tests will be monitored, and excavated post-glacial sediments warmed and screened or raked.

Testing strategies (and confidence in testing) will consider the degree in which microtopography was discernable.

Select as Appropriate:

☒ Snow will be removed as necessary, exposing the ground.

☒ Tools (e.g., concrete saws) may be employed to cut frozen ground.

☒ Subsurface tests will be excavated by shovel and/or pick-axe, etc.

☐ Subsurface test soils will be collected and bagged individually by test unit.

☐ Subsurface tests will be numbered and mapped; soils will be kept separate.

☐ Provisions will be made to transport the soils to facilities for screening.

☒ Sediments will be thawed and screened through ¼" mesh.

☒ Remaining cleaned clasts from the collection screen will be removed and visually inspected.

☒ Evaluative units may be excavated when the ground is heated, using excavation methods as discussed elsewhere in this application.

☒ If topography is difficult to discern, systematic testing will be employed and the methods employed will be outlined in the interim reports. Testing at smaller intervals may be required.

☐ Other. **Describe:**

Additional comments: Situations not covered by the application should be discussed with the Archaeology Branch to determine appropriate assessment strategy (e.g., frozen mud and debris flows).

5.8 Site Recording

Sites will be mapped using measuring tape, compass, GPS, total station, or similar. Archaeological features (e.g., cultural depressions) will be measured, mapped, and photographed. Sites and significant artifacts will be photographed in the field and detailed in a photo log.

Recognizing that conditions may not be ideal for site recording, these standard methods may be modified in consultation with the Archaeology Branch.

5.8.1. **Boundary Definition**

☒ **Standard methods will be followed regarding the definition of site boundaries:**

Site boundaries may be defined by subsurface testing, the extent of the landform, or administrative boundaries (e.g., development boundary), per the [Defining Archaeological Site Boundaries](#) document.

When site boundaries are defined by subsurface testing, tests may be spaced 1-5 m apart on a grid, as appropriate. Additional testing may occur at the Field Director's discretion. Testing will continue until three negative tests are reached in each direction (e.g., cardinal or ordinal), unless the site boundary is defined by the landform and/or administrative boundary.

For larger sites, "back testing" may be applied. The specific methods will be described in the report.

Where the site is comprised of one positive test, a minimum of four additional subsurface tests will be placed 1 m around the test.

5.8.2. **Collection of Archaeological Material**

All recovered archaeological materials including human remains, faunal remains, other fragile artifacts (e.g., wet site materials), will be handled with sufficient care during excavation, recording, transport, cleaning, analysis and storage to ensure no additional damage or negative impacts occur to the collections during these processes per [Bulletin 26](#).

☒ Standard methods will be followed:

All archaeological materials from an archaeological context (e.g., artifacts, fauna) will be collected. Samples (e.g., radiocarbon, ethnobotanical) may be collected, as appropriate.

Exceptions:

- Large lithic scatters (>100 artifacts) may be sampled in consultation with the Branch; diagnostic artifacts will be collected, as well as artifacts at risk from proposed development or unauthorized collection.
- In midden contexts, all vertebrates and a representative sample of invertebrates will be collected;

- Fire Altered Rock (FAR) will be counted and weighed to the nearest 100 g in the field, but otherwise discarded. The location and distribution of FAR will be described, including by layer/level if appropriate.

Additional comments: It is anticipated that volumes of mixed material may be encountered. Stockpiling may be considered in exceptional circumstances based on the volume or nature of the material, such as ancestral remains. Stockpiling may be used as a temporary measure for project feasibility. The curation of stockpiles of site material is subject to approval of a management plan by the Archaeology Branch, and may require additional permitting.

5.8.3. **Flagging**

Will boundaries be flagged?

☐ No. **Provide rationale:**

☒ Yes. **Describe approach:** Sites will only be demarked in the field when required for impact avoidance during construction. All markings (e.g., snow fence, flagging) are considered temporary and specific to this project. No paint is to be applied to surface features for the purpose of site recording.

Additional comments: Given the variable ground conditions and potential for existing sites to be expanded or merged with new sites, it may be necessary to determine site boundaries after fieldwork is completed, in discussion with the Archaeology Branch.

5.9 CMT Survey

Are CMTs anticipated?

☐ No. **Provide rationale:**

☒ Yes. Following [Bulletin 27](#)⁶, CMT sites will be recorded and samples will be analyzed in accordance with Branch standards⁷. Rationale and details regarding a sampling strategy⁸ will be discussed in reports. CMTs presumed to post-date AD 1846 will be fully recorded and may be provided to the Archaeology Branch for addition for the Informed Contributor's Layer (ICL).

Additional comments: CMTs exposed landslides may be damaged or destroyed, but may be recognizable.

⁶ https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/archaeology/forms-publications/bulletin_27_cmt_guidelines.pdf

⁷ Defining Archaeological Site Boundaries; CMT Handbook

⁸ I.e., Muir and Moon 2000

5.10 Evaluative Units

5.10.1. **Systematic Data Recovery**

Will methods include systematic data recovery?

☐ No

☒ Yes

Describe under what circumstances evaluative units will be excavated: Up to 5 evaluative units may be excavated to assess the nature and extent of the site, where remediation plans do not allow for 100% site avoidance. If more than 5 evaluative units are considered necessary, the Archaeology Branch will be contacted prior to implementation to determine next steps: additional units may be authorized by the Archaeology Branch as part of an emergency response, or, if time allows, the excavation may be subject to discussion with affected Indigenous communities.

☒ **Standard methods will be followed:**

Evaluative units may be excavated in stratigraphic layers or arbitrary levels (5-10 cm). Features will be excavated by stratigraphic layer. Within thicker layers, 5-10 cm arbitrary levels will be excavated as appropriate.

3D provenience for features and artifacts found in situ will be recorded and cultural materials collected. For each unit, an illustrative representation to scale for two adjacent walls and floor plans will be prepared and labelled as appropriate. Photographs will be taken at the completion of each layer. Stratigraphy will be recorded.

Where wet screening is appropriate (e.g., waterlogged sediments) all displaced sediments will be screened through an appropriate sized screen (e.g., 1/4" or smaller). Sediments will be placed in the screen and washed through using a hand-held hose with a variable control nozzle. Contextual information will be maintained to ensure that levels, layers, and features are separated within evaluative units or shovel tests and cultural material recovered in the screens will be bagged by level, layer, and unit/test.

Additional comments: The site setting may need to be stabilized prior to undertaking controlled systematic excavation using measures such as caissons, tents or retaining structures.

5.10.2. **Sampling**

☒ **Standard methods will be followed:**

If intact deposits are encountered, appropriate samples (e.g., radiocarbon, column, bulk samples) will be taken. Description of methods and analysis will be provided in the report.

The provenience of all samples will be recorded. Samples will be labeled appropriately.

When column samples are taken, the volume from each stratigraphic component should be 1 L unless otherwise specified in the report. The samples will be dried and screened through nested geologic screens. The contents of the screens will be sorted and weighed to the nearest 0.01 g.

Samples will be processed by a qualified individual before the report deliverables are due. Samples will be analyzed in the lab using methods appropriate for geological, palaeobotanical, zooarchaeological, or micro debitage analysis, which will be described in the final report.

When samples are not processed, they will be stabilized for long-term storage, and their lack of analysis rationalized in the associated report(s).

Additional comments:

5.11 Ancestral Remains and Burial Features

In the event partial or complete human remains or burial features (e.g., cairns and mounds) are identified in the field, nearby ground disturbance will cease. Ancestral remains and/or burial features will be protected in place. First Nations, the Branch, and other concerned parties will be immediately informed.

Where human remains of suspected forensic interest are encountered, local law enforcement and/or the Coroners Service will be notified.

☒ **Standard methods will be followed:**

Where suspected burial features are identified, the Field Director will record the rationale describing the basis for their identification. In addition to standard archaeological site recording human remains and burial features will be recorded to include, at minimum: horizontal and vertical extent, orientation and position, inventory of skeletal remains and grave inclusions, and integrity.

Where possible, basic osteological data will be recorded (e.g., minimum number of individuals, sex, age, stature, and any evidence of trauma, disease and cultural modification).

Fragmentary or isolated human remains identified during post-field analysis will be kept in secure storage pending final disposition.

In consultation with all concerned parties, efforts will be made to rebury the remains in an appropriate area within the archaeological site boundary, in an area unlikely to be disturbed in the future. If the reburial location is within or near the original archaeological site, it will be mapped and recorded on the site form under that Borden number.

If the proposed reburial location is not in the vicinity of the original archaeological site, consultation will occur with the Branch to discuss what records are required.

In its description of the site, the report will cite the appropriate classification scheme(s) (e.g., Mathews 2006).

5.12 Rock Art

If rock art is identified, it will be fully recorded (e.g., multiple overlapping photographs, sketches), whilst minimising damage, per [Bulletin 26](#)⁹. Rock art will not be subject to any procedure that involves physical contact with the image to make a recording of the image.

Additional comments: The location of rock art and its associated images are often considered sacred and confidential by First Nation communities; caution must be exercised accordingly to ensure the respectful collection and distribution of information. Photographs of features may be withheld from the interim and final report if requested by Indigenous Communities. Photographs are required for site records.

5.13 Significance Evaluation Scheme

Site significance will be evaluated following Section 3.5.2.2 and Appendix D of the [AIA Guidelines](#). Archaeologists are encouraged to consider additional information that First Nations may have that will inform the significance evaluation.

5.14 Assessing Impacts

Assessing impacts to archaeological sites will follow 3.5.2.3 and Appendix F of the [AIA Guidelines](#).

Mitigating Impacts

In order to determine the most appropriate mitigation plan, Field Directors will assign a low or high interpretive value to sites and compare that to the level of expected impact. While avoidance is always the preferred option, Table 7 summarizes the approach to be followed:

⁹ <https://www2.gov.bc.ca/gov/content/industry/natural-resource-use/archaeology/bulletins-policies>

Table 7. Mitigating Impacts to Sites

Proposed Disturbance ¹⁰	Low Interpretive Value ¹¹	High Interpretive Value
Light	Options include: no further work or, if warranted, monitoring or a post-impact assessment of the damaged portion of the site.	Monitoring or, if warranted, a post-impact assessment of the damaged portion of the site.
Heavy	Options include: no further work or, if warranted, monitoring or a post-impact assessment of the damaged portion of the site.	Any combination of systematic data recovery (SDR), additional subsurface inspection and/or monitoring, site protection measures.

Impacts may be mitigated through the use of geotextile fabric and overburden (e.g., clean fill), to temporarily protect archaeological sites from disturbance, under the direction of a Field Director.

A combination of recommendations (e.g., no further work; monitoring) can be proposed for sites with both low and high areas of interpretive value. Sites with high interpretive value, or activities not considered “urgent” may be subject to additional HCA permitting.

Any combination of emergency SDR, construction monitoring, site protection or post-impact assessment may be appropriate for sites (regardless of value) under immediate threat from a development that is required to mitigate further flooding or landslides.

6. METHODS AND TECHNIQUES FOR DATA ANALYSIS

Analysts must be qualified and named in report(s).

Select as appropriate:

☒ Ancestral remains will not be subjected to destructive testing nor out-of-Province analysis without approval from the Branch, following engagement with Indigenous Communities.

6.1. Artifact and Faunal Analysis

☒ Standard methods will be followed:

Artifacts will be sent out of the Province (even to other offices within the archaeological

¹⁰ Light impacts include activities like removal of surface materials with minimal land alterations; heavy impacts include road and bridge construction, and land clearing activities.

¹¹ Interpretive value will consider artifact density, presence of exotic materials, presence of faunal materials, formed tools, diagnostic artifacts, and archaeological features.

firm) only with the permission of the Branch; the archaeologist will also contact Indigenous Communities with an interest in the site. The request to send artifacts out of the Province will include an artifact catalogue, photographs of tools and/or diagnostics, the reason for export, the destination and the length of time they will be out of Province.

All artifact assemblages will be analyzed with the intent of defining site function, activity areas and cultural chronology if possible (see Clark 2010, Mitchell 1971, and others).

Lithic analysis will use an established system (e.g., Andrefsky 1998; Magne 1983). Interpretation of the assemblage will provide insight into technologies represented at the site (e.g., core reduction, pressure flaking, heat treatment, etc.).

Tools will be measured and illustrated or photographed, with technological attributes noted.

Raw material sourcing analysis will be completed, where appropriate.

Faunal remains will be analyzed to the most specific taxa possible by a trained individual with access to an appropriate comparative collection or reference materials. Faunal elements will be identified by taxa, element, and side if possible, and any relevant cultural modifications or natural taphonomic processes noted, **with the aim of answering questions on site formation processes, subsistence strategies, environment, season of occupation, etc.**

Additional comments:

6.2. Sample Analysis

☒ **Standard methods will be followed:**

Samples may be sent out of the province for analysis.

Where wet sites are encountered, monolith and/or specialist samples may be taken and processed.

Collected CMT samples (*i.e.*, stem rounds) will be analyzed. Per [Bulletin 27](#), magnification will be used to improve the confidence of the results of tree-ring counting. Comparative collections will be used as appropriate for dendrochronology analysis.

The lab results from radiocarbon analysis will be appended to the report and site form(s). The report will present calibrated and conventional/standard dates.

Unprocessed samples will be stabilized for long-term storage.

Additional comments: none

7. DISPOSITION OF CULTURAL MATERIALS

Collected materials from archaeological sites (e.g., wet site materials), will be handled with sufficient care during excavation, recording, transport, cleaning, analysis and storage to ensure no additional damage or negative impacts occur to the collections during these processes per [Bulletin 26: Treatment of Archaeological Materials](#).

The permit report and site form(s) will identify the repository. Additional repositories may be added to the permit **upon completion of the study**, when it is known where materials originated, and if special curation measures are required. Additional repositories will require an amendment to the permit, subject to referral with affected Indigenous Communities.

Table 8. Permit Repository

Contact Name: Dr Genevieve Hill	Repository: Royal British Columbia Museum
Address: 675 Belleville Street, Victoria, BC V8W 9W2	
Phone: 250-893-8019	Fax or Email: GHill@royalbcmuseum.bc.ca

All artifacts recovered under permit must be labeled with a provincial catalogue number; the Province must be advised of the final catalogue number under this permit when cataloguing is complete.

Sediments believed to contain cultural materials will remain within the site boundary and a location specified in the site form and report. Samples may be collected for off-site analysis.

CMT samples will be analyzed and retained in-office for one year after the expiration of the permit and discarded.

Once the project is complete, all cultural materials and supporting documentation must be transferred to the designated repository prior to the permit expiry date, per their standards for packing and transport. Confirmation of acceptance of artifacts, samples, and record submission by the repository must be provided to the Branch prior to the expiration of the reporting period.

Materials to accompany the archaeological collection include:

- submission letter with box inventory
- artifacts and digital catalogue
- field notes (original and digital copies, including maps and sketches)
- photographs and photo log (copies of prints, if any, and digital), and
- interim report and specialized analysis appended (hardcopy and digital copy).

Additional comments: In the case of ancestral remains, collection and handling will be under the direction of and in consultation with Indigenous Communities. Human remains and suspected human remains are to be respectfully left in situ until recovery and disposition plans are made and confirmed by the affected parties. In emergency situations, in consultation with the Archaeology Branch, human remains, including ancestral remains, may be recovered or location stabilized to prevent ongoing direct impacts. Recovered ancestral remains will be held respectfully, in the territory, until direction can be received.

8. REPORTING

Reports, maps, and site records will comply with Branch standards. Electronic versions of reports will be provided to Indigenous Communities with an interest in the study area unless other arrangements are in place. Reports will include a distribution list to identify which Indigenous Communities were provided a copy of the report.

The Reference section will include relevant HCA permit number of previous studies. The titles of reports generated under this assessment will clearly identify the HCA permit number.

8.1. Site Records

Site forms and all related documentation (e.g., maps, artifact catalogues) will comply with Branch requirements. Site forms will be submitted within 6 weeks of the completion of site investigations.

Additional comments: Archaeologists will provide the Archaeology Branch with a British Columbia Archaeological Site Inventory Form for all sites revisited or investigated under authority of this permit. To fulfill this condition, the site form, mapping, and related documentation must comply with Archaeology Branch directives for site record submission.

Archaeologists authorized to conduct assessments under this permit who fail to provide satisfactory site forms will be considered to have outstanding obligations, thereby affecting their ability to hold additional permits issued by the Archaeology Branch

For the purpose of this permit, all site forms submitted to the Archaeology Branch will be via email to archsiteform@gov.bc.ca, citing permit **2021-0453** in the subject line.

8.2. Reports

As appropriate, management summaries and recommendations will clearly articulate responsibilities under the *Heritage Conservation Act*.

Delegated archaeologists will submit interim reports to describe their assessments and the results under this permit.

Interim reports shall contain detailed descriptions of every part of each investigation area, in terms of the criteria used to evaluate archaeological potential. This includes all areas subjected to field inspection, as well as those areas reviewed solely through map and document review if the permit would have authorized field inspection of those developments.

Interim reports will provide a tabular description of shovel test areas (STA) in terms of size, stratigraphy, setting, and number of tests placed.

Interim reports will provide a tabular description of each area of archaeological potential (AOP) in terms of size, setting and recommended number of shovel tests.

Spatial data will be submitted to the Branch for STAs and AOPs.

All specialized analyses will be appended to the report.

Low potential areas, including areas assessed by desktop, will be described to support model development.

Unless otherwise discussed with Indigenous Communities or the Branch, all photographs of diagnostic artifacts, formed tools, and rock art will be included in the permit report.

Other details:

All deliverables must be submitted to the Archaeology Branch by email at archpermitapp@gov.bc.ca, citing permit **2021-0453** in the subject.

Proponents may require that non-permitted assessments are summarized and provided to the Archaeology Branch for inclusion in this report.

Archaeologists authorized to conduct assessments under this permit who fail to provide satisfactory interim reports will be considered to have outstanding obligations, thereby affecting their ability to hold additional permits issued by the Archaeology Branch.

Project tracking reports are required under this permit. See Appendix for the format of the report, which must be submitted in excel format.

Deliverables include:

- Project tracking report of field assessment and results
- Notice(s) of Intent
- Site records, including site forms, artifact catalogues, and other documentation
- PDF of finalized interim report(s). Appendices will include:
 - Specialized analyses (e.g., radiocarbon dating)
 - Summary of notices of intent (as applicable).
- Shapefiles (as polygons):
 - study areas
 - shovel test locations
 - areas of potential not subjected to subsurface testing.

8.3. Schedule of deliverables

Is the report due within two years of the anticipated permit issuance?

☐ **Yes** (delete rest of text below and proceed to the next section).

☒ **No** (refer to Table 9409)

As the inability to access information from long-term projects impacts the efficiency and effectiveness of recourse management decisions for the project and archaeological activities in the general area of these studies, the following submissions will be due throughout the course of the permit:

Table 9. Schedule of Deliverables

Deliverable	Timelines (Choose as appropriate)	
	Standard	Other (Specify)
Project Tracking Report	☒ Monthly or Project completion	
Non-permitted PFR reports, including spatial data of survey coverage	☒ Project completion	
Interim reports	☒ For all developments assessed under the permit.	
Shapefiles	☐ Annually, on the anniversary of permit issuance	☒ Annually, on March 31
Summary reports		☒ Annually, on March 31

Site forms will be submitted within six weeks of the completion of site investigations.

A summary report is a status update of all projects by NOI, Interim Report and Site Inventory Records, and a forecast of outstanding work to be completed in the next year if possible, in a tabular format

Additional comments: The interim and summary report should utilize a tabular format.

9. APPLICANT

The applicant is an employee of the Province of British Columbia, Ministry of FLNRORD with the authority to sign on behalf of FLNRORD. This is his first permit.

Additional comments: Delegated Archaeologists will be added to the permit subject to review and authorization by the Archaeology Branch.

10. NOTICES

NOTICE REGARDING COPYRIGHT

At the time of report production, the owner(s) of the report copyright will be asked to grant a non-exclusive license to the Province of British Columbia for the purpose of copying and distributable ing the report. The original copyright owner will retain copyright ownership. The granting of this license will facilitate access to the archaeological data contained within the report and will therefore contribute to the protection of heritage resources throughout the Province. Copyright owners who refuse to grant a license to the Province, and anyone carrying out research on behalf of those copyright owners, will not be granted access to the Archaeology Branch's online library and will not be permitted to photocopy reports within the Branch office.

The following will be added to the first page of reports:

The copyright owner may be the corporate employer of the report author, the client for whom the report was written, the actual author, or the Province of British Columbia if written while employed by the Province. The Grant of License reads:

I _____ confirm that I am the copyright owner (or a copyright owner) of this permit report, and for good and valuable consideration I irrevocably grant a non-exclusive license to the Province of British Columbia, for a term equal to the life of the copyright commencing on the date of execution below, to make copies of the reports, including all appendices and photos, and to provide such copies to anyone, at the discretion of the Province, either at no charge or at the cost incurred by the Province in making and distributing the copies. All parties, except the party for whom the report was prepared, acknowledge that any use or interpretation of this report is at the sole risk and liability of the subsequent user(s).

Executed this ____ day of _____, 20XX, by

Signature of Copyright Owner

Affiliation

2020-0453
Permit Number

NOTICE REGARDING OTHER PERMITS

No permits or approvals, other than a *Heritage Conservation Act* permit, are required to carry out the inspections or investigations described in the permit application. However, licensees and property owners or developers may also require other approvals such as forestry cutting permits and municipal development permits.

11. REFERENCES

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Archaeology Branch

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GENERAL TERMS AND CONDITIONS OF PERMIT

1. Permits shall be valid for the term stipulated on the front of the permit unless otherwise suspended or cancelled. Extensions to the term of the permit, or other amendments, will be considered upon submission of an application to the Archaeology Branch at least 60 days prior to the expiry date of the permit.
2. The permit-holder or delegated archaeologist(s) shall provide the Archaeology Branch with one (1) bound copy and one (1) electronic copy in PDF format of a written report, in accordance with the standards required by the Minister, outlining the work carried out under the terms of the permit.
3. The delegated archaeologist(s) shall provide the Archaeology Branch with Project Tracking reports at the completion of each project.
4. The title page of all reports must indicate the name(s) of the copyright owner(s) and, where agreed to, a Grant of License statement completed and signed by the copyright owner(s).
5. A person appointed by the Archaeology Branch may at any time inspect any aspect of a project conducted under the terms of this permit. To further their inspection, the appointee may request field data, or conduct excavations within the study area. Unless other arrangements are made, data must be made available to the Archaeology Branch within five (5) days of their request. Notwithstanding the expiration or earlier termination of the term of the permit this provision will remain and continue in full force and effect.
6. Upon completion of any inspection or investigation involving excavations, the permit holder or delegated archaeologist(s) shall make reasonable efforts to ensure all sites are restored as nearly as possible to their former condition.
7. The permit holder or delegated archaeologist(s) shall arrange for a secure repository to curate any materials recovered under authority of the permit.
8. Heritage objects and associated materials recovered under authority of the permit may not be sold or exchanged for financial gain. Any other transfer of heritage objects, materials and records, or changes to the conditions identified under the "Disposition of materials collected..." section of the permit may only be carried out with prior consent of the Minister.
9. The permit holder or delegated archaeologist(s) shall conform to all requirements that may be imposed by the institution or organization named in the "Disposition of materials collected..." section of the permit.
10. Notwithstanding expiration or earlier termination of the term of the permit, provisions with respect to the "Disposition of materials collected ..." section shall remain and continue in full force and effect.
11. The permit holder or delegated archaeologist(s) shall utilize any site recording forms, formats or systems required by the minister. To fulfill this condition, the site form, mapping, and related documentation must comply with Archaeology Branch directives for site record submission. Failure to submit satisfactory site records will be considered an outstanding obligation, thereby affecting the archaeologists' ability to hold additional permits.
12. A Heritage Investigation permit issued under the HCA does not authorize entry onto land or into a building without the permission of the owner or occupier.
13. The permit holder or delegated archaeologist(s) shall submit spatial information (as a shapefile in accordance with the standards required by the Minister) of all study areas that were the subject of in-field inspections.
14. Where known, First Nation file numbers will be referenced in permit-related correspondence.
15. Unless other arrangements are made, First Nations will be provided electronic copies of reports for work conducted in their area of interest under the permit.

16. In the event ancestral remains are encountered, all work must cease in the vicinity of the remains and the Archaeology Branch must be contacted for direction, unless otherwise provided for in the permit application
17. Archaeologists qualified as a Permit Holders in the appropriate cultural area will be retained by the applicant, and act as a co-permittee, known as the delegated archaeologists.
18. The delegated archaeologist is responsible for all of the terms and conditions of the permit (e.g., site records, management recommendations, and interim reporting) for fieldwork conducted under the permit. The delegated archaeologist must be an eligible permit holder, having no outstanding obligations with the Archaeology Branch and sufficiently experienced to hold permits without conditions (i.e., not a novice permit holder).
19. The delegated archaeologist may utilize Field Directors per Bulletin 17.
20. All impact management recommendations must be reviewed and signed by the Delegated Archaeologist or similarly qualified Eligible Permit Holder, though emergent situations may be approved by Archaeology Branch staff.
21. Any ground-altering activities within known archaeological sites must be conducted under the direction of the archaeologist.
22. The permit holder shall conduct the inspection as described in the permit application, unless otherwise specified in the permit.
23. Any other conditions that may be specified in the permit.

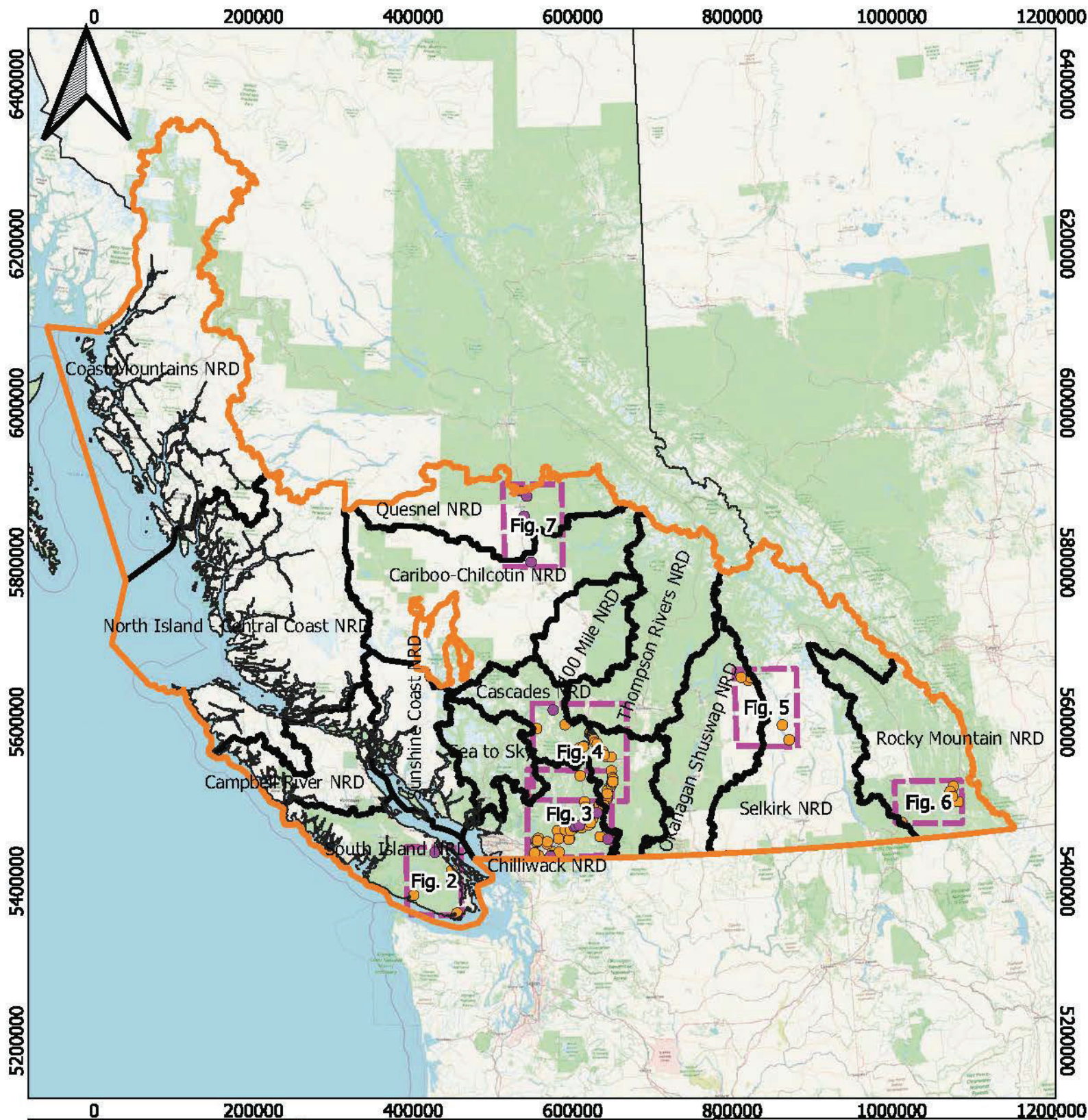


Fig. 1 - Permit Area Overview

0 100 200 km

HCA Application: 21A0694

Scale: 1: 6,500,000

Datum: UTM 10 N

Date: 2021-12-03

Author:

Corey Cookson (Arch Branch)

Legend

● Flood Events (Recorded as of 2021-11-26)

● Landslides (Recorded as of 2021-11-2021)

NRDs

Permit Area

Midrange maps

Base Data: Open Street Map
Flood Data: Ministry of Transportation and Infrastructure
Landslides: GeoBc



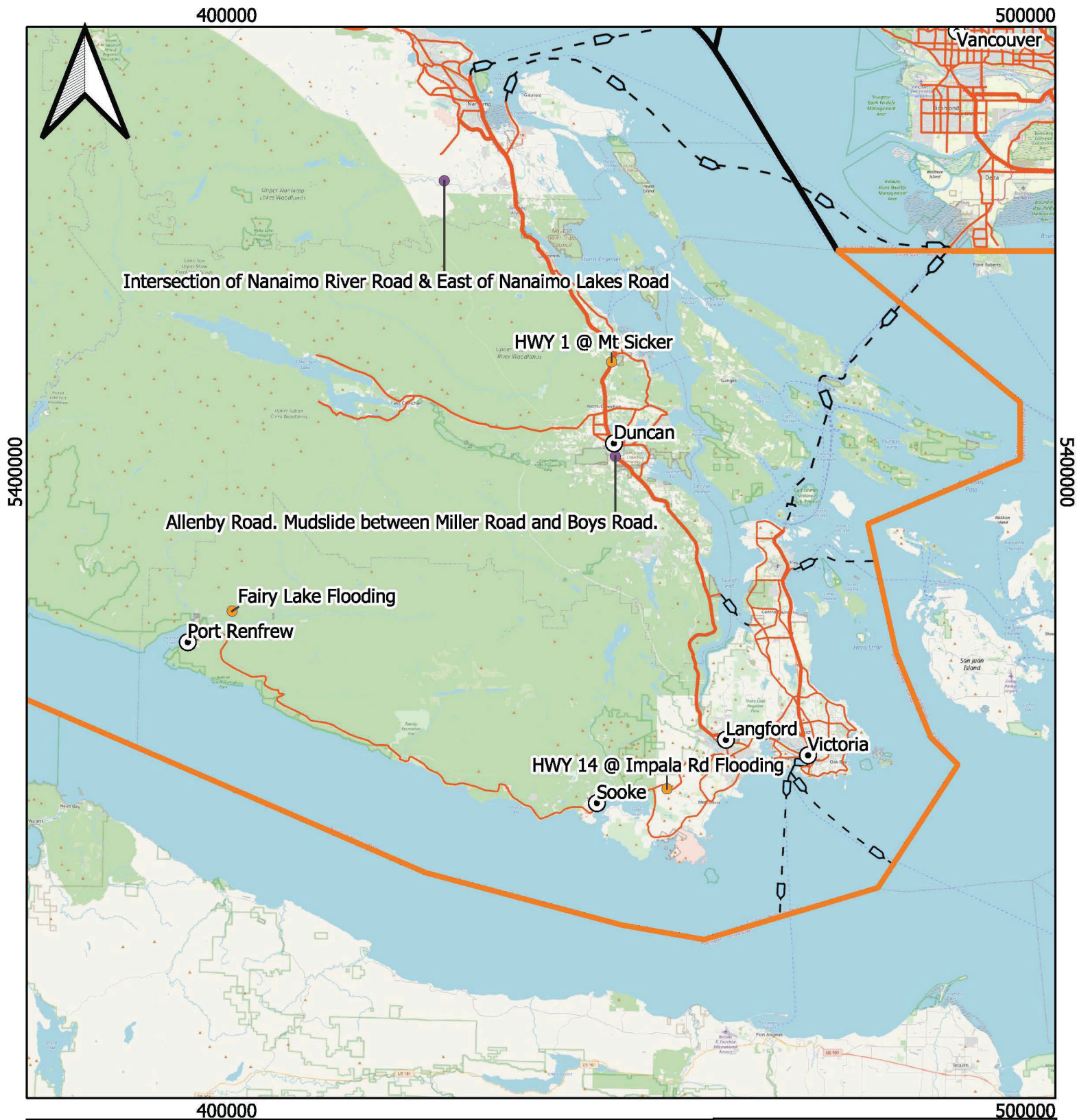


Fig. 2 Midrange - South Island

0 10 20 km

HCA Application: 21A0694

Scale: 1: 650,000

Datum: UTM 10 N

Date: 2021-11-26

Author:

Corey Cookson (Arch Branch)

Legend

Permit Area

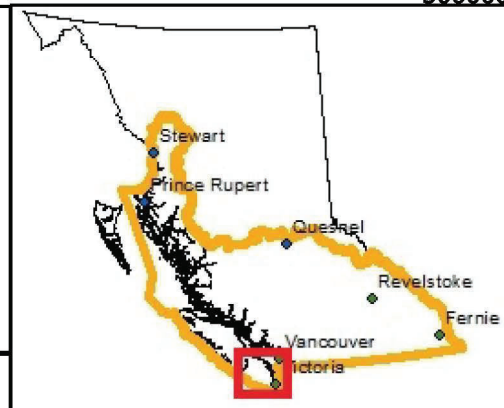
Cities

Highway

Landslides (Recorded as of 2021-11-26)

Flood Events (Recorded as of 2021-11-26)

Base Data: Open Street Map
Flood Events: Ministry of Transportation and Infrastructure
Landslides: GeoBC



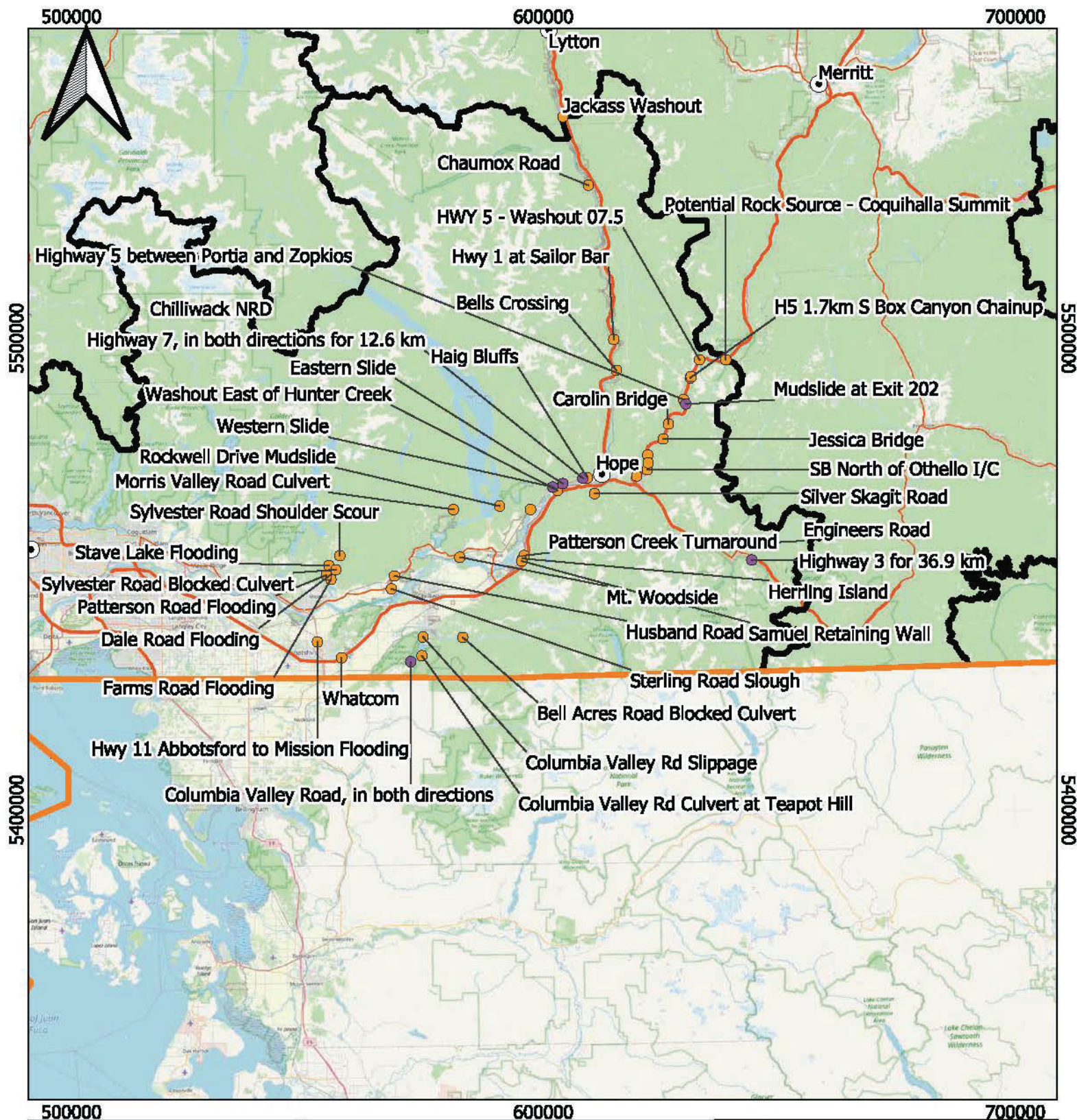


Fig. 3 Midrange - Chilliwack

0 10 20 km

HCA Application: 21A0694

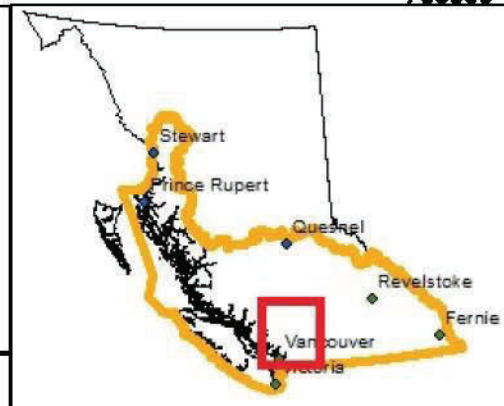
Scale: 1: 1,100,000

Datum: UTM 10 N

Date: 2021-11-26

Author:

Corey Cookson (Arch Branch)



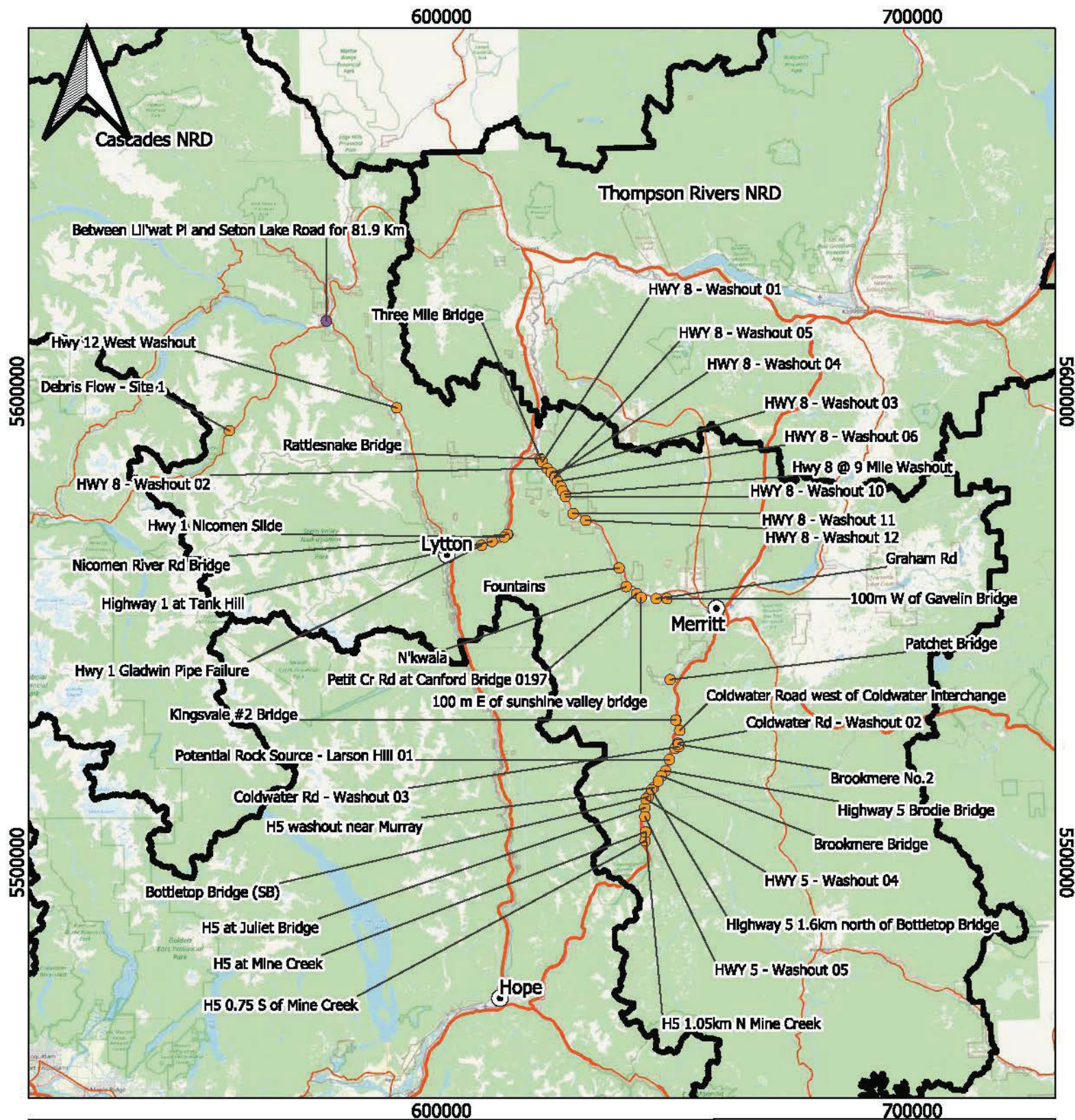


Fig. 4 Midrange - Cascades

0 10 20 km

HCA Application: 21A0694

Scale: 1:1,100,000

Datum: UTM 10 N

Date: 2021-11-26

Author:

Corey Cookson (Arch Branch)

Legend

Permit Area

Cities

Highway

Landslides (Recorded as of 2021-11-26)

Flood Events (Recorded as of 2021-11-26)

Base Data: Open Street Map
Flood Events: Ministry of Transportation and Infrastructure
Landslides: GeoBC



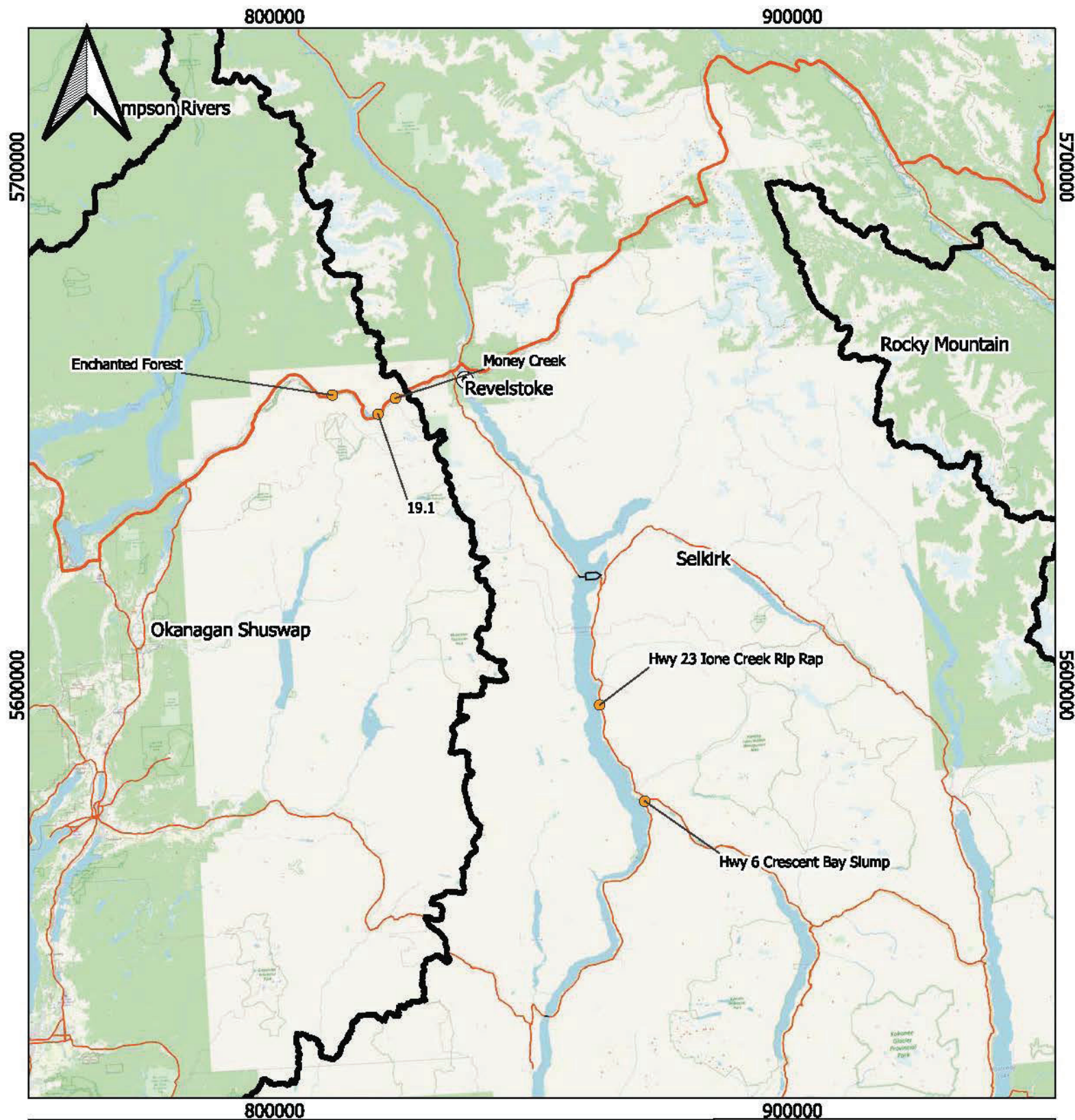


Fig. 5 Midrange - Okanagan Shuswap & Selkirk

0 10 20 km

HCA Application: 21A0694

Scale: 1: 1,000,000

Datum: UTM 10 N

Date: 2021-11-24

Author:

Corey Cookson (Arch Branch)

Legend

Permit Area

Cities

Highway

Flood Events (As of Nov 23, 2021)

Natural Resource Districts

Base Data: Open Street Map
Flood Events: Ministry of Transportation and Infrastructure



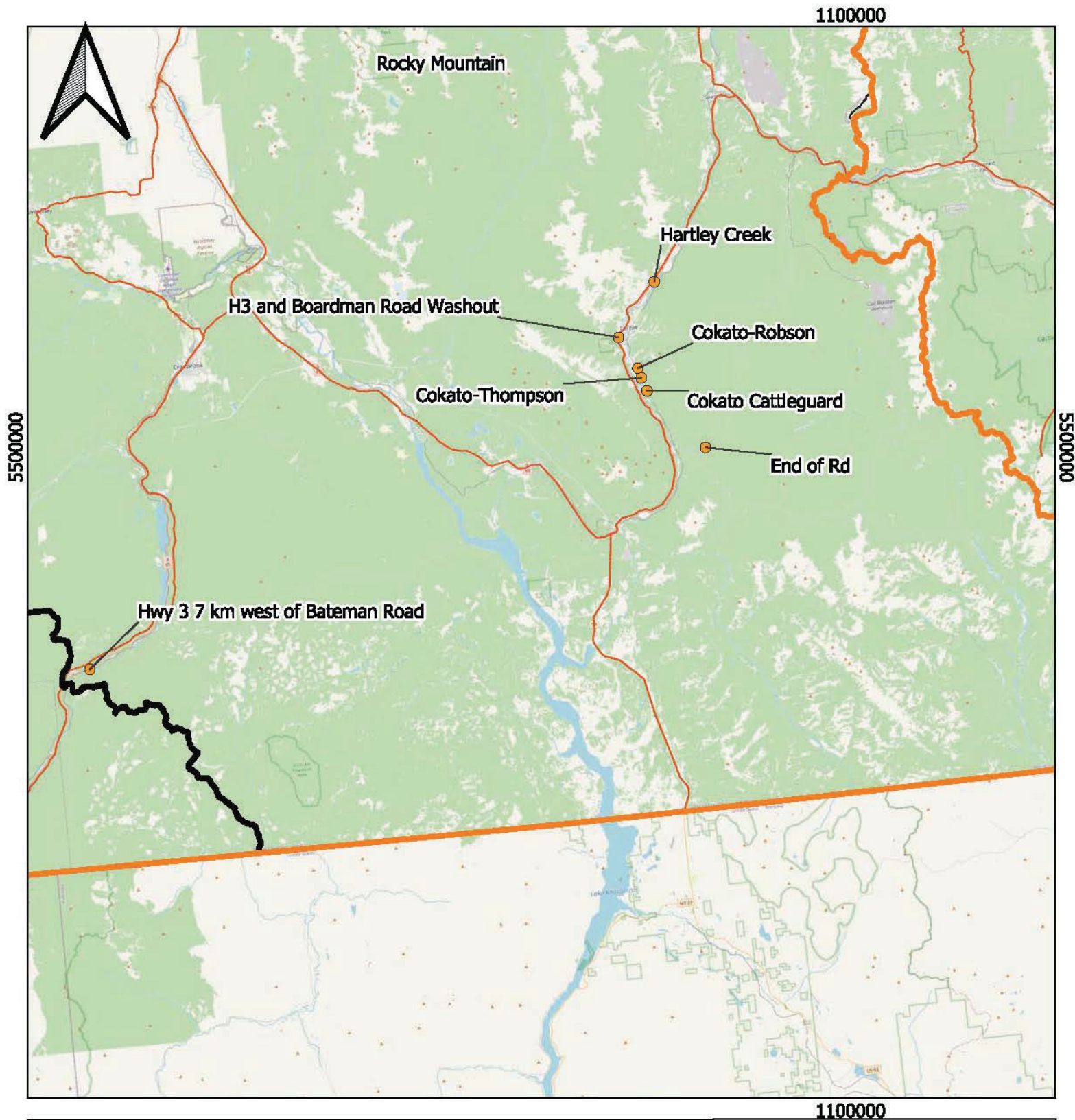


Fig. 6 Midrange - Rocky Mountain

0 10 20 km

HCA Application: 21A0694

Scale: 1: 600,000

Datum: UTM 10 N

Date: 2021-11-24

Author:

Corey Cookson (Arch Branch)

Legend

Permit Area

● Flood Events (As of Nov 24, 2021)

● Cities

NRDs

Highway

Base Data: Open Street Map

Flood Events: Ministry of Transportation and Infrastructure



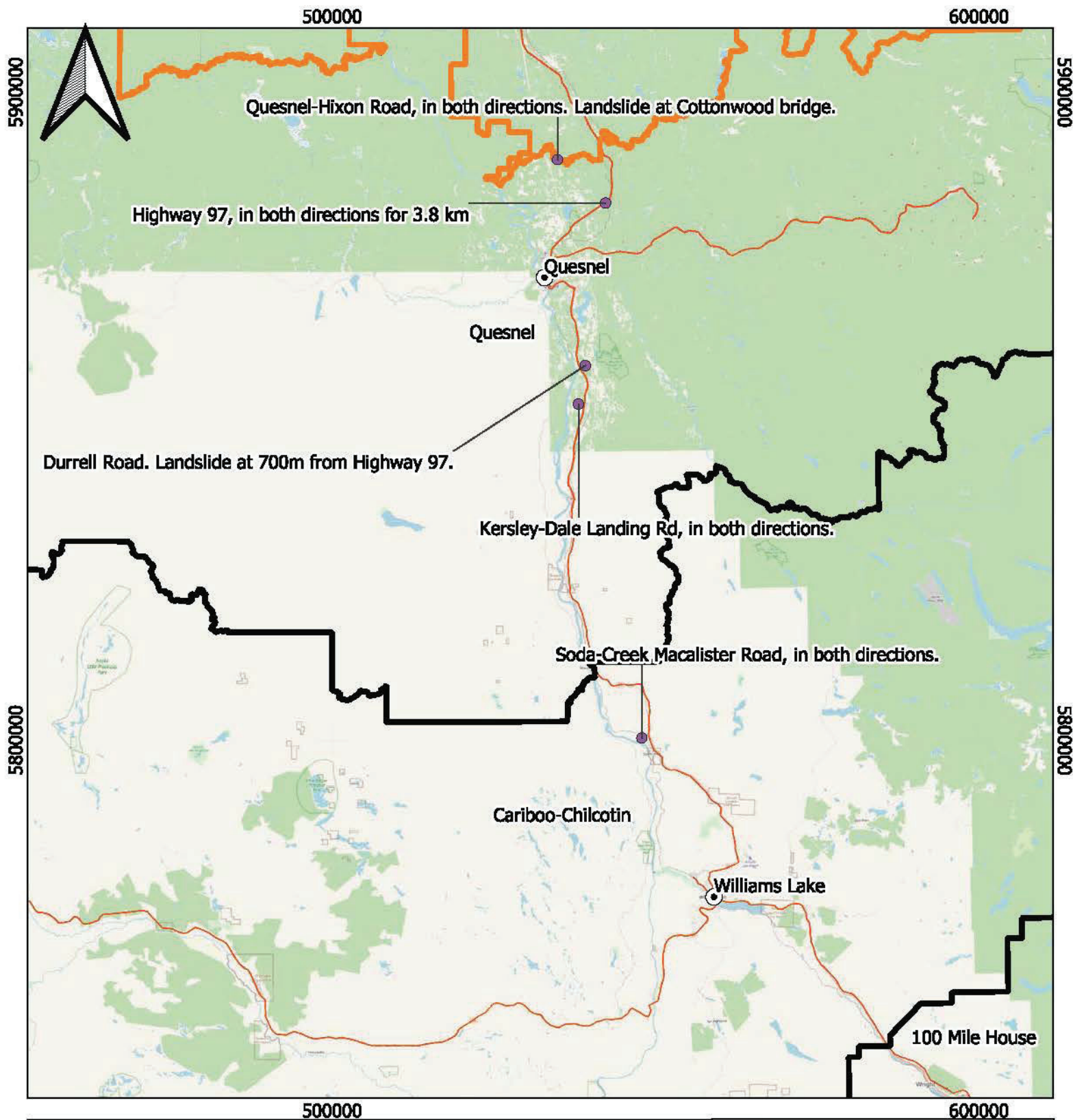


Fig. 7 Midrange - Quesnel & Cariboo-Chilcotin

0 10 20 km

HCA Application: 21A0694

Scale: 1: 800,000

Datum: UTM 10 N

Date: 2021-11-26

Author:

Corey Cookson (Arch Branch)

Legend

Permit Area

Cities

Highway

Landslides (Recorded as of 2021-11-26)

Flood Events (Recorded as of 2021-11-26)

Base Data: Open Street Map
Flood Events: Ministry of Transportation and Infrastructure
Landslides: GeoBC



Appendix 1: Landslides and Floods impacting MoTI infrastructure

Data in the following tables is current to November 26, 2021

Table 10 MoTI Infrastructure impacted by Landslides and Flood Events

Area	Region	District	Event	Location
North	Skeena	Coast Mountains	N/A	
Coast	West Coast	North Island – Central Coast	N/A	
		Campbell River	N/A	
		South Island	Flood	Fairy Lake Flooding
			Flood	Hwy 1 @ Mt Sicker
			Landslide	Allenby Road. Mudslide between Miller Road and Boys Road.
			Landslide	Intersection of Nanaimo River Road & East of Nanaimo Lakes Road
			Flood	Hwy 14 @ Impala Rd Flooding
	South Coast	Sunshine Coast	N/A	
		Sea to Sky	N/A	
		Chilliwack	Flood	Bell Acres Road Blocked Culvert
			Flood	Bells Crossing
			Flood	Carolin Bridge
			Flood	Chaumox Road
			Flood	Columbia Valley Rd Culvert at Teapot Hill
			Flood	Columbia Valley Rd Slippage
			Landslide	Columbia Valley Road, in both directions
			Flood	Dale Road Flooding
			Landslide	Eastern Slide
			Flood	Engineers Road
			Flood	Farms Road Flooding
			Flood	Hwy 5 1.3km S Box Canyon Chainup
			Flood	Hwy 5 1.7km S Box Canyon Chainup
			Flood	Haig Bluffs
			Flood	Herrling Island
			Landslide	Highway 3, in both directions for 36.9 km
			Flood	Highway 5 between Portia and Zopkios
			Flood	Highway 5 - Washout 07.5
			Flood	Highway 5 - Washout 11
			Flood	Highway 5 - Debris 04
			Flood	Highway 5 - Debris 05
			Landslide	Highway 7, in both directions for 12.6 km
			Flood	Husband Road
			Flood	Hwy 1 at Sailor Bar
			Flood	Hwy 11 Abbotsford to Mission Flooding
			Flood	Jessica Bridge
			Flood	Morris Valley Road Culvert
			Flood	Mt. Woodside
			Landslide	Mudslide at Exit 202
			Flood	Patterson Creek Turnaround
			Flood	Patterson Road Flooding
			Flood	Potential Rock Source - Coquihalla Summit

Area	Region	District	Event	Location
Coast	South Coast	Chilliwack	Flood	Rockwell Drive Mudslide
			Flood	Samuel Retaining Wall
			Flood	SB North of Othello I/C
			Flood	Seabird Bluffs
			Flood	Silver Skagit Road
			Flood	Stave Lake Flooding
			Flood	Sterling Road Slough
			Flood	Sylvester Road Blocked Culvert
			Flood	Sylvester Road Shoulder Scour
			Flood	Washout East of Hunter Creek
			Landslide	Western Slide
			Flood	Whatcom
South	Thompson-Okanagan	Cascades	Flood	100 m E of sunshine valley bridge
			Flood	100 m W Gavelin Bridge
			Flood	Bottletop Bridge (SB)
			Flood	Brookmere Bridge
			Flood	Brookmere No.2
			Flood	Coldwater Road west of Coldwater interchange
			Flood	Coldwater Rd - Washout 02
			Flood	Coldwater Rd - Washout 03
			Flood	Debris Flow - Site 1
			Landslide	Eastern extent of mudslide between Lil'wat PI and Seton Lake Road for 81.9 Km
			Flood	Fountains
			Flood	Graham Rd
			Flood	Hwy 1 at Nicomen Bridge
			Flood	Hwy 5 0.75 S of Mine Creek
			Flood	Hwy 5 1.05km N Mine Creek
			Flood	Hwy 5 at Juliet Bridge
			Flood	Hwy 5 at Mine Creek
			Flood	Hwy 5 washout near Murray
			Flood	HWY 5 - Washout 04
			Flood	HWY 5 - Washout 05
			Flood	HWY 8 - Washout 01
			Flood	HWY 8 - Washout 02
			Flood	HWY 8 - Washout 03
			Flood	HWY 8 - Washout 04
			Flood	HWY 8 - Washout 05
			Flood	HWY 8 - Washout 06
			Flood	HWY 8 - Washout 07
			Flood	HWY 8 - Washout 08
			Flood	HWY 8 - Washout 10
			Flood	HWY 8 - Washout 11
			Flood	HWY 8 - Washout 12
			Flood	Highway 1 at Tank Hill
			Flood	Highway 12 washout 2 Mud Slide
			Flood	Highway 5 1.6km north of Bottletop Bridge
			Flood	Highway 5 Brodie Bridge
			Flood	Hwy 1 Gladwin Pipe Failure
			Flood	Hwy 1 Nicomen Slide

Area	Region	District	Event	Location
South	Thompson-Okanagan	Cascades	Flood	Hwy 12 West Washout
			Flood	Hwy 8 @ 9 Mile Washout
			Flood	Jackass Washout
			Flood	Kingsvale #2 Bridge
			Flood	Murray Bridge
			Flood	N'kwala
			Flood	Nicomen River Rd Bridge
			Flood	Patchet Bridge
			Flood	Petit Cr Rd at Canford Bridge 0197
			Flood	Potential Rock Source - Larson Hill 01
			Flood	Potential Rock Source - Larson Hill 02
			Flood	Rattlesnake Bridge
			Flood	Three Mile Bridge
		Okanagan-Shuswap	Flood	19.1
			Flood	Enchanted Forest
			Flood	Money Creek
		Thompson Rivers	N/A	
	Kootenay-Boundary	Selkirk	Flood	Hwy 23 Lone Creek Rip Rap
			Flood	Hwy 6 Crescent Bay Slump
		Rocky Mountain	Flood	Cokato Cattleguard
			Flood	Cokato-Robson
			Flood	Cokato-Thompson
			Flood	End of Rd
			Flood	Hwy 3 and Boardman Road Washout
			Flood	Hartley Creek
			Flood	Hwy 3 7 km west of Bateman Road
	Cariboo	100 Mile House	N/A	
		Cariboo-Chilcotin		
			Landslide	Soda-Creek Macalister Road, in both directions.
		Quesnel	Landslide	Kersley-Dale Landing Rd, in both directions.
			Landslide	Durrell Road. Landslide at 700m from Highway 97.
			Landslide	Quesnel-Hixon Road, in both directions.
			Landslide	Landslide at Cottonwood bridge.
			Landslide	Highway 97, in both directions for 3.8 km

Appendix 2: Archaeological Sites and MoTI infrastructure

Data in the following tables is current to November 26, 2021

Table 11. Summary of recorded archaeological sites within 1 km of impacted MoTI infrastructure by Natural Resource District

Area	Region	District	Table
North	Skeena	Coast Mountains	N/A
Coast	West Coast	North Island-Central Coast	N/A
		Campbell River	N/A
		South Island	Table
	South Coast	Sunshine Coast	N/A
		Sea to Sky	N/A
		Chilliwack	Table
South	Thompson-Okanagan	Cascades	Table
		Okanagan-Shuswap	N/A
		Thompson Rivers	N/A
	Kootenay-Boundary	Selkirk	Table
		Rocky Mountain	Table
	Cariboo	100 Mile House	N/A
		Cariboo-Chilcotin	N/A
		Quesnel	N/A

Table 12. Recorded sites within 1 km - South Island Natural Resource District

Impact	Location	Site	Site Type	Distance/Direction
Flood	Highway 1 @ Mt Sticker	DfRw-7	Subsurface, Shell midden; Surface lithics	460 m N
Flood	Highway 14 Impala Road	DcRv-45	Cultural Material, Surface	200 m S
Flood		DcRv-83	Cultural Material, Surface, Lithics	460 m E/SE

Table 13. Recorded sites within 1 km - Chilliwack Natural Resource District

Impact	Location	Site	Site Type	Distance/Direction
Flood	Bells Crossing	DjRi-12	Rock art, pictograph; Habitation, Rock Shelter; Subsurface and Surface Lithics	380 m SE
Flood		DjRi-16	Habitation, Rock Shelter	110 m SE
Flood		DjRi-2	Human Remains; Subsurface Lithics; Cultural Depression, Housepit	150 m N
Flood		DjRi-3	Human Remains; Subsurface Lithics	560 m N
Flood		DjRi-32	Cultural Material, Surface	600 m S
Flood		DjRi-53	Cultural Depression, Cache Pit; Cultural Material, Surface	380 m SE
Flood		DjRi-57	Cultural Material, Surface, Fire broken Rock; Habitation, Rock Shelter	380 m E
Flood		DjRi-63	Subsurface Lithics; Habitation, Rock Shelter	620 m SE
Flood		DjRi-65	Subsurface Lithics; Habitation, Rock Shelter	380 m SE
Flood		DjRi-79	Post Contact Human Remains	250 m NE
Flood		DjRi-87	Cultural Material, Surface, Lithics	500 m S/SE
Flood	Carolyn Bridge	DiRh-9	Subsurface Lithics	200 m SE
Flood		DiRh-6	Subsurface Lithics	700 m NE
Flood		DiRh-3	Culturally Modified Tree	950 m NW
Flood	Highway 1 @ Sailor Bar	DjRi-25	Surface Lithics	440 m NE
Flood		DjRi-28	Surface Lithics	330 m NE
Flood		DjRi-66	Cultural Depressions, Cache Pit and Unassigned	580 m N/NE
Flood		DjRi-81	Cultural Depression, Cache Pit; Cultural Material, Surface	380 m NE
Flood		DjRi-83	Surface Lithics	700 m N/NE
Flood		DjRi-84	Surface Lithics	400 m N/NE
Flood	Jessica Bridge	DiRh-4	Cultural Depression, Undefined	980 m SW
Flood	Morris Valley Road Culvert	DhRI-53	Culturally Modified Tree	530 m N

Impact	Location	Site	Site Type	Distance/Direction
Flood	Washout East of Hunter Creek	DiRj-18	Surface Lithics	290 m N
Flood		DiRj-28	Cultural Depression, Cache Pit	480 m NE
Flood		DiRj-34	Subsurface Lithics and Faunal; Habitation, Rock Shelter	520 m E/NE
Flood		DiRj-5	Surface Lithics	260 m NE
Flood	Chaumoux Road	DIRi-11	Cultural Depression, Cache Pit	625 m NE
Flood		DIRi-14	Cultural Depression, undefined; Historic Building	625 m NE
Flood		DIRi-15	Cultural Depression, Cache Pit	625 m NE
Flood		DIRi-32	Historic Building	Direct overlap
Flood		DIRi-33	Cultural Depression, Cache Pit	600 m N
Flood	Haig Bluffs	DiRi-18	Post Contact Human Remains	730 m E
Flood		DiRi-38	Culturally Modified Tree	360 m SE
Flood	Highway 11 Abbotsford	DgRn-30	Surface Lithics	930 m E/SE
Flood	Silver Skagit Road	DiRi-105	Culturally Modified Tree	780 m SE
Flood		DiRi-123	Subsurface Lithics; Habitation, Rock Shelter	630 m N
Flood		DiRi-99	Subsurface Lithics; Habitation, Rock Shelter	930 m E
Landslide	Eastern Slide	DiRj-21	Lithics, cairn	Direct overlap
Landslide	Western Slide	DiRj-32	Rock Shelter	Direct overlap
Landslide	Highway 7, in both directions	DiRj-1	Cultural Depression, Housepit; Rock art, Petroglyph	Direct overlap
Flood	Sterling Road Slough	DhRm-2	Cultural Depression, undefined; Surface Lithics	760 m NW

Table 14. Recorded sites within 1 km - Cascades Natural Resource District

Impact	Location	Site	Site Type	Distance/Direction
Flood	100 m E of Sunshine Valley Bridge	EaRf-17	Surface Lithics	890 m E
Flood		EaRf-18	Surface Lithics	730 m NE
Flood		EaRf-7	Human Remains	650 m E
Landslide	Eastern extent of mudslide between Lil'wat PI and Seton Lake Road for 81.9 Km	EeRI-120	Cultural Depression, Housepit; Surface, lithics	Direct overlap
Landslide		EeRI-217	Subsurface and Surface Lithics	Direct overlap
Flood	Fountains	EbRg-1	Cultural Depression, Housepit	290 m N/NW
Flood		EbRg-32	Cultural Depression, Housepit	350 m SW
Flood	Highway 1 @ Tank Hill	EbRi-37	Cultural Depression, Cache pit; Surface Lithics	900 m NE
Flood		EbRi-38	Cultural Depression, Cache pit; Surface Lithics	220 m N
Flood	Highway 1 Gladwin Pipe Failure	EbRi-44	Cultural Depression, undefined; Surface Lithics	700 m N
Flood	Highway 1 Nicomen Slide	EbRi-3	Cultural Depression, undefined; Surface Lithics	360 m NW
Flood		EbRi-49	Rock art, petroglyph	680 m NE
Flood	Highway 8 @ 9 mile washout	EcRh-1	Cultural Depression, Housepit and Cache pits; Human Remains	240 m NW
Flood		EcRh-26	Surface Lithics	260 m S
Flood		EcRh-3	Cultural Depression, Cache Pit; Habitation, Rock Shelter; Surface Lithics; Human Remains	645 m NW
Flood	Highway 8 Washout 01	EcRh-98	Surface Lithics	100 m NW
Flood		EcRh-92	Surface Lithics; Subsurface Lithics	300 m NW
Flood	Highway 8 Washout 03	EcRh-87	Surface Lithics	150 m W
Flood	Highway 8 Washout 04	EcRh-9	Rock art, pictograph	590 m SE
Flood	Highway 8 Washout 05	EcRh-9	Rock art, pictograph	270 m E/SE

Impact	Location	Site	Site Type	Distance/Direction
Flood	Highway 8 Washout 07	EcRh-2	Surface Lithics; Rock art, pictograph; Cultural Depression, Cache Pit	700 m SE
Flood	Highway 8 Washout 08	EcRh-1	Cultural Depression, Housepit and Cache pits; Human Remains	50 m S
Flood		EcRh-2&5	Surface Lithics; Rock art, pictograph; Cultural Depression, Cache Pit	110 m NW
Flood		EcRh-3	Cultural Depression, Cache Pit; Habitation, Rock Shelter; Surface Lithics; Human Remains	250 m E
Flood	Highway 8 Washout 09	EcRh-9	Rock art, pictograph	700 m N/NW
Flood	Highway 8 Washout 10	EcRh-26	Surface Lithics	220 m N
Flood		EcRh-1	Cultural Depression, Housepit and Cache pits; Human Remains	720 m N/NW
Flood	Highway 8 Washout 11	EbRh-24	Surface Lithics; Subsurface Lithics	180 m W (on Federal Reserve)
Flood		EbRh-4	Cultural Depression, Cache Pit and House pit; Subsurface, Faunal; Subsurface, Lithics	300 m SW
Flood		EbRh-23	Surface Lithics; Subsurface Lithics	420 m SE
Flood	Highway 8 Washout 12	EbRg-7	Cultural Depression, Cache Pit	160 m E/SE
Flood		EbRg-6	Cultural Depression, Cache pits; Human Remains	320 m SE
Flood		EbRg-26	Surface Lithics	360 m W
Flood		EbRg-8	Culturally Modified Tree	530 m W
Flood		EbRg-27&31	Surface Lithics; Subsurface Lithics	750 m SE
Flood		EbRg-25&27	Surface Lithics; Subsurface Lithics	650 m SW
Flood		EbRh-1	Cultural Depression, House Pit	620 m NW
Flood	Jackass	EaRj-49	Cultural Depression, Cache Pit	840 m NW
Flood		EaRj-63	Historic Log Cabin	890 m W/NW
Flood		EaRj-57	Historic Building; Surface Lithics	750 m S
Flood	Nicomen River Rd	EbRi-49	Rock art, petroglyph	240 m SW

Impact	Location	Site	Site Type	Distance/Direction
Flood		EbRi-7	Human Remains	100 m N
Flood	N'Kwala	EaRg-3	Cultural Material, Surface; Human Remains	1 km SE
Flood	Patchet Bridge	DIRf-1	Subsurface Lithics	950 m N
Flood	Petit Cr Road Canford Bridge	EaRg-4	Rock art, pictograph	925 m W/SW
Flood	Rattlesnake Bridge	EcRh-94	Subsurface Lithics	300 m W/NW
Flood		EcRh-92	Surface Lithics; Subsurface Lithics	670 m SE
Flood	Three Mile Bridge	EcRh-92	Surface Lithics; Subsurface Lithics	350 m S
Flood		EcRh-98	Surface Lithics	500 m S
Flood		EcRh-94	Subsurface Lithics	600 m NW

Table 15. Recorded sites within 1 km - Selkirk Natural Resource District

Impact	Location	Site	Site Type	Distance/Direction
Flood	Highway 6 Crescent Bay Slump	EbQk-1	Human Remains; Cultural Material, surface	650 m N
Flood		EbQk-2	Cultural Depression, sweat lodge	960 m S

Table 16. Recorded sites within 1 km - Rocky Mountain Natural Resource District

Impact	Location	Site	Site Type	Distance/Direction
Flood	Highway 3, 7 km west of Bateman Road	DhPx-1	Historic Transportation Trail; Subsurface Lithics	675 m NW
Flood		DhPx-3	Historic Transportation Trail; Subsurface Lithics	545 m SW

Appendix 3: Project Tracking

A project tracking log (in Excel) must be maintained and provided to the Archaeology Branch on a monthly basis during active project work. Forms should be submitted by email to ArchPermitApp@gov.bc.ca citing permit **2021-0453** in the subject line.

The log must minimally contain the following columns:

1. Firm Name
2. Delegated Archaeologist Name
3. Interim Report Number
4. Interim Report Name
5. Proponent
6. Proponent Contact person
7. Component Names
8. Notice of Intent Date
9. Date(s) of fieldwork
10. Number of assessment hours (field days x crew members)
11. Automatically Protected Sites found (yes/no)
12. Other cultural sites found (yes/no)
13. Temp site Number
14. Borden Number
15. Revisit (yes/no)

For each site:

16. Site Type
17. Significance Rating
18. Ongoing impacts?
19. Mitigation type(s): avoidance, protection, systematic data recovery
20. Archaeology Branch Approved Mitigation: Date
21. Mitigation approval by: Archaeology Branch Project Officer name



Additional Client Certification for Permits Issued under Section 12.2 of the Heritage Conservation Act

Select as appropriate:

☒ An application for a Heritage Investigation Permit **21A0694** has been submitted to the Branch by: **Sarah Fraser, A/Associate Deputy Minister, Ministry of Forests, Land, Natural Resource Operations and Rural Development (FLNRORD)**. It is currently described as: *Archaeological investigation of recovery activities undertaken in response to 2021's catastrophic rain resulting in widespread flooding and landslide events in British Columbia by the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD), the Ministry of Transportation and Infrastructure (MOTI) and other Provincial and/or Local Government proponents responsible to restore infrastructure in the affected areas*

Financial responsibility for assessments is assumed by the following proponent:

Name: Jeff Sheldrake, Assistant Deputy Minister, Coast Area	Company: Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD)
Address: 4th Floor - 2975 Jutland Road, Victoria, BC V8T 5J9	
Phone: (778) 974-5826	Fax or Email: Jeff.Sheldrake@gov.bc.ca

CLIENT'S CERTIFICATION

I certify that I have read and concur with the content of this permit application, any amendments submitted to the Branch, and any other conditions the Minister may impose, as empowered by said Act.

Client Certification

Date: December 8, 2021	Client Name: Jeff Sheldrake, Assistant Deputy Minister, Coast Area	Client Affiliation: Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD)	Client Signature: 
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CERTIFICATION AND CONSENT

CLIENT'S CERTIFICATION

I certify that I have read and concur with the content of this permit application.

Client Certification.

Client Endorsement

For applications where there are no recorded archaeological sites, or where assessment is not required by another agency or under a Heritage Conservation Act Ministerial Order:

I acknowledge I have not been ordered to conduct a heritage inspection under S.12.3 of the Heritage Conservation Act and that I have commissioned an archaeological impact assessment on my own accord to facilitate my proposal to undertake the developments described herein.

Name: Jeff Sheldrake, Assistant Deputy Minister, Coast Area	Company: Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD)
Address: 4th Floor - 2975 Jutland Road, Victoria, BC V8T 5J9	
Phone: (778) 974-5826	Fax or Email: Jeff.Sheldrake@gov.bc.ca
Date: December 7, 2021	Client Signature: 



Additional Client Certification for Permits Issued under Section 12.2 of the Heritage Conservation Act

Select as appropriate:

☒ An application for a Heritage Investigation Permit **21A0694** has been submitted to the Branch by: **Sarah Fraser, A/Associate Deputy Minister, Ministry of Forests, Land, Natural Resource Operations and Rural Development (FLNRORD)**. It is currently described as:
Archaeological investigation of recovery activities undertaken in response to 2021's catastrophic rain resulting in widespread flooding and landslide events in British Columbia by the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD), the Ministry of Transportation and Infrastructure (MOTI) and other Provincial and/or Local Government proponents responsible to restore infrastructure in the affected areas

Financial responsibility for assessments is assumed by the following proponent:

Name: Gerry MacDougall A/Assistant Deputy Minister, South Area	Company: Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD)
Address: 441 Columbia Street, Kamloops, BC V2C 2T3	
Phone: 250-267-8999	Fax or Email: Gerry.MacDougall@gov.bc.ca

CLIENT'S CERTIFICATION

I certify that I have read and concur with the content of this permit application, any amendments submitted to the Branch, and any other conditions the Minister may impose, as empowered by said Act.

Client Certification

Date: December 10, 2021	Client Name: Gerry MacDougall A/Assistant Deputy Minister, South Area	Client Affiliation: Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD)	Client Signature: 
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CERTIFICATION AND CONSENT

CLIENT'S CERTIFICATION

I certify that I have read and concur with the content of this permit application.

Client Certification.

Client Endorsement

For applications where there are no recorded archaeological sites, or where assessment is not required by another agency or under a Heritage Conservation Act Ministerial Order:

I acknowledge I have not been ordered to conduct a heritage inspection under S.12.3 of the Heritage Conservation Act and that I have commissioned an archaeological impact assessment on my own accord to facilitate my proposal to undertake the developments described herein.

Name: Gerry MacDougall		Company: Forests, Lands, Natural Resource	
A/Assistant Deputy Minister, South Area		Operations and Rural Development (FLNRORD)	
Address: 441 Columbia Street, Kamloops, BC V2C 2T3			
Phone: 250-267-8999		Fax or Email: Gerry.MacDougall@gov.bc.ca	
Date: December 10, 2021	Client Signature: 		



Additional Client Certification for Permits Issued under Section 12.2 of the Heritage Conservation Act

Select as appropriate:

☒ An application for a Heritage Investigation Permit **21A0694** has been submitted to the Branch by: **Sarah Fraser, A/Associate Deputy Minister, Ministry of Forests, Land, Natural Resource Operations and Rural Development (FLNRORD)**. It is currently described as:
Archaeological investigation of recovery activities undertaken in response to 2021's catastrophic rain resulting in widespread flooding and landslide events in British Columbia by the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD), the Ministry of Transportation and Infrastructure (MoTI) and other Provincial and/or Local Government proponents responsible to restore infrastructure in the affected areas

Financial responsibility for assessments is assumed by the following proponent:

Name: Brent Persello, Environmental Services Manager	Company: Ministry of Transportation and Infrastructure (MoTI)
Address: 477 Columbia Street, Kamloops, BC V2C 2T3	
Phone: 778-362-4522	Fax or Email: Brent.Persello@gov.bc.ca

CLIENT'S CERTIFICATION

I certify that I have read and concur with the content of this permit application, any amendments submitted to the Branch, and any other conditions the Minister may impose, as empowered by said Act.

Client Certification

Date: December 8, 2021	Client Name: Brent Persello, Environmental Services Manager	Client Affiliation: Ministry of Transportation and Infrastructure (MoTI)	Client Signature:
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CERTIFICATION AND CONSENT

CLIENT'S CERTIFICATION

I certify that I have read and concur with the content of this permit application.

Client Certification.

Client Endorsement

For applications where there are no recorded archaeological sites, or where assessment is not required by another agency or under a Heritage Conservation Act Ministerial Order:

I acknowledge I have not been ordered to conduct a heritage inspection under S.12.3 of the Heritage Conservation Act and that I have commissioned an archaeological impact assessment on my own accord to facilitate my proposal to undertake the developments described herein.

Name: Brent Persello, Environmental Services Manager		Company: Ministry of Transportation and Infrastructure (MoTI)
Address: 477 Columbia Street, Kamloops, BC V2C 2T3		
Phone: 778-362-4522		Fax or Email: <u>Brent.Persello@gov.bc.ca</u>
Date: December 8, 2021	Client Signature: 	

Appendix H



Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	01
Project:	Carratt Creek Emergency Works	Page:	1 of 4
Location:	Carratt Road, Fraser Valley, BC 49.262720, -122.217965	Project No.:	S-CR-28 2022-2632
Contractor:	Jakes Construction, Richco Contracting Ltd.	File No.:	
Contract:		Date:	November 25, 2022
Contract No.:		Temperature:	High: 8 Low: 4
Weather:	Predominantly overcast, rain in the AM.		

Labour Force: Jakes: 2x Equipment Operators, 1x Safety Representative, 1x Superintendent (AM)

Richco: 3x Excavator Operators, 3x Truck Drivers, 1x Wheel Loader Operator

Contractor's Equipment: Jakes: 1x Hitachi 350 Excavator, 1x John Deere 345G Excavator

Richco: 1x Hitachi 350 Excavator, 1x Hitachi 345 Excavator, 1x Hitachi 245 Excavator (Eng Road pit),
3x Tandem Axle Dump Trucks, 1x Kubota SSV75 Wheel Loader (w/ Street Sweep)

1.0 Report:

- Arrived on site 9:10 AM. Met with Dianna (AE) and Jason Thompson (Leq'á:mel First Nation).
- Met with MoE & PWC representatives at the Carratt Road bridge from approximately 9:45 AM to 10:30 AM. Dianna, Jason, PWC & MoE representatives departed thereafter.
- Departed site approximately 3:15 PM.

1.1 Downstream Extents – Richco Contracting:

- Excavation of in-stream sediment deposition underway. 1 excavator (345) removing in-stream material and creating stockpile. 1 excavator (350) removing material from created stockpile and loading tandem axle dump trucks (x3).

General methodology involved establishment of streamflow adjacent to the left (south) bank, followed by removal of materials within the center of the channel and stockpile of excavated materials adjacent to the right (north) bank.

- Excavated material trucked to the Eng Road site and deposited. An excavator (245) was present at the pit to place and compact stockpiled material.
- I provided verbal instruction to the contractor that no work was to be performed to modify or alter the channel banks (registered dikes). Any in stream excavation below the existing channel elevation was to establish a side



slope matching, or shallower than, the existing banks such that undermining of the existing banks would not occur.

- Large woody debris (logs) were cut by the contractor and relocated to the Eng Road stockpile location.
- Continued excavation effort progressing approximately 100 m upstream of the Carratt Road bridge.

1.2 Upstream Extents – Jakes Construction

- Temporary bridge crossing streamflow in place at the time of my arrival. Performed walk-through of upstream works with Jakes operators and Derek Bryce (Superintendent). Discussed registered dike extents, sediment removal, and upstream avulsion bank restoration.
- Excavators began clearing of a turn-around area at the upstream debris jam location to allow for dump truck traffic.
- Contractor expressed interest in removal of several trees (< 300 mm diameter) for ease of access/construction and excavator safety during bank restoration construction. AE to check approvals and permits.
- Contractor noted intention to perform all sediment removals within primary channel prior to rediverting avulsion streamflows back to the primary channel. HESCO baskets expected on site next week to provide protection to downslope private property in advance of streamflow realignment.
- Removal of channel sediment deposition underway. Upstream materials to be cast against eroded banks (beyond registered dike extents) where possible to reduce off-site disposal efforts while also providing improved channel capacity.

1.3 Environmental Monitoring

- AE to inquire regarding tree removal.
- Further comments, if any, require input by Environmental Monitor.

1.4 Archaeology / First Nations

- Related comments, if any, require input by First Nations representative.



2.0 Site Photographs



Figure 2-1
Richco – Sediment Removal



Figure 2-2
Richco – Sediment Removal



Figure 2-3
Richco – Sediment Removal



Figure 2-4
Richco – Woody Debris Removal



Figure 2-5
Jakes - Temporary Bridge Installation



Figure 2-6
Jakes - Spill Kit On-Site



Figure 2-7
Jakes - Upstream Truck Turn-Around
Construction

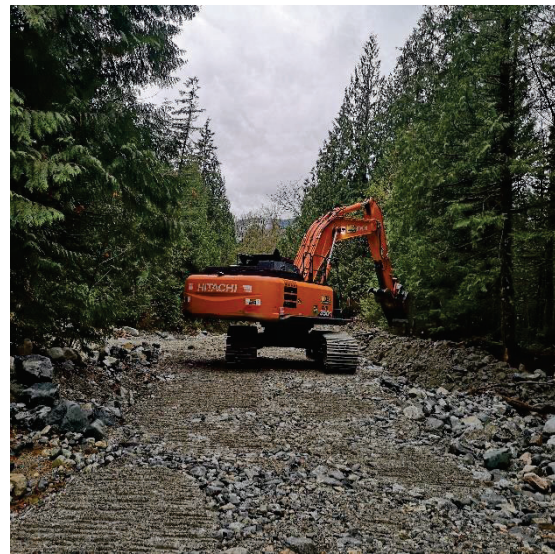


Figure 2-8
Jakes - Upstream Sediment
Removal/Stockpiling



Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	02
Project:	Carratt Creek Emergency Works	Page:	1 of 4
Location:	Carratt Road, Fraser Valley, BC 49.262720, -122.217965	Project No.:	S-CR-28 2022-2632
Contractor:	Jakes Construction, Richco Contracting Ltd.	File No.:	
Contract:		Date:	November 26, 2022
Contract No.:		Temperature:	High: 7 Low: 4
Weather:	Predominantly overcast, light rain.		

Labour Force: Jakes: 2x Equipment Operators, 1x Safety Representative, 1x Superintendent (AM)

Richco: 3x Excavator Operators, 2x Truck Drivers, 1x Wheel Loader Operator, 1x Labourer

Contractor's Equipment: Jakes: 1x Hitachi 350 Excavator, 1x John Deere 345G Excavator

Richco: 1x Hitachi 350 Excavator, 1x Hitachi 345 Excavator, 1x Hitachi 245 Excavator (Eng Road pit),
2x Tandem Axle Dump Trucks, 1x Kubota SSV75 Wheel Loader (w/ Street Sweep)

1.0 Report:

- Arrived on site 8:30 AM. Met with Hoyeon Lee (AE) and Matt (Aqua Silva).
- No First Nations representative present on site.
- Jakes Construction end of day approximately 2:30 PM.
- Trevor Friedmann (AE) departed site approximately 2:30 PM.
- Hoyeon Lee (AE) departed site approximately 3:00 PM.
- Richco Contracting end of day approximately 4:00-4:30 PM.

1.1 Downstream Extents – Richco Contracting:

- Excavation of in-stream sediment deposition underway. 1 excavator (345) removing in-stream material and creating stockpile. 1 excavator (350) removing material from created stockpile and loading tandem axle dump trucks (x3).

General methodology involved establishment of streamflow adjacent to the left (south) bank, followed by removal of materials within the center of the channel and stockpile of excavated materials adjacent to the right (north) bank.

- Over half of the 50 m channel length excavation underway complete by end of day. Continued excavation effort progressing approximately 100 m upstream of the Carratt Road bridge.



1.2 Upstream Extents – Jakes Construction

- Temporary bridge crossing streamflow remains in place.
- Excavators have completed turn-around area construction at the upstream debris jam location to allow for rock truck traffic. Jakes intends to use rock trucks for transfer of sediment to Richco Tandem Dump Trucks downstream. Rock trucks expected to be on site next week.
- Excavators stockpiling nearly 50 m of in-stream sediment to allow for removal by rock truck. Upstream materials cast against some eroded banks (beyond registered dike extents) to reduce off-site disposal efforts while also providing improved channel capacity.
- Provided verbal direction to contractor to compact discarded fills in order to help prevent re-mobilization of sediment during severe streamflow events (likely to be completed with excavator bucket).
- Contractor continued intention to perform all sediment removals within primary channel prior to rediverting avulsion streamflows back to the primary channel. HESCO baskets expected on site next week to provide clearwater flow protection to downslope private property in advance of streamflow realignment.

1.3 Environmental Monitoring

- AE to follow-up regarding tree removal.

No significant concerns expressed by Aqua Silva (Matt – temporary representative) on site. Further concerns to be confirmed with the permanent representative on site in the following week.

1.4 Archaeology / First Nations

- Related comments, if any, require input by First Nations representative. No representative on site this day.

2.0 Site Photographs



Figure 2-1
Richco – Sediment Removal



Figure 2-2
Richco – Sediment Removal



Figure 2-3
Richco – Sediment Removal Progress

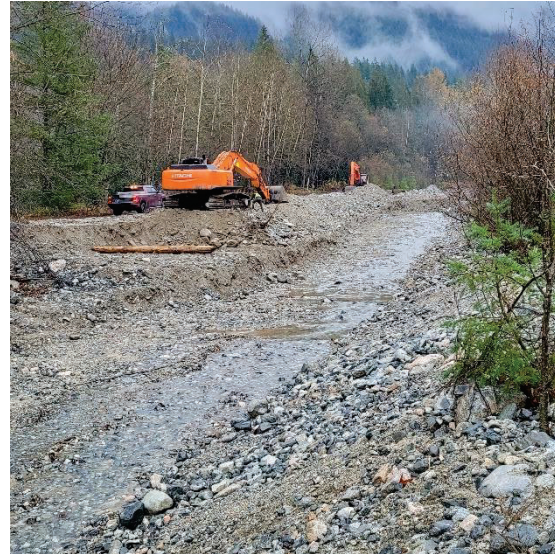


Figure 2-4
Richco – Sediment Removal Progress



Figure 2-5
Jakes – Turn-Around Area Completion



Figure 2-6
Jakes – Stockpiling of Channel Sediment



Figure 2-7
Jakes – On-going Sediment Stockpiling

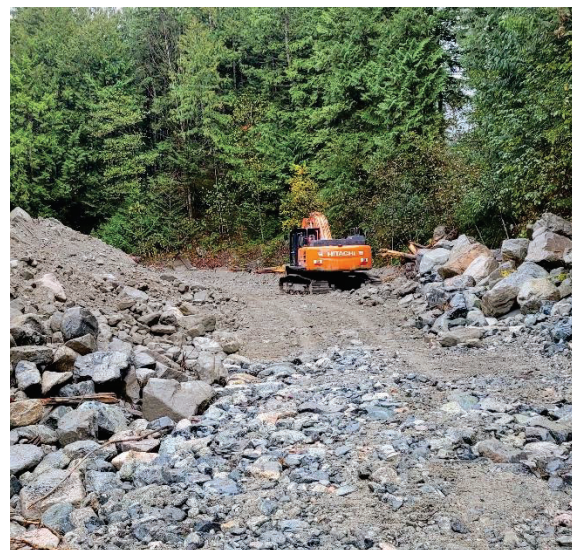


Figure 2-8
Jakes – End of Day Progress



Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	03
Project:	Carratt Creek Emergency Works	Page:	1 of 4
Location:	Carratt Road, Fraser Valley, BC 49.262720, -122.217965	Project No.:	S-CR-28 2022-2632
Contractor:	Jakes Construction, Richco Contracting Ltd.	File No.:	
Contract:		Date:	November 28, 2022
Contract No.:		Temperature:	High: 3 Low: -3
Weather:	Sunny		

Labour Force: Jakes: 2x Equipment Operators, 1x Safety Representative, 1x Superintendent

Richco: 3x Excavator Operators, 3x Truck Drivers, 1x Wheel Loader Operator, 1x Labourer

Contractor's Equipment: Jakes: 1x Hitachi 350 Excavator, 1x John Deere 345G Excavator

Richco: 1x Hitachi 350 Excavator, 1x Hitachi 345 Excavator, 1x Hitachi 245 Excavator (Eng Road pit),
3x Tandem Axle Dump Trucks, 1x Kubota SSV75 Wheel Loader (w/ Street Sweep)

1.0 Report:

- Arrived on site 8:30 AM. Met with Tina (FN), Jenn (Aqua Silva) and Oscar (AE).
- Jakes Construction end of day at 4:00 PM.
- Hoyeon Lee (AE) departed site at 4:00 PM.
- Tina (FN) departed site at 4:00 PM.
- Richco Contracting end of day approximately at 4:00 PM.
- Met with property owner to discuss potential tree removal for the Hesco barrier alignment

1.1 Downstream Extents – Richco Contracting:

- Excavation of in-stream sediment deposition underway. 1 excavator (345) removing in-stream material and creating stockpile. 1 excavator (350) removing material from created stockpile and loading tandem axle dump trucks (x3).

General methodology involved establishment of streamflow adjacent to the left (south) bank, followed by removal of materials within the center of the channel and stockpile of excavated materials adjacent to the right (north) bank.

- Over half of the 50 m channel length excavation underway complete by end of day. Continued excavation effort progressing approximately 100 m upstream of the Carratt Road bridge.



- Contractor continued intention to perform all sediment removals within primary channel prior to rediverting avulsion streamflow back to the primary channel. HESCO baskets expected on site next week to provide clearwater flow protection to downslope private property in advance of streamflow realignment.
- . Richco to layout area for Hesco baskets on Tuesday.

1.2 Upstream Extents – Jakes Construction

- Temporary bridge crossing streamflow remains in place.
- Rock trucks expected to be on site Tuesday or Wednesday.
- Excavators stockpiling nearly 50 m of in-stream sediment to allow for removal by rock truck. Upstream materials cast against some eroded banks (beyond registered dike extents) to reduce off-site disposal efforts while also providing improved channel capacity.

1.3 Environmental Monitoring

- Jenn (Aqua Silva) has confirmed that the tagged trees may be removed if necessary.
- Jenn will also send end of day reports directly to Andrew Weins.
- Fish net was installed near the confluence downstream of the bridge.

No significant concerns expressed by Aqua Silva on site.

1.4 Archaeology / First Nations

No significant concerns expressed by Tina on site.

2.0 Site Photographs



Figure 2-1
Richco – Sediment Removal



Figure 2-2
Richco – Sediment Removal

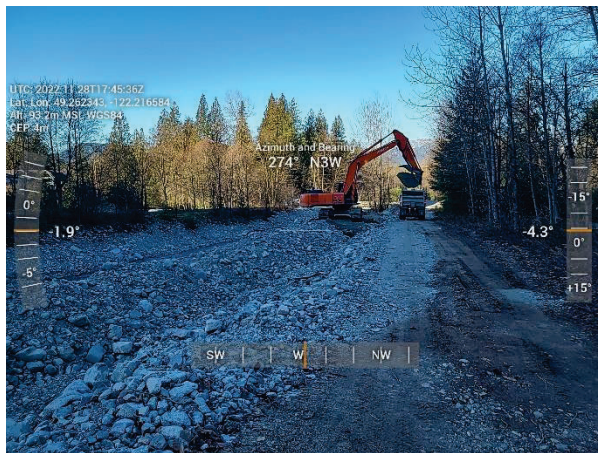


Figure 2-3
Richco – Sediment Removal Progress

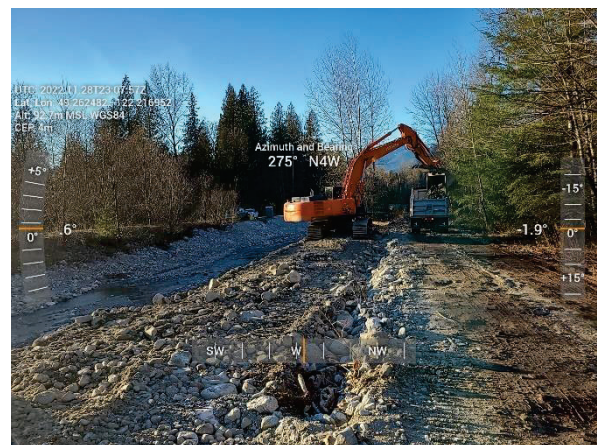


Figure 2-4
Richco – Sediment Removal Progress



Figure 2-5
Jakes - Turn-Around Area



Figure 2-6
Jakes - Stockpiling of Channel Sediment



Figure 2-7
Jakes - On-going Sediment Stockpiling



Figure 2-8
Jakes - End of Day Progress



Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	04
Project:	Carratt Creek Emergency Works	Page:	1 of 4
Location:	Carratt Road, Fraser Valley, BC 49.262720, -122.217965	Project No.:	S-CR-28 2022-2632
Contractor:	Jakes Construction, Richco Contracting Ltd.	File No.:	
Contract:		Date:	November 29, 2022
Contract No.:		Temperature:	High: 0 Low: -4
Weather:	Overcast/Snow		

Labour Force: Jakes: 2x Equipment Operators, 1x Safety Representative, 2x Truck Driver

Richco: 3x Excavator Operators, 3x Truck Drivers, 1x Wheel Loader Operator, 1x Labourer

Contractor's Equipment: Jakes: 1x Hitachi 350 Excavator, 1x John Deere 345G Excavator, 2x Deere 300D Rock Trucks

Richco: 1x Hitachi 350 Excavator, 1x Hitachi 345 Excavator, 1x Hitachi 245 Excavator (Eng Road pit), 3x Tandem Axle Dump Trucks, 1x Kubota SSV75 Wheel Loader (w/ Street Sweep)

1.0 Report:

- Arrived on site 8:30 AM. Met with Tina (FN), Jenn (Aqua Silva), Oscar (AE) and Trevor (AE).
- Jakes Construction end of day at 4:00 PM.
- Hoyeon Lee (AE) departed site at 4:00 PM.
- Tina (FN) on site at approximately 8am - 4:30 PM.
- Richco Contracting end of day at 4:00 PM.

1.1 Downstream Extents – Richco Contracting:

- Excavation of in-stream sediment deposition underway. 1 excavator (345) removing in-stream material and creating stockpile. 1 excavator (350) removing material from created stockpile and loading tandem axle dump trucks (x3).

General methodology involved establishment of streamflow adjacent to the left (south) bank, followed by removal of materials within the center of the channel and stockpile of excavated materials adjacent to the right (north) bank.

- Layout of HESCO baskets discussed with Mark and Chris of Richco. Basket alignment will be directed by Trevor Friedmann P.ENG. (AE).
- The below estimates are based on % of total works that are complete (Channel centerline station used for estimate). Does not account for interim progress.



- Estimated total sediment removal progress = 10%. Based on % of total works that are complete (Channel centerline station used for estimate), does not account for interim progress.
- Estimated HESCO basket progress = 0%

1.2 Upstream Extents – Jakes Construction

- Temporary bridge crossing moved downstream to improve rock truck access.
- Excavation of stockpiled in-stream material underway. Both excavators (350, 345) currently removing material from created stockpiles and loading rock trucks (x2)
- Loaded rock trucks carry materials downstream and are dumped approximately 150m upstream of the permanent bridge. Materials are stockpiled adjacent to the right bank.
- Estimated total sediment removal progress = 5%
- Estimated diversion channel / bank restoration works progress = 0%

1.3 Environmental Monitoring

- Jenn (Aqua Silva) is monitoring the water levels and quality.

No significant concerns expressed by Aqua Silva on site.

1.4 Archaeology / First Nations

No significant concerns expressed by Tina on site.

1.5 Property Owners

Meeting with Danny at 10:30 am. Discussion of potential tree removals for placement of HESCO Baskets on Danny's property. Niel, acting as Danny's representative, indicated the property line with respect to the existing fencing on Danny's property. AE indicated that one tree on Danny's property will be impacted/damaged and may require removal. Niel provided verbal approval to remove the tree if required.

2.0 Site Photographs



Figure 2-1
Richco - HESCO Alignment Layout



Figure 2-2
Richco - Potential Tree Removal (HESCO baskets)

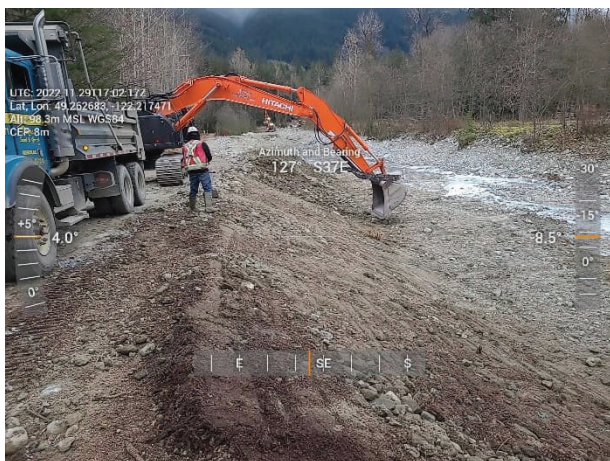


Figure 2-3
Richco - Sediment Removal Progress

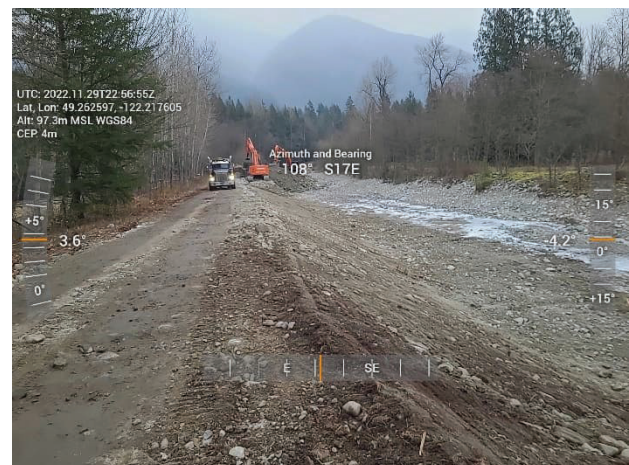


Figure 2-4
Richco - Sediment Removal Progress



Figure 2-5

Jakes - New Location of Temporary Bridge



Figure 2-6

Jakes - Removal of Stockpiled Channel Sediment

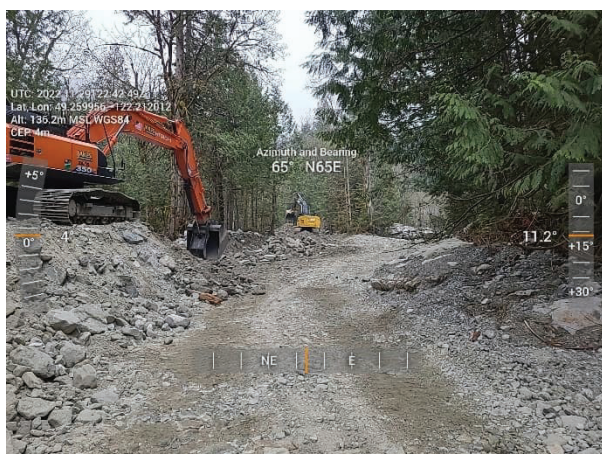


Figure 2-7

Jakes - On-going Sediment Removal

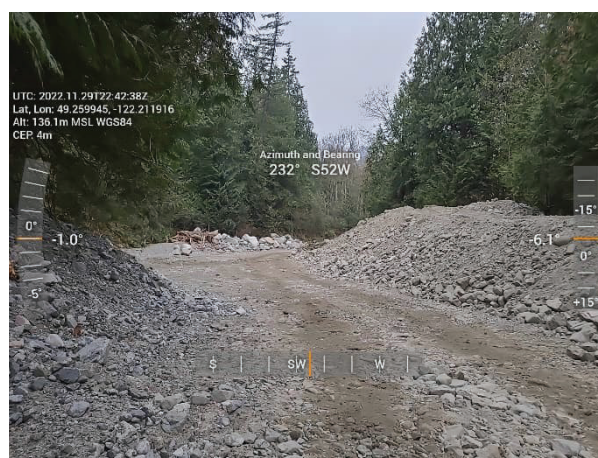


Figure 2-8

Jakes - End of Day Progress



Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	05
Project:	Carratt Creek Emergency Works	Page:	1 of 5
Location:	Carratt Road, Fraser Valley, BC 49.262720, -122.217965	Project No.:	S-CR-28 2022-2632
Contractor:	Jakes Construction, Richco Contracting Ltd.	File No.:	
Contract:		Date:	December 1, 2022
Contract No.:		Temperature:	High: -3 Low: -8
Weather:	Sunny		

Labour Force: Jakes: 2x Equipment Operators, 1x Safety Representative, 2x Rock Truck Driver, 1x Foreman/Supervisor

Richco: 3x Equipment Operators (Foreman), 4x Truck Drivers, 1x Labourer, 1x Superintendent

Contractor's Equipment: Jakes: 1x Hitachi 350 Excavator, 1x John Deere 345G Excavator, 2x Deere 300D Rock Trucks

Richco: 1x Hitachi 350 Excavator, 1x Hitachi 345 Excavator, 1x Hitachi 245 Excavator (Eng Road pit), 4x Tandem Axle Dump Trucks, 1x Kubota SSV75 Wheel Loader (w/ Street Sweep)

1.0 Report:

- Arrived on site 8:30 AM. Met with Jason (FN), Jenn (Aqua Silva) and Naomi (AE).
- Jenn (Aqua Silva) departed site at 4:30 PM.
- Jakes Construction end of day at 4:30 PM.
- Hoyeon Lee (AE) departed site at 4:30 PM.
- Jason (FN) on site at approximately 8am - 1:00 PM.
- Richco Contracting end of day at 4:30 PM.

1.1 Downstream Extents – Richco Contracting:

- Excavation of in-stream sediment deposition underway. 1 excavator (345) removing in-stream material and creating stockpile. 1 excavator (350) removing material from created stockpile and loading tandem axle dump trucks (x4).

General methodology involved establishment of streamflow adjacent to the left (south) bank, followed by removal of materials within the center of the channel and stockpile of excavated materials adjacent to the right (north) bank.

- Superintendent on site to gain familiarity with HESCO basket placement layout.
- Sand placed on roadways for trucking safety, starting from Carratt Road Bridge to approximately 150m upstream.



- HESCO baskets to be delivered early next week, clearing layout/building access ramp to commence tomorrow
- Estimated total sediment removal progress = 15%. Based on % of total works that are complete (Channel centerline station used for estimate), does not account for interim progress.
- Estimated HESCO basket progress = 0%

1.2 Upstream Extents – Jakes Construction

- Snow removal from temporary road to allow access for rock trucks and excavators.
- Excavation of stockpiled in-stream material underway. One excavator (350) currently removing material from stockpiles and loading rock trucks (x2)
- Loaded rock trucks carry materials downstream and are dumped approximately 150m upstream of Carratt Road bridge. Materials are stockpiled adjacent to the right bank.
- Other excavator (345) is shaping the diversion channel, removing sediment/debris and grading of the channel.
- Estimated total sediment removal progress = 15%
- Estimated diversion channel / bank restoration works progress = 10%

1.3 Environmental Monitoring

- Jenn (Aqua Silva) is monitoring the water levels and quality.

No significant concerns expressed by Jenn

1.4 Archaeology / First Nations

No significant concerns expressed by Jason

1.5 Environmental Monitoring (AE)

- Naomi walked the length of Carratt Creek, taking notes and pictures of relevant details.
- Jenn, Jason and Naomi liaised and discussed ongoing events on site, specifically the installation of a fish fence, silt fencing and pre-construction site conditions.
- Naomi was also made aware of potential tree removals on Danny's property. She was shown the general location and alignment (subject to change) of the HESCO basket

2.0 Site Photographs



Figure 2-1
Richco - Snow/Ice Clearing

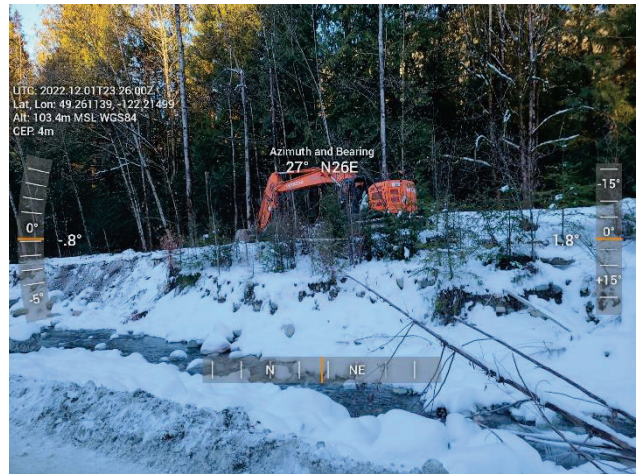


Figure 2-2
Richco - Clearing Path Towards Future Access Ramp (HESCO Baskets)



Figure 2-3
Richco - Sediment Removal Progress

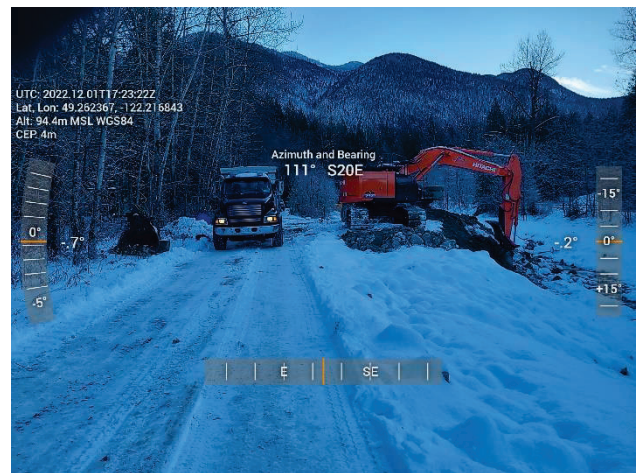


Figure 2-4
Richco - Sediment Removal Progress



Figure 2-5
Jakes – Channel Shaping/Sediment Removal



Figure 2-6
Jakes – Removal of Stockpiled Channel Sediment

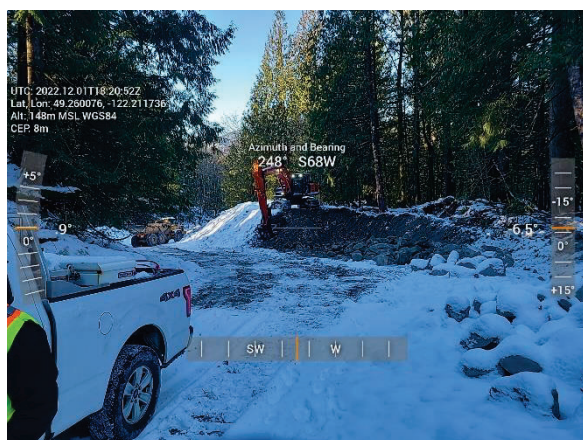


Figure 2-7
Jakes – On-going Sediment Removal

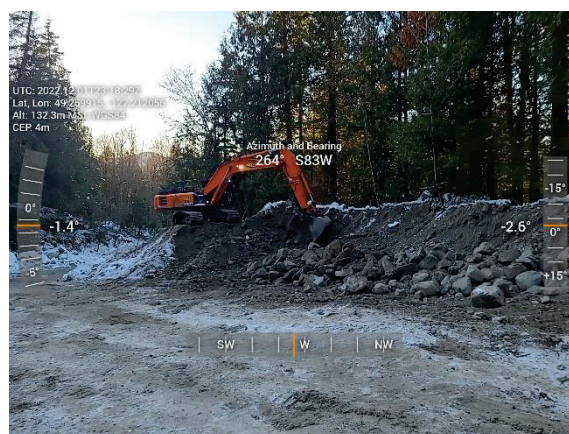


Figure 2-8
Jakes – End of Day Progress



Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	06
Project:	Carratt Creek Emergency Works	Page:	1 of 4
Location:	Carratt Road, Fraser Valley, BC 49.262720, -122.217965	Project No.:	S-CR-28 2022-2632
Contractor:	Jakes Construction, Richco Contracting Ltd.	File No.:	
Contract:		Date:	December 2, 2022
Contract No.:		Temperature:	High: 1 Low: -8
Weather:	Overcast		

Labour Force: Jakes: 2x Equipment Operators, 1x Safety Representative, 2x Truck Driver, 1x Foreman, 1x Superintendent
Richco: 3x Excavator Operators (Foreman), 4x Truck Drivers, 1x Labourer

Contractor's Equipment: Jakes: 1x Hitachi 350 Excavator, 1x John Deere 345G Excavator, 2x Deere 300D Rock Trucks
Richco: 1x Hitachi 350 Excavator, 1x Hitachi 345 Excavator, 1x Hitachi 245 Excavator (Eng Road pit), 4x Tandem Axle Dump Trucks, 1x Kubota SSV75 Wheel Loader (w/ Street Sweep)

1.0 Report:

- Arrived on site 8:30 AM. Met with Oscar (AE)
- Jakes Construction end of day at 2:00 PM.
- Hoyeon Lee (AE) departed site at 2:00 PM.
- Jason (FN) on site from approximately 10:45am – 1pm
- Richco Contracting end of day at 3:30 PM.
- 1x Rock Truck idle for repairs (half day)

1.1 Downstream Extents – Richco Contracting:

- Excavation of in-stream sediment deposition underway. 1 excavator (345) removing in-stream material and creating stockpile. 1 excavator (350) removing material from created stockpile and loading tandem axle dump trucks (x4).

General methodology involved establishment of streamflow adjacent to the left (south) bank, followed by removal of materials within the center of the channel and stockpile of excavated materials adjacent to the right (north) bank.

- HESCO baskets to be delivered early next week, access ramp has been built (245 excavator) along with clearing and grading.



- The below estimates are based on % of total works that are complete (Channel centerline station used for estimate). Does not account for interim progress.
- Estimated total sediment removal progress = 20%. Based on % of total works that are complete (Channel centerline station used for estimate), does not account for interim progress.
- Estimated HESCO basket progress = 20%

1.2 Upstream Extents – Jakes Construction

- Excavation of stockpiled in-stream material underway. One excavator (350) currently removing material from created stockpiles and loading rock trucks (x2)
- Loaded rock trucks carry materials downstream and are dumped approximately 150m upstream of Carratt Road bridge. Materials are stockpiled adjacent to the right bank.
- Other excavator (345) is shaping the channel, removing sediment/debris, and smoothing the grade of the channel.
- Estimated total sediment removal progress = 20%
- Estimated diversion channel / bank restoration works progress = 15%

1.3 Environmental Monitoring

- Jenn (Aqua Silva) is monitoring the water levels and quality.
- Jenn has confirmed tree removals for the placement of HESCO baskets are not an issue.

No significant concerns expressed by Jenn

1.4 Archaeology / First Nations

No significant concerns expressed by Jason



2.0 Site Photographs



Figure 2-1
Richco - Access ramp creation (HESCO
Baskets)



Figure 2-2
Richco - Clearing and Grading (HESCO
Baskets)



Figure 2-3
Richco - Sediment Removal Progress



Figure 2-4
Richco - Sediment Removal Progress



Figure 2-5
Jakes - Channel Grading



Figure 2-6
Jakes - Channel Grading

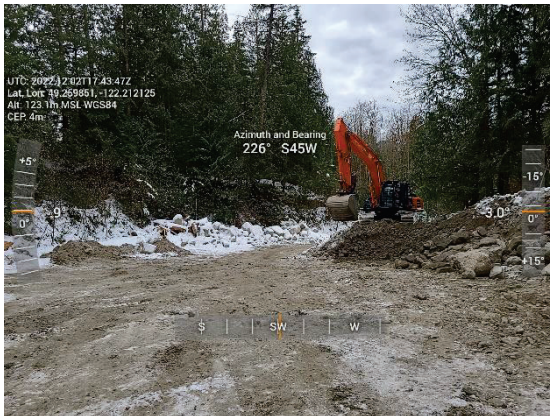


Figure 2-7
Jakes - On-going Sediment Removal



Figure 2-8
Jakes - End of Day Progress



Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	07
Project:	Carratt Creek Emergency Works	Page:	1 of 4
Location:	Carratt Road, Fraser Valley, BC 49.262720, -122.217965	Project No.:	S-CR-28 2022-2632
Contractor:	Jakes Construction, Richco Contracting Ltd.	File No.:	
Contract:		Date:	December 2, 2022
Contract No.:		Temperature:	High: 1 Low: -8
Weather:	Overcast		

Labour Force: Jakes: 2x Equipment Operators, 1x Safety Representative, 2x Truck Driver, 1x Foreman,
Richco: 3x Excavator Operators (Foreman), 4x Truck Drivers, 1x Labourer

Contractor's Equipment: Jakes: 1x Hitachi 350 Excavator, 1x John Deere 345G Excavator, 2x Deere 300D Rock Trucks

Richco: 1x Hitachi 350 Excavator, 1x Hitachi 345 Excavator (Eng Pit), 1x Hitachi 245 Excavator (HESCO Basket area), 4x Tandem Axle Dump Trucks, 1x Kubota SSV75 Wheel Loader (w/ Street Sweep)

1.0 Report:

- Arrived on site 8:30 AM
- Jakes Construction end of day at 4:00 PM.
- Hoyeon Lee (AE) departed site at 4:00 PM.
- Jason (FN) on site from approximately 9:00am – 11:15am, 1:30pm – 230pm
- Richco Contracting end of day at 3:30PM.

1.1 Downstream Extents – Richco Contracting:

- Excavation of in-stream sediment deposition underway. 1 Rock Truck dumping material near stockpile and 1 excavator (350) removing material from created stockpile and loading tandem axle dump trucks (x4).

General methodology involved establishment of streamflow adjacent to the left (south) bank, followed by removal of materials within the center of the channel and stockpile of excavated materials adjacent to the right (north) bank.

- HESCO baskets to be delivered early next week, Layout of baskets and grading currently underway.
- The below estimates are based on % of total works that are complete (Channel centerline station used for estimate). Does not account for interim progress.



- Estimated total sediment removal progress = 25%. Based on % of total works that are complete (Channel centerline station used for estimate), does not account for interim progress.
- Estimated HESCO basket progress = 25%

1.2 Upstream Extents – Jakes Construction

- Excavation of stockpiled in-stream material underway. One excavator (350) currently removing material from created stockpiles and loading rock trucks (x2)
- Loaded rock trucks carry materials downstream and are dumped approximately 150m upstream of Carratt Road bridge. Materials are stockpiled adjacent to the right bank.
- Other excavator (345) is shaping the channel, removing sediment/debris, and smoothing the grade of the channel.
- Around noon, the stockpile on the right bank has been depleted. The rock trucks are now hauling leftover rocks back upstream and disposing them against the right bank. An excavator (345) is compacting the rock against the bank.
- Estimated total sediment removal progress = 25%
- Estimated diversion channel / bank restoration works progress = 20%

1.3 Environmental Monitoring

- Jenn (Aqua Silva) is monitoring the water levels and quality.
- Jenn has confirmed tree removals for the placement of HESCO baskets are not an issue.

No significant concerns expressed by Jenn

1.4 Archaeology / First Nations

No significant concerns expressed by Jason

2.0 Site Photographs

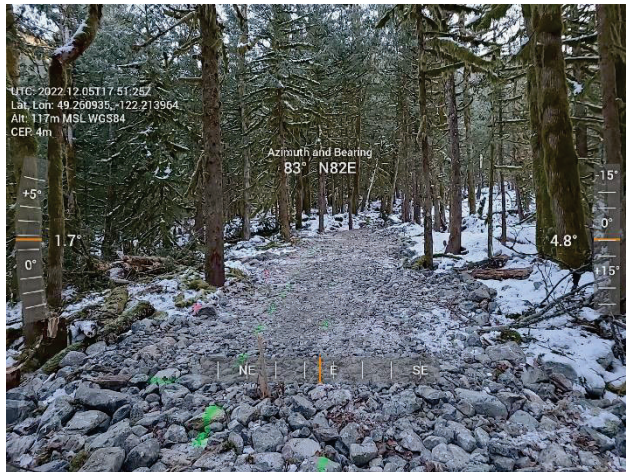


Figure 2-1
Richco - Alignment Placement (HESCO Baskets)

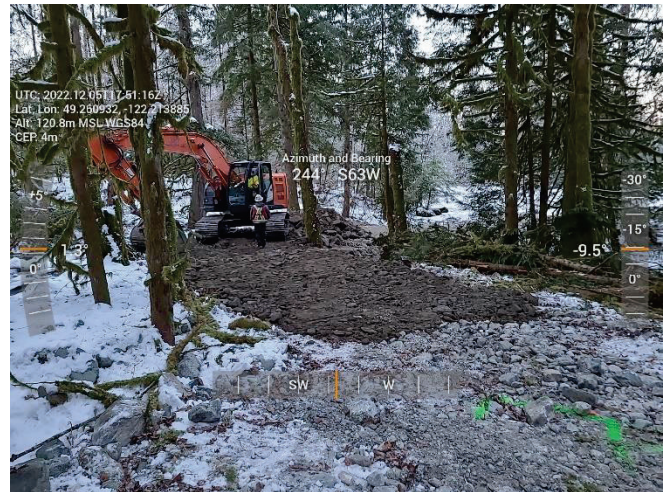


Figure 2-2
Richco - Layout Grading (HESCO Baskets)

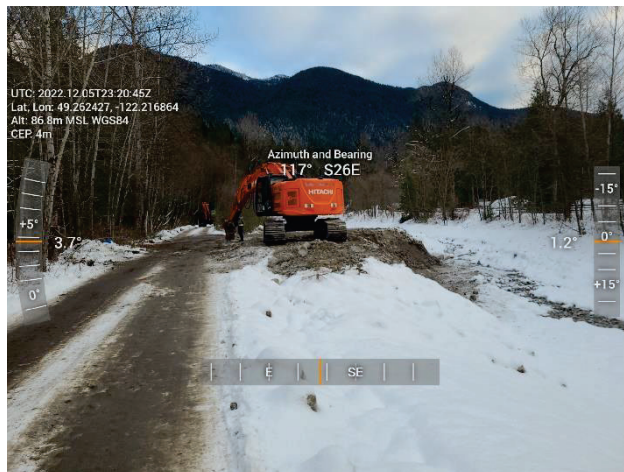


Figure 2-3
Richco - Sediment Removal Progress



Figure 2-4
Richco - Sediment Removal Progress

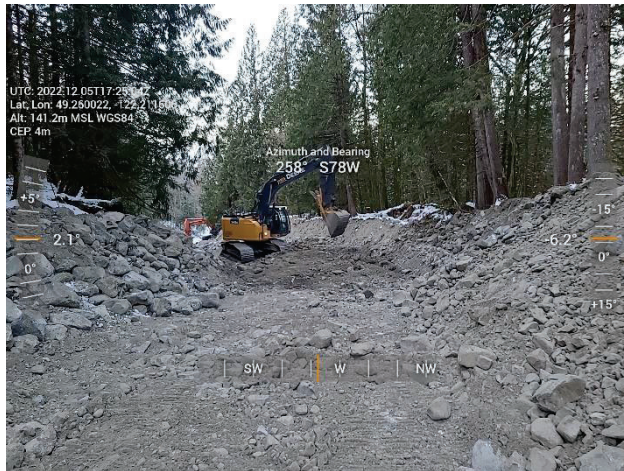


Figure 2-5
Jakes - Channel Grading

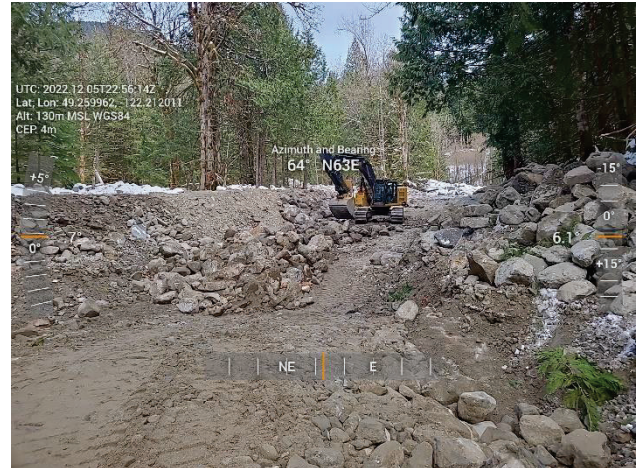


Figure 2-6
Jakes - Compaction of Rock against Right Bank



Figure 2-7
Jakes - On-going Sediment Removal

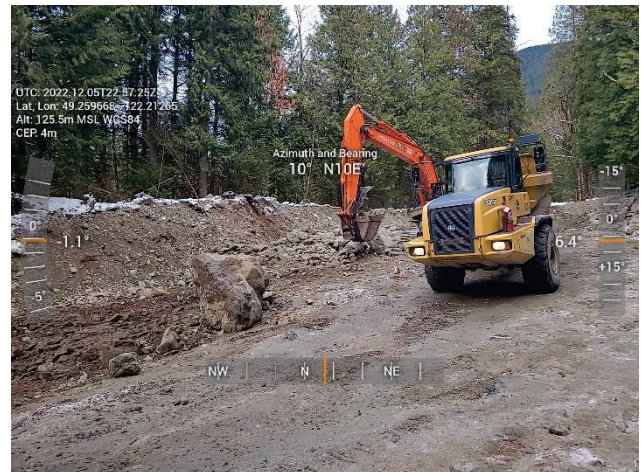


Figure 2-8
Jakes - End of Day Progress



Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	08
Project:	Carratt Creek Emergency Works	Page:	1 of 4
Location:	Carratt Road, Fraser Valley, BC 49.262720, -122.217965	Project No.:	S-CR-28 2022-2632
Contractor:	Jakes Construction, Richco Contracting Ltd.	File No.:	
Contract:		Date:	December 6, 2022
Contract No.:		Temperature:	High: 3 Low: -2
Weather:	Overcast		

Labour Force: Jakes: 2x Equipment Operators, 1x Safety Representative, 2x Truck Driver, 1x Foreman,
Richco: 3x Excavator Operators (Foreman), 4x Truck Drivers, 1x Labourer

Contractor's Equipment: Jakes: 1x Hitachi 350 Excavator, 1x John Deere 345G Excavator, 2x Deere 300D Rock Trucks

Richco: 1x Hitachi 350 Excavator, 1x Hitachi 345 Excavator (Eng Pit), 1x Hitachi 245 Excavator (HESCO Basket area), 4x Tandem Axle Dump Trucks, 1x Kubota SSV75 Wheel Loader (w/ Street Sweep)

1.0 Report:

- Arrived on site 8:30 AM.
- Jakes Construction end of day at 4:00 PM.
- Hoyeon Lee (AE) departed site at 4:30 PM.
- No First Nation Representative on site.
- Dianna (AE) and Andrew (AE) on site at 11am.
- Eric (AE) and Trevor (AE) on site at 3pm
- Richco Contracting end of day at 4:00PM.

1.1 Downstream Extents – Richco Contracting:

- Excavation of in-stream sediment deposition underway. 1 Rock Truck dumping material near stockpile and 1 excavator (350) removing material from created stockpile and loading tandem axle dump trucks (x4).
- Excavator (245) loading rock trucks with large rocks found approximately 50m upstream from temporary bridge. Rock Trucks hauling rocks upstream to be disposed on bank slopes.

General methodology involved establishment of streamflow adjacent to the left (south) bank, followed by removal of materials within the center of the channel and stockpile of excavated materials adjacent to the right (north) bank.



- HESCO baskets to be delivered Wednesday, the alignment will be extended approximately 25m to ensure a secondary channel is retained.
- Incident at Eng Pit, loose rock from top of stockpile has damaged the side of one of the tandem trucks.
- The below estimates are based on % of total works that are complete (Channel centerline station used for estimate). Does not account for interim progress.
- Estimated total sediment removal progress = 30%. Based on % of total works that are complete (Channel centerline station used for estimate), does not account for interim progress.
- Estimated HESCO basket progress = 25%

1.2 Upstream Extents – Jakes Construction

- Excavation of stockpiled in-stream material complete. **Both excavators currently** excavating channel bed and loading rock trucks (x2).
- Loaded rock trucks carry materials downstream and are dumped approximately 150m upstream of the permanent bridge. Materials are stockpiled adjacent to the right bank.
- Estimated total sediment removal progress = 35%
- Estimated diversion channel / bank restoration works progress = 25%

1.3 Environmental Monitoring

- Jenn (Aqua Silva) is monitoring the water levels and quality.
- Small oil spill found on site (Jenn to comment)

No significant concerns expressed by Jenn

1.4 Archaeology / First Nations

No significant concerns expressed by Jason

2.0 Site Photographs



Figure 2-1
Richco - Sediment Removal Progress

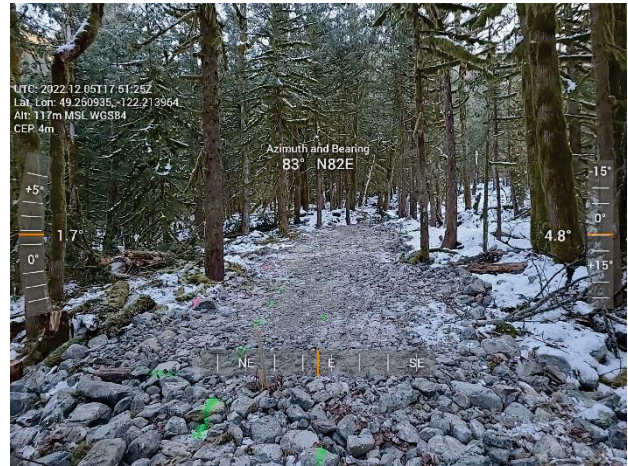


Figure 2-2
Richco - HESCO Basket Alignment to be Extended



Figure 2-3
Richco - Sediment Removal Progress



Figure 2-4
Richco - Sediment Removal Progress



Figure 2-5
Jakes – Removal of Channel Sediment



Figure 2-6
Jakes – Removal of Channel Sediment



Figure 2-7
Jakes – End of Day Progress

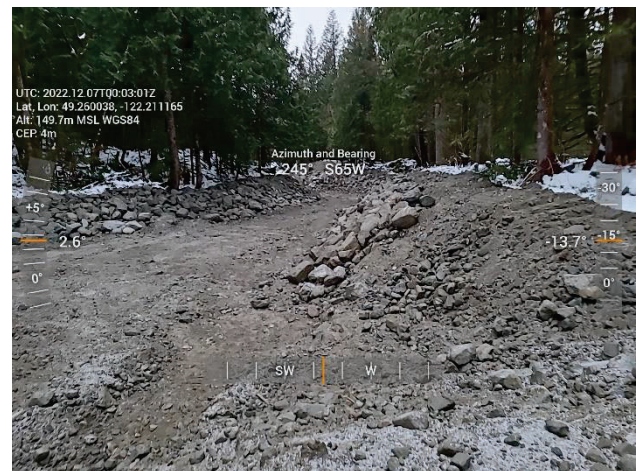


Figure 2-8
Jakes – End of Day Progress



Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	09
Project:	Carratt Creek Emergency Works	Page:	1 of 4
Location:	Carratt Road, Fraser Valley, BC 49.262720, -122.217965	Project No.:	S-CR-28 2022-2632
Contractor:	Jakes Construction, Richco Contracting Ltd.	File No.:	
Contract:		Date:	December 7, 2022
Contract No.:		Temperature:	High: 5 Low: 1
Weather:	Overcast/rain		

Labour Force: Jakes: 2x Equipment Operators, 1x Safety Representative, 2x Truck Driver, 1x Foreman, 1x Project Manager
Richco: 3x Excavator Operators (Foreman), 4x Truck Drivers, 1x Labourer

Contractor's Equipment: Jakes: 1x Hitachi 350 Excavator, 1x John Deere 345G Excavator, 2x Deere 300D Rock Trucks
Richco: 1x Hitachi 350 Excavator, 1x Hitachi 345 Excavator (Eng Pit), 1x Hitachi 245 Excavator (HESCO Basket area), 4x Tandem Axle Dump Trucks, 1x Kubota SSV75 Wheel Loader (w/ Street Sweep)

1.0 Report:

- Arrived on site 8:30 AM.
- Jakes Construction end of day at 4:00 PM.
- Hoyeon Lee (AE) departed site at 4:00 PM.
- Tina (FN) on site from approx. 10:00 AM – 4:00 PM
- Richco Contracting end of day at 4:00 PM.

1.1 Downstream Extents – Richco Contracting:

- Excavation of in-stream sediment deposition underway. 1 Rock Truck dumping material near stockpile and 1 excavator (350) removing material from created stockpile and loading tandem axle dump trucks (x4).

General methodology involved establishment of streamflow adjacent to the left (south) bank, followed by removal of materials within the center of the channel and stockpile of excavated materials adjacent to the right (north) bank.
- HESCO baskets delivered Wednesday, the alignment extends 106m north. HESCO baskets are currently being installed starting from the north end.
- The below estimates are based on % of total works that are complete (Channel centerline station used for estimate). Does not account for interim progress.



- Estimated total sediment removal progress = 35%. Based on % of total works that are complete (Channel centerline station used for estimate), does not account for interim progress.
- Estimated HESCO basket progress = 50%

1.2 Upstream Extents – Jakes Construction

- Excavation of stockpiled in-stream material complete. Both excavators currently excavating channel bed and loading rock trucks (x2).
- Loaded rock trucks carry materials downstream and are dumped approximately 150m upstream of the permanent bridge. Materials are stockpiled adjacent to the right bank.
- Estimated total sediment removal progress = 40%
- Estimated diversion channel / bank restoration works progress = 30%

1.3 Environmental Monitoring

- Jenn (Aqua Silva) is monitoring the water levels and quality.
- Multiple oil/fuel leaks detected on site; 2 tandem trucks found to be leaking. Trucks to be inspected and repaired. (Jenn to comment)

1.4 Archaeology / First Nations

No significant concerns expressed by Tina

2.0 Site Photographs



Figure 2-1
Richco - HESCO Basket Installation

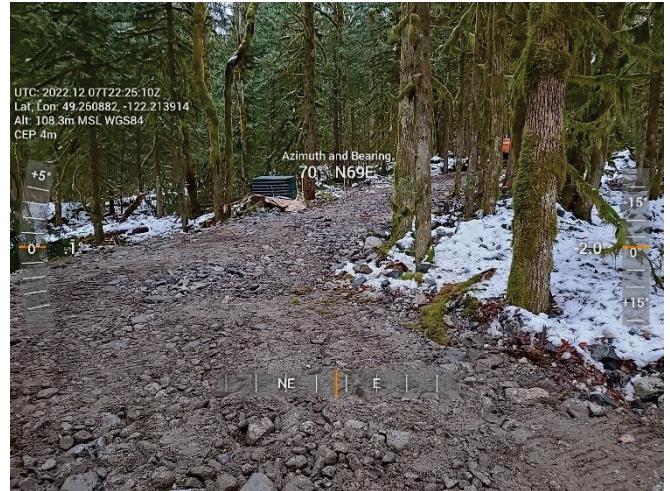


Figure 2-2
Richco - HESCO Baskets Alignment Layout



Figure 2-3
Richco - Sediment Removal Progress



Figure 2-4
Richco - Sediment Removal Progress



Figure 2-5

Jakes - New Location of Temporary Bridge



Figure 2-6

Jakes - On-going Sediment Removal



Figure 2-7

Jakes - On-going Sediment Removal

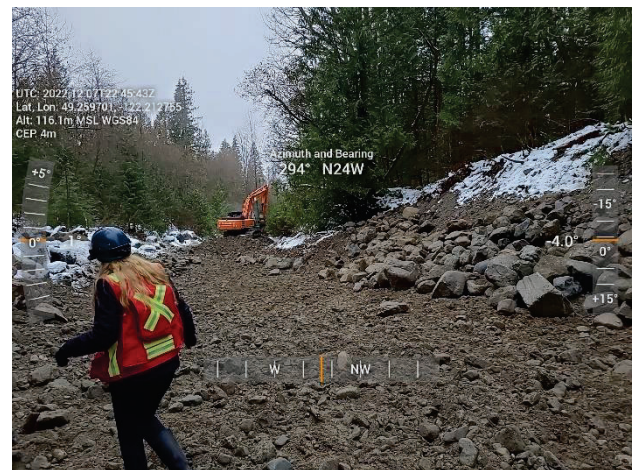


Figure 2-8

Jakes - End of Day Progress



Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	10
Project:	Carratt Creek Emergency Works	Page:	1 of 4
Location:	Carratt Road, Fraser Valley, BC 49.262720, -122.217965	Project No.:	S-CR-28 2022-2632
Contractor:	Jakes Construction, Richco Contracting Ltd.	File No.:	
Contract:		Date:	December 8, 2022
Contract No.:		Temperature:	High: 4 Low: 1
Weather:	Overcast		

Labour Force: Jakes: 2x Equipment Operators, 1x Safety Representative, 2x Truck Driver, 1x Foreman,
Richco: 3x Excavator Operators (Foreman), 3x Truck Drivers, 1x Labourer

Contractor's Equipment: Jakes: 1x Hitachi 350 Excavator, 1x John Deere 345G Excavator, 2x Deere 300D Rock Trucks

Richco: 1x Hitachi 350 Excavator, 1x Hitachi 345 Excavator (Eng Pit), 1x Hitachi 245 Excavator (HESCO Basket area), 3x Tandem Axle Dump Trucks, 1x Kubota SSV75 Wheel Loader (w/ Street Sweep)

1.0 Report:

- Arrived on site 8:30 AM.
- Safety representatives for Jakes on site.
- Jakes Construction end of day at 4:00 PM.
- Hoyeon Lee (AE) departed site at 4:00 PM.
- Jason (FN) on site from approx. 8 AM – 11 PM
- Richco Contracting end of day at 4:00 PM.

1.1 Downstream Extents – Richco Contracting:

- Excavation of in-stream sediment deposition underway. 2 rock trucks dumping material near stockpile and 1 excavator (350) removing material from created stockpile and loading tandem axle dump trucks (x3).

General methodology involved establishment of streamflow adjacent to the left (south) bank, followed by removal of materials within the center of the channel and stockpile of excavated materials adjacent to the right (north) bank.

- HESCO baskets are currently being installed starting from the north end. 38m of the layout has been completed (Total alignment length = 106m).
- The below estimates are based on % of total works that are complete (Channel centerline station used for estimate). Does not account for interim progress.



- Estimated total sediment removal progress = 45%. Based on % of total works that are complete (Channel centerline station used for estimate), does not account for interim progress.
- Estimated HESCO basket progress = 60%

1.2 Upstream Extents – Jakes Construction

- Excavation of stockpiled in-stream material complete. Both excavators currently excavating channel bed and loading rock trucks (x2).
- At end of day, channel bed has been excavated up to approximately 100m downstream of end of registered dyke.
- Loaded rock trucks carry materials downstream and are dumped approximately 150m upstream of the permanent bridge. Materials are stockpiled adjacent to the right bank.
- Estimated total sediment removal progress = 50%
- Estimated diversion channel / bank restoration works progress = 75%

1.3 Environmental Monitoring

- Jenn (Aqua Silva) is monitoring the water levels and quality.
- Oil leaks still present on site (Jenn to comment)

No significant concerns expressed by Jenn

1.4 Archaeology / First Nations

No significant concerns expressed by Jason



2.0 Site Photographs



Figure 2-1
Richco - HESCO Basket Progress

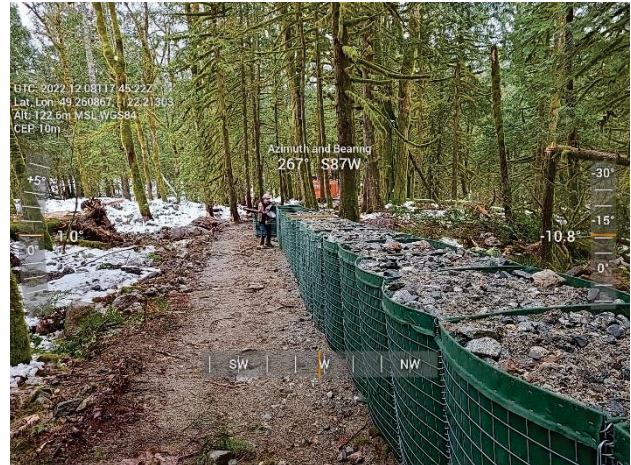


Figure 2-2
Richco - HESCO Basket Progress

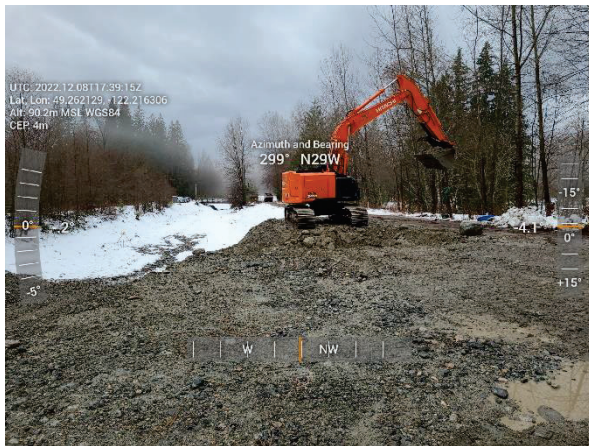


Figure 2-3
Richco - Sediment Removal Progress



Figure 2-4
Richco - Sediment Removal Progress



Figure 2-5
Jakes – On-going Sediment Removal



Figure 2-6
Jakes – On-going Sediment Removal



Figure 2-7
Jakes – On-going Sediment Removal



Figure 2-8
Jakes – End of Day Progress



Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	11
Project:	Carratt Creek Emergency Works	Page:	1 of 5
Location:	Carratt Road, Fraser Valley, BC 49.262720, -122.217965	Project No.:	S-CR-28 2022-2632
Contractor:	Jakes Construction, Richco Contracting Ltd.	File No.:	
Contract:		Date:	December 9, 2022
Contract No.:		Temperature:	High: 4 Low: 1
Weather:	Overcast		

Labour Force: Jakes: 2x Equipment Operators, 1x Safety Representative, 2x Truck Driver, 1x Foreman, 1x Superintendent
Richco: 3x Excavator Operators (Foreman), 3x Truck Drivers, 1x Labourer
Contractor's Equipment: Jakes: 1x Hitachi 350 Excavator, 1x John Deere 345G Excavator, 2x Deere 300D Rock Trucks
Richco: 1x Hitachi 350 Excavator, 1x Hitachi 345 Excavator (Eng Pit), 1x Hitachi 245 Excavator (HESCO Basket area), 3x Tandem Axle Dump Trucks, 1x Kubota SSV75 Wheel Loader (w/ Street Sweep)

1.0 Report:

- Arrived on site 8:30 AM.
- Trevor Friedmann (AE) arrived on site 9:15 AM – 11:30 AM.
- Jakes Construction end of day at 4:00 PM.
- Hoyeon Lee (AE) departed site at 4:00 PM.
- Jason (FN) on site from approx. 8 AM – 11 AM
- Richco Contracting end of day at 4:00 PM.

1.1 Downstream Extents – Richco Contracting:

- Excavation of in-stream sediment deposition underway. 2 rock trucks dumping material near stockpile and 1 excavator (350) removing material from created stockpile and loading tandem axle dump trucks (x3).

General methodology involved establishment of streamflow adjacent to the left (south) bank, followed by removal of materials within the center of the channel and stockpile of excavated materials adjacent to the right (north) bank.

- HESCO baskets are currently being installed starting from the north end. Contractor to make sure to provide additional support to the barrier by overlapping baskets and filling in gaps.



- AE Field engineer directed contractor to extend the HESCO basket alignment by approximately 25 m north; modifications were made to ensure capture of surface runoff and minor avulsion flow channelization. Additional alignment to tie-in to installed HESCO alignment with a 45 degree angle.
- AE to confirm entity responsible for excavation directly under Carratt Road Bridge (MOTI?).
- The below estimates are based on % of total works that are complete (Channel centerline station used for estimate). Does not account for interim progress.
- Estimated total sediment removal progress = 60%. Based on % of total works that are complete (Channel centerline station used for estimate), does not account for interim progress.
- Estimated HESCO basket progress = 80%

1.2 Upstream Extents – Jakes Construction

- Excavation of stockpiled in-stream material complete. **Both excavators currently** excavating channel bed and loading rock trucks (x2).
- Loaded rock trucks carry materials downstream and are dumped approximately 150m upstream of the permanent bridge. Materials are stockpiled adjacent to the right bank.
- Tentative plan in place to divert flow into main channel on Thursday of next week.
- AE Field Engineer provided direction on bank restoration:
 - Contractor to match existing ground/grade at top of right bank and left bank of diversion channel.
 - Contractor to excavate main channel sediment as deep as need to divert flow.
 - Channel side slopes to maintain 1.5H:1V min. slope, preferred 2H:1V min. on inside corner.
 - Restored channel right bank height to be 1.5 m above diverted channel invert.
 - Bucket compaction, max. 0.5 m particle size for material placed in restored bank.
 - Restored bank dimensions 4.0 m top width, 3H:1V fore slope and back slope.
 - Contractor to provide AE notice prior to construction of diversion, Field Engineer to be on site.
- Contractor to regrade a 25 m section of the channel to ensure minimum 2.5 m depth below dike crest is met. Ground to be track packed.
- Contractor to remove part of temporary berm immediately downstream of debris jam to allow debris flow to spread towards left bank during storm events.
- Large boulders scattered at the toe of existing dikes to be hauled upstream and disposed of where appropriate.
- Estimated total sediment removal progress = 60%



- Estimated diversion channel / bank restoration works progress = 80%

1.3 Environmental Monitoring

- Jenn (Aqua Silva) is monitoring the water levels and quality.
- Oil leaks still present on site (Jenn to comment)
- Knotweed found at Eng pit, Mark to mark areas with caution tape (Jenn to comment)

1.4 Archaeology / First Nations

No significant concerns expressed by Jason

2.0 Site Photographs



Figure 2-1
Richco - HESCO Basket Progress



Figure 2-2
Richco - HESCO Basket Progress &
Alignment Extension (Right)



Figure 2-3
Richco - Sediment Removal Progress



Figure 2-4
Richco - Sediment Removal Progress

DAILY CONSTRUCTION REPORT



Figure 2-5
Jakes – On-going Sediment Removal



Figure 2-6
Jakes – On-going Sediment Removal

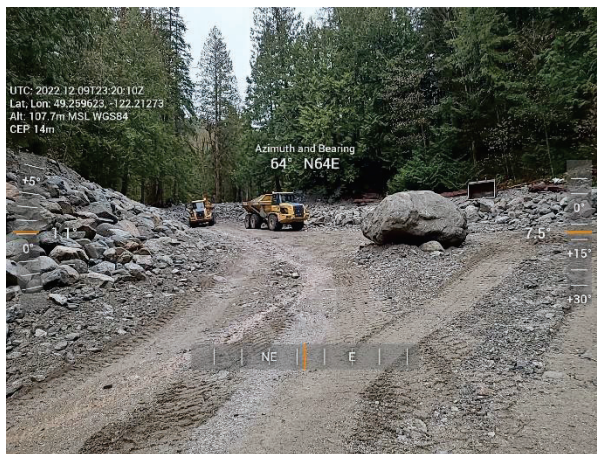


Figure 2-7
Jakes – On-going Sediment Removal

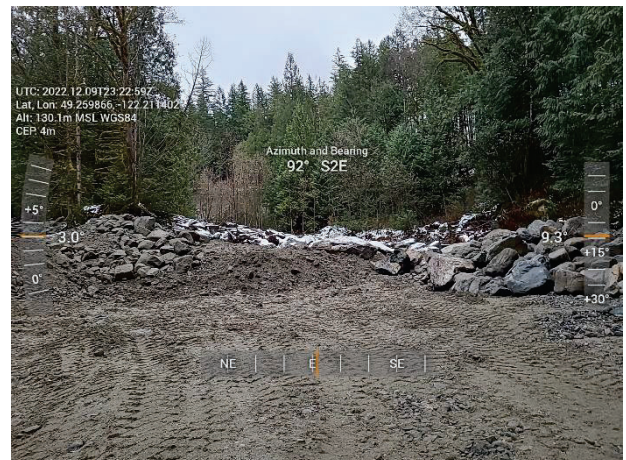


Figure 2-8
Jakes – Excavation of Temporary Berm



Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	12
Project:	Carratt Creek Emergency Works	Page:	1 of 4
Location:	Carratt Road, Fraser Valley, BC 49.262720, -122.217965	Project No.:	S-CR-28 2022-2632
Contractor:	Jakes Construction, Richco Contracting Ltd.	File No.:	
Contract:		Date:	December 10, 2022
Contract No.:		Temperature:	High: 4 Low: 1
Weather:	Overcast		

Labour Force: Jakes: 2x Equipment Operators, 1x Safety Representative, 2x Truck Driver, 1x Foreman

Richco: 3x Excavator Operators (Foreman), 3x Truck Drivers, 1x Labourer

Contractor's Equipment: Jakes: 1x Hitachi 350 Excavator, 1x John Deere 345G Excavator, 2x Deere 300D Rock Trucks

Richco: 1x Hitachi 350 Excavator, 1x Hitachi 345 Excavator (Eng Pit), 1x Hitachi 245 Excavator (HESCO Basket area), 3x Tandem Axle Dump Trucks, 1x Kubota SSV75 Wheel Loader (w/ Street Sweep)

1.0 Report:

- Arrived on site 8:30 AM.
- Jakes Construction end of day at 12:30 PM.
- Hoyeon Lee (AE) departed site at 1:30 PM.
- Tina (FN) on site from approx. 8 AM – 1:30 PM
- Richco Contracting end of day at 1:30 PM.

1.1 Downstream Extents – Richco Contracting:

- Excavation of in-stream sediment deposition underway. 2 rock trucks dumping material near stockpile and 1 excavator (350) removing material from created stockpile and loading tandem axle dump trucks (x3).

General methodology involved establishment of streamflow adjacent to the left (south) bank, followed by removal of materials within the center of the channel and stockpile of excavated materials adjacent to the right (north) bank.

- HESCO baskets are currently being installed starting from the north end. Contractor to make sure to provide additional support to the barrier by overlapping baskets and filling in gaps.
- AE to confirm entity responsible for excavation directly under Carratt Road Bridge (MOTI?).



- The below estimates are based on % of total works that are complete (Channel centerline station used for estimate). Does not account for interim progress.
- Estimated total sediment removal progress = 65%. Based on % of total works that are complete (Channel centerline station used for estimate), does not account for interim progress.
- Estimated HESCO basket progress = 70%

1.2 Upstream Extents – Jakes Construction

- 1x Excavator (350) currently excavating channel bed and loading rock trucks (x2).
- Loaded rock trucks carry materials downstream and are dumped approximately 150m upstream of the permanent bridge. Materials are stockpiled adjacent to the right bank.
- Tentative plan in place to divert flow into new channel on Thursday of next week.
- Contractor to match existing ground/grade at top of right bank of diversion channel.
- Channel restoration to be 1.5m high above channel invert, making sure to lightly pack material with a maximum boulder size of 0.5m.
- Contractor to regrade parts of the channel bed to ensure minimum 2.5m depth below dyke is met. Ground to be track packed.
- Large boulders scattered at the toe of existing dykes to be hauled upstream and disposed of where appropriate.
- Contractor to widen diversion channel approximately 1m by pushing out left bank (directly upstream of diversion channel work). Jenn (Aqua Silva) has confirmed tree removal is not an issue.
- Estimated total sediment removal progress = 70%
- Estimated diversion channel / bank restoration works progress = 85%

1.3 Environmental Monitoring

- Jenn (Aqua Silva) is monitoring the water levels and quality.
- Oil leaks still present on site (Jenn to comment)
- Knotweed found at Eng pit (Jenn to comment)

1.4 Archaeology / First Nations

No significant concerns expressed by Tina

2.0 Site Photographs



Figure 2-1

Richco - HESCO Basket Progress



Figure 2-2

Richco - HESCO Basket Progress



Figure 2-3

Richco - Sediment Removal Progress



Figure 2-4

Richco - Sediment Removal Progress



DAILY CONSTRUCTION REPORT

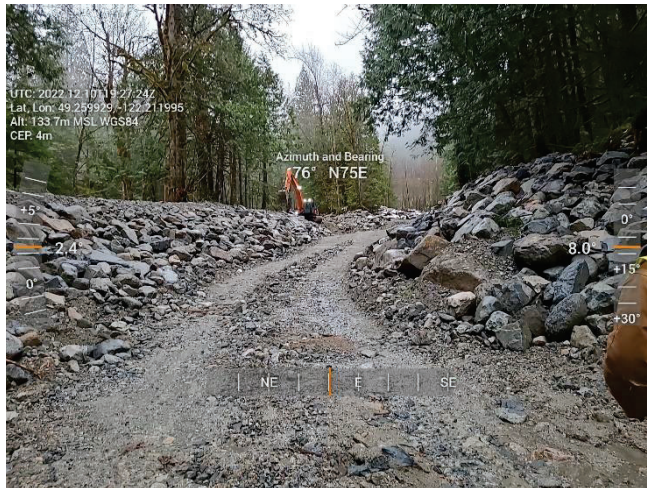


Figure 2-5
Jakes - Sediment Removal Progress



Figure 2-6
Jakes - Sediment Removal Progress



Figure 2-7
Jakes - Channel Restoration Works



Figure 2-8
Jakes - Channel Restoration Works



Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	13
Project:	Carratt Creek Emergency Works	Page:	1 of 4
Location:	Carratt Road, Fraser Valley, BC 49.262720, -122.217965	Project No.:	S-CR-28 2022-2632
Contractor:	Jakes Construction, Richco Contracting Ltd.	File No.:	
Contract:		Date:	December 10, 2022
Contract No.:		Temperature:	High: 3°C Low: -1°C
Weather:	Foggy patches in early am to sunny & clear the remainder of the day		

Labour Force: Jakes: 2x Equipment Operators, 1x Safety Representative, 2x Truck Driver, 1x Foreman, Superintendent (2 hours on site)

Richco: 3x Excavator Operators (Foreman), 2x Truck Drivers, 1x Labourer

Contractor's Equipment: Jakes: 1x Hitachi 350 Excavator, 1x John Deere 345G Excavator, 2x Deere 300D Rock Trucks

Richco: 1x Hitachi 350 Excavator, 1x Hitachi 345 Excavator (Eng Pit), 1x Hitachi 245 Excavator (HESCO Basket area), 3x Tandem Axle Dump Trucks, 1x Kubota SSV75 Wheel Loader (w/ Street Sweep used for 2 hours only)

1.0 Report:

- Arrived on site: 7:45 AM.
- Jakes Construction end of day at 4:30 PM.
- Lorne Semenowich (AE) departed site at 4:00 PM.
- Sumeet (EM) on site from approx. 10:40 AM – 3:30 PM
- Richco Contracting end of day at 4:30 PM.

1.1 Downstream Extents – Richco Contracting:

- Excavation of in-stream sediment deposition underway. 2 rock trucks dumping material near stockpile and 1 excavator (350) removing material from created stockpile and loading tandem axle dump trucks (x2).

General methodology involved establishment of streamflow adjacent to the left (south) bank, followed by removal of materials within the center of the channel and stockpile of excavated materials adjacent to the right (north) bank.

- HESCO baskets are continuing being installed starting from the north end. Contractor to make sure to provide additional support to the barrier by overlapping baskets and filling in gaps.



- The below estimates are based on % of total works that are complete (Channel centerline station used for estimate). Does not account for interim progress.
- Estimated total sediment removal progress = 75%. Based on % of total works that are complete (Channel centerline station used for estimate), does not account for interim progress.
- Estimated HESCO basket progress = 95%

1.2 Upstream Extents – Jakes Construction

- 1x Excavator (350) currently excavating channel bed and loading rock trucks (x2).
- Loaded rock trucks carry materials downstream and are dumped approximately 150m upstream of the permanent bridge. Materials are stockpiled adjacent to the right bank.
- Tentative plan in place to divert channel flow on Thursday of this week.
- Contractor to match existing ground/grade at top of right bank of diversion channel.
- Channel restoration to be 1.5m high above channel invert, making sure to lightly pack material with a maximum boulder size of 0.5m. Jakes removing material at this location and building rip-rap banks
- Contractor continuing to regrade parts of the channel bed to ensure minimum 2.5m depth below dyke is met. Ground to be track packed.
- Large boulders scattered at the toe of existing dykes to be hauled upstream and disposed of where appropriate.
- Contractor to widen diversion channel approximately 1m by pushing out left bank (directly upstream of diversion channel work). Jenn (Aqua Silva) has confirmed tree removal is not an issue.
- Estimated total sediment removal progress = 80%
- Estimated diversion channel / bank restoration works progress = 90%

1.3 Environmental Monitoring

- Sumeet (Aqua Silva) is monitoring the water levels and quality.
- Oil leaks still present on site (Jenn to comment) (Ongoing)
- Knotweed found at Eng pit (Jenn to comment) (Ongoing)

1.4 Archaeology / First Nations

No significant concerns expressed by Sumeet



2.0 Site Photographs



Figure 2-1
Richco - HESCO Basket Progress



Figure 2-2
Richco - HESCO Basket Progress



Figure 2-3
Richco - HESCO Basket Progress



Figure 2-4
Richco - Sediment Removal Progress



Figure 2-5
Jakes – Shaping creek to grade



Figure 2-6
Jakes – Diversion Removal Progress



Figure 2-7
Richco – Shaping pf Stockpile at the Pit



Figure 2-8
Richco –End of Day Road sweeping



Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	14
Project:	Carratt Creek Emergency Works	Page:	1 of 4
Location:	Carratt Road, Fraser Valley, BC 49.262720, -122.217965	Project No.:	S-CR-28 2022-2632
Contractor:	Jakes Construction, Richco Contracting Ltd.	File No.:	
Contract:		Date:	December 13, 2022
Contract No.:		Temperature:	High: 4 Low: 1
Weather:	Overcast,Fog		

Labour Force: Jakes: 2x Equipment Operators, 1x Safety Representative, 2x Truck Driver, 1x Foreman, 1x Superintendent
Richco: 3x Excavator Operators (Foreman), 3x Truck Drivers, 1x Labourer
Contractor's Equipment: Jakes: 1x Hitachi 350 Excavator, 1x John Deere 345G Excavator, 2x Deere 300D Rock Trucks
Richco: 1x Hitachi 350 Excavator, 1x Hitachi 345 Excavator (Eng Pit), 1x Hitachi 245 Excavator (HESCO Basket area), 3x Tandem Axle Dump Trucks, 1x Kubota SSV75 Wheel Loader (w/ Street Sweep)

1.0 Report:

- Arrived on site 8:30 AM.
- Trevor (AE) on site at 9:30 AM.
- Jakes Construction end of day at 4:30 PM.
- Hoyeon Lee (AE) departed site at 4:15 PM.
- No First Nations representative on site.
- Richco Contracting end of day at 4:30 PM.

1.1 Downstream Extents – Richco Contracting:

- Excavation of in-stream sediment deposition underway. 2 rock trucks dumping material near stockpile and 1 excavator (350) removing material from created stockpile and loading tandem axle dump trucks (x3).

General methodology involved establishment of streamflow adjacent to the left (south) bank, followed by removal of materials within the center of the channel and stockpile of excavated materials adjacent to the right (north) bank.

- HESCO baskets are currently being installed starting from the north end. Contractor to make sure to provide additional support to the barrier by overlapping baskets and filling in gaps.
- AE to confirm entity responsible for excavation directly under Carratt Road Bridge (MOTI?).



- The below estimates are based on % of total works that are complete (Channel centerline station used for estimate). Does not account for interim progress.
- Estimated total sediment removal progress = 75%. Based on % of total works that are complete (Channel centerline station used for estimate), does not account for interim progress.
- Estimated HESCO basket progress = 95%
- HESCO Baskets to remain unfinished until discussion with Jakes about allowing excavator to exit through the access ramp.

1.2 Upstream Extents – Jakes Construction

- 1x Excavator (345) currently excavating channel bed working its way downstream. The second excavator (350) is currently grading the channel restoration area and preparing to divert flow back into the newly constructed channel.
- Loaded rock trucks carry materials downstream and are dumped approximately 150m upstream of the permanent bridge. Materials are stockpiled adjacent to the right bank.
- Tentative plan in place to divert flow into new channel on Friday (Dec 16).
- AE Field Engineer provided direction on bank restoration:
 - Contractor to match existing ground/grade at top of right bank and left bank of diversion channel.
 - Contractor to excavate main channel sediment as deep as need to redivert flow.
 - Channel side slopes to maintain 1.5H:1V min. slope, preferred 2H:1V min. on inside corner.
 - Restored channel right bank height to be 1.5 m above rediverted channel invert.
 - Bucket compaction, max. 0.5 m particle size for material placed in restored bank.
 - Restored bank dimensions 4.0 m top width, 3H:1V fore slope and back slope.
 - Contractor to provide AE notice prior to construction of diversion, Field Engineer to be on site.
- Contractor to regrade channel bed to ensure minimum 2.5m depth below dyke crest is met. Ground to be track packed.
- Large boulders scattered at the toe of existing dykes to be hauled upstream and disposed of where appropriate.
- Contractor currently widening diversion channel approximately 1m by pushing out left bank (directly upstream of diversion channel work). Jenn (Aqua Silva) has confirmed tree removal is not an issue.
- Estimated total sediment removal progress = 80%
- Estimated diversion channel / bank restoration works progress = 90%



1.3 Environmental Monitoring

- Jenn (Aqua Silva) is monitoring the water levels and quality.

No significant concerns expressed by Jenn.

1.4 Archaeology / First Nations

N/A

2.0 Site Photograph



Figure 2-1
Richco - HESCO Basket Progress



Figure 2-1
Richco - HESCO Basket Progress

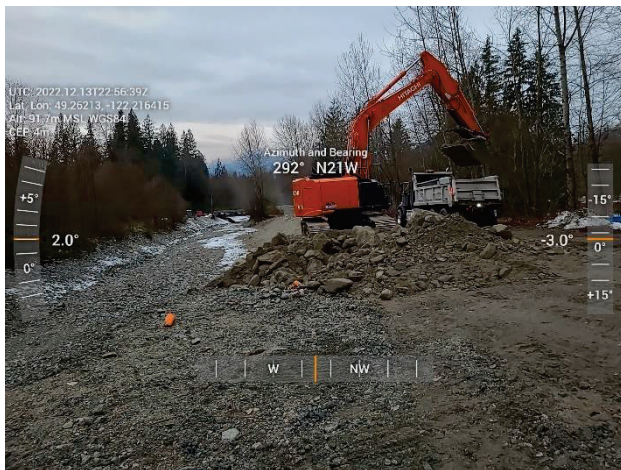


Figure 2-3
Richco - Sediment Removal Progress

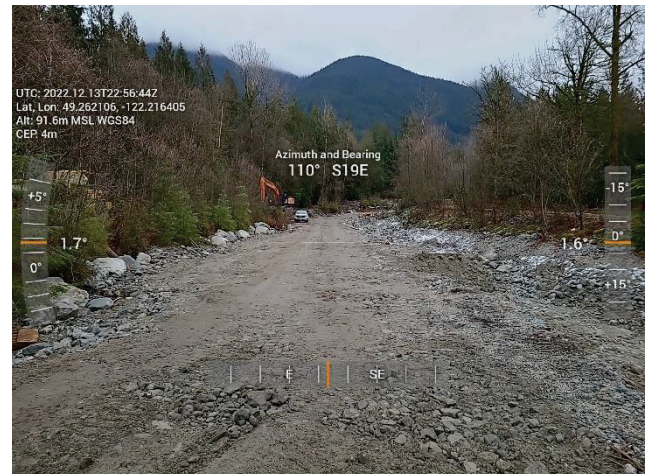


Figure 2-4
Richco - Sediment Removal Progress



Figure 2-5
Jakes – Sediment Removal Progress



Figure 2-6
Jakes – Sediment Removal Progress



Figure 2-7
Jakes – Channel Restoration Works



Figure 2-8
Jakes –Channel Restoration Works



Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	15
Project:	Carratt Creek Emergency Works	Page:	1 of 5
Location:	Carratt Road, Fraser Valley, BC 49.262720, -122.217965	Project No.:	S-CR-28 2022-2632
Contractor:	Jakes Construction, Richco Contracting Ltd.	File No.:	
Contract:		Date:	December 14, 2022
Contract No.:		Temperature:	High: 5 Low: -1
Weather:	Overcast, Fog		

Labour Force: Jakes: 2x Equipment Operators, 1x Safety Representative, 2x Truck Driver, 1x Foreman,
Richco: 3x Excavator Operators (Foreman), 3x Truck Drivers, 1x Labourer, 1x Superintendent

Contractor's Equipment: Jakes: 1x Hitachi 350 Excavator, 1x John Deere 345G Excavator, 2x Deere 300D Rock Trucks

Richco: 1x Hitachi 345 Excavator, 1x Hitachi 245 Excavator (Eng Pit),
3x Tandem Axle Dump Trucks, 1x Kubota SSV75 Wheel Loader (w/ Street Sweep)

1.0 Report:

- Arrived on site 8:30 AM.
- Trevor (AE) on site at 9:30 AM.
- Jakes Construction end of day at 3:30 PM.
- Hoyeon Lee (AE) departed site at 4:15 PM.
- Naomi (AE) and Jayden (AE) on site.
- Tina (FN) and Rick (FN) on site from approx 10:30AM - 4:00PM
- Patrick (Aqua Silva) on site
- Richco Contracting end of day at 4:30 PM.

1.1 Downstream Extents – Richco Contracting:

- Excavation of in-stream sediment deposition underway. 2 rock trucks dumping material near stockpile and 1 excavator (350) removing material from created stockpile and loading tandem axle dump trucks (x3).

General methodology involved establishment of streamflow adjacent to the left (south) bank, followed by removal of materials within the center of the channel and stockpile of excavated materials adjacent to the right (north) bank.

- AE to confirm entity responsible for excavation directly under Carratt Road Bridge (MOTI?).



- The below estimates are based on % of total works that are complete (Channel centerline station used for estimate). Does not account for interim progress.
- Estimated total sediment removal progress = 80%. Based on % of total works that are complete (Channel centerline station used for estimate), does not account for interim progress.
- Estimated HESCO basket progress = 95%
- HESCO Baskets to remain unfinished until discussion with Jakes about allowing excavator to exit through the access ramp.

1.2 Upstream Extents – Jakes Construction

- 1x Excavator (345) currently excavating channel bed working its way downstream. The second excavator (350) is currently grading the channel restoration area and preparing to divert flow back into the newly constructed channel.
- Loaded rock trucks carry materials downstream and are dumped approximately 150m upstream of the permanent bridge. Materials are stockpiled adjacent to the right bank.
- Tentative plan in place to divert flow into new channel on Friday (Dec 16).
- AE Field Engineer provided direction on bank restoration:
 - Contractor to match existing ground/grade at top of right bank and left bank of diversion channel.
 - Contractor to excavate main channel sediment as deep as need to red divert flow.
 - Channel side slopes to maintain 1.5H:1V min. slope, preferred 2H:1V min. on inside corner.
 - Restored channel right bank height to be 1.5 m above red diverted channel invert.
 - Bucket compaction, max. 0.5 m particle size for material placed in restored bank.
 - Restored bank dimensions 4.0 m top width, 3H:1V fore slope and back slope.
 - Contractor to provide AE notice prior to construction of diversion, Field Engineer to be on site.
- Contractor to regrade channel bed to ensure minimum 2.5m depth below dyke crest is met. Ground to be track packed.
- Estimated total sediment removal progress = 85%
- Estimated diversion channel / bank restoration works progress = 90%

1.3 Environmental Monitoring

- Jenn (Aqua Silva) is monitoring the water levels and quality.

No significant concerns expressed by Jenn.



1.4 Archaeology / First Nations

Rick has expressed a few concerns regarding opening the new channel before all sediment has been removed:

1. Water turbidity is a concern
2. Higher than expected flows may arise in the new channel

Trevor (AE) has been made aware of the concerns.

Hoyeon (AE), Tina (FN) and Jenn (Aqua Silva) have participated in the conversation and are aware of the concerns.

2.0 Site Photograph

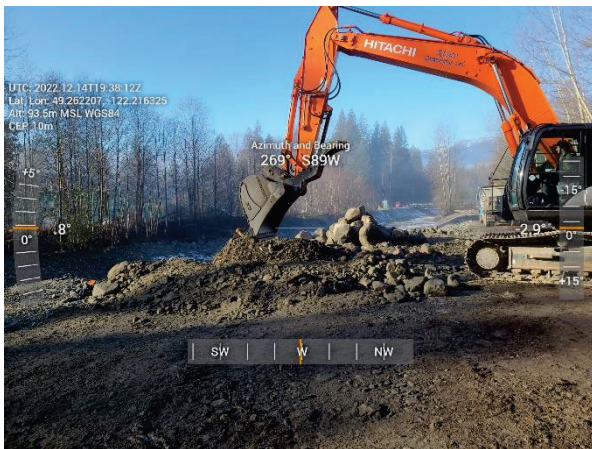


Figure 2-1
Richco – Sediment Removal Progress



Figure 2-1
Richco – Sediment Removal Progress



Figure 2-3
Richco – Sediment Removal Progress

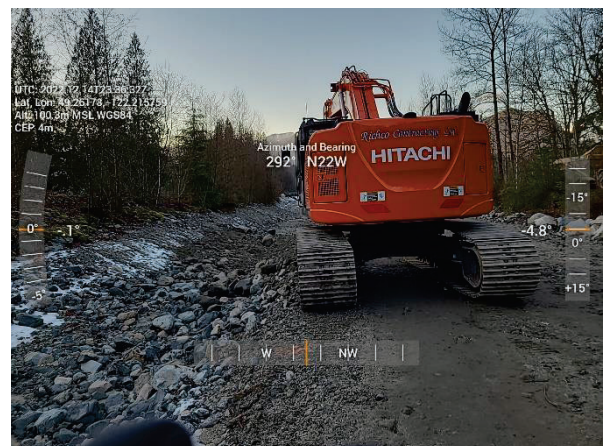


Figure 2-4
Richco – Sediment Removal Progress



Figure 2-5
Jakes – Sediment Removal Progress

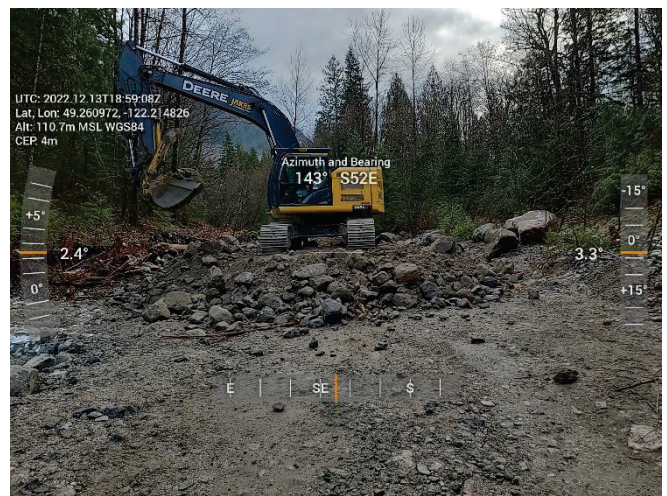


Figure 2-6
Jakes – Sediment Removal Progress



Figure 2-7
Jakes – Channel Restoration Works



Figure 2-8
Jakes – Channel Restoration Works



Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	16
Project:	Carratt Creek Emergency Works	Page:	1 of 5
Location:	Carratt Road, Fraser Valley, BC 49.262720, -122.217965	Project No.:	S-CR-28 2022-2632
Contractor:	Jakes Construction, Richco Contracting Ltd.	File No.:	
Contract:		Date:	December 15, 2022
Contract No.:		Temperature:	High: 4 Low: -2
Weather:	Sunny, Fog		

Labour Force: Jakes: 2x Equipment Operators, 1x Safety Representative, 2x Truck Driver, 1x Foreman

Richco: 3x Excavator Operators (Foreman), 3x Truck Drivers, 2x Labourer

Contractor's Equipment: Jakes: 1x Hitachi 350 Excavator, 1x John Deere 345G Excavator, 2x Deere 300D Rock Trucks

Richco: 1x Hitachi 345 Excavator, 1x Hitachi 245 Excavator (Eng Pit),
3x Tandem Axle Dump Trucks, 1x Kubota SSV75 Wheel Loader (w/ Street Sweep), Watering station

1.0 Report:

- Arrived on site 8:30 AM.
- Jakes Construction end of day at 4:00 PM.
- Hoyeon Lee (AE) departed site at 4:00 PM.
- Tina (FN) on site from approx 10:30AM 1:30PM
- Richco Contracting end of day at 4:30 PM.

1.1 Downstream Extents – Richco Contracting:

- Excavation of in-stream sediment deposition underway. 1 rock truck dumping material near stockpile and 1 excavator (350) removing material from created stockpile and loading tandem axle dump trucks (x3).

General methodology involved establishment of streamflow adjacent to the left (south) bank, followed by removal of materials within the center of the channel and stockpile of excavated materials adjacent to the right (north) bank.

- AE to confirm entity responsible for excavation directly under Carratt Road Bridge (MOTI?).
- Washing station is present at the entrance of pit.
- The below estimates are based on % of total works that are complete (Channel centerline station used for estimate). Does not account for interim progress.



- Estimated total sediment removal progress = 85%. Based on % of total works that are complete (Channel centerline station used for estimate), does not account for interim progress.
- Estimated HESCO basket progress = 95%
- HESCO Baskets to remain unfinished until discussion with Jakes about allowing excavator to exit through the access ramp.

1.2 Upstream Extents – Jakes Construction

- Contractor found excavating a trough through new channel (See photos below):
 - Trough did not follow design drawings (which calls for a flat channel bed)
 - Approximately 0.5m deep and 2.0 m wide (TOB)
 - Starting at approximately STA 1 140 ending at STA 1 400.
 - Trevor was made aware of the situation and the construction was halted
 - Trough was bucket compacted and is awaiting direction on final configuration (Fill trough or leave excavated?)
- Laborer/Surveyor from Richco has confirmed the channel depth to be at a minimum 2.5m from the lower dyke crest.
- 1x Excavator (350) is currently aiding Richco remove sediment stockpiled on the right bank downstream of the temporary bridge.
- 1x Excavator (345) has created a trail through the upstream bank breach and an access ramp to allow excavator to exit once channel restoration works has been completed.
- Temporary bridge has been removed at the end of the day
- Tentative plan in place to divert flow into new channel on Monday (Dec 19).
- Jakes to demobilize machinery on Friday, leaving necessary equipment to complete channel restoration works.
- AE Field Engineer provided direction on bank restoration:
 - Contractor to match existing ground/grade at top of right bank and left bank of diversion channel.
 - Contractor to excavate main channel sediment as deep as needed to redirect flow.
 - Channel side slopes to maintain 1.5H:1V min. slope, preferred 2H:1V min. on inside corner.
 - Restored channel right bank height to be 1.5 m above redirected channel invert.
 - Bucket compaction, max. 0.5 m particle size for material placed in restored bank.
 - Restored bank dimensions 4.0 m top width, 3H:1V fore slope and back slope.
 - Contractor to provide AE notice prior to construction of diversion, Field Engineer to be on site.



- Estimated total sediment removal progress = 100%
- Estimated diversion channel / bank restoration works progress = 90%

1.3 Environmental Monitoring

- Jenn (Aqua Silva) is monitoring the water levels and quality.
- Jenn expressed concerns with opening the diversion channel before all the sediment in the channel has been removed, Jakes now planning on diverting flow on Monday (Dec 19)

1.4 Archaeology / First Nations

- Site Inspector to confirm woody debris is being collected and disposed further upstream near benched area.

2.0 Site Photograph

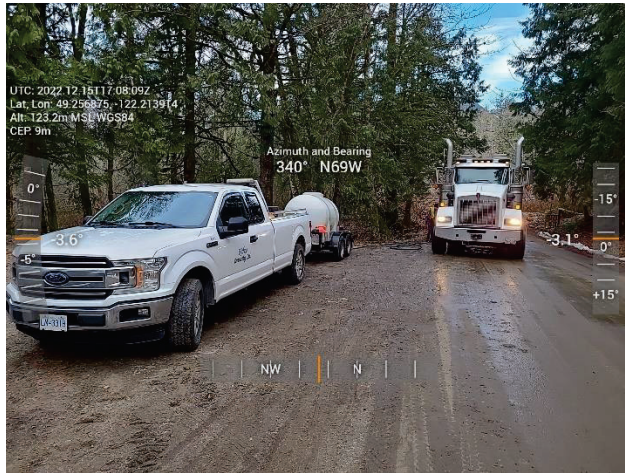


Figure 2-1
Richco – Washing Station



Figure 2-1
Richco – Washing Station

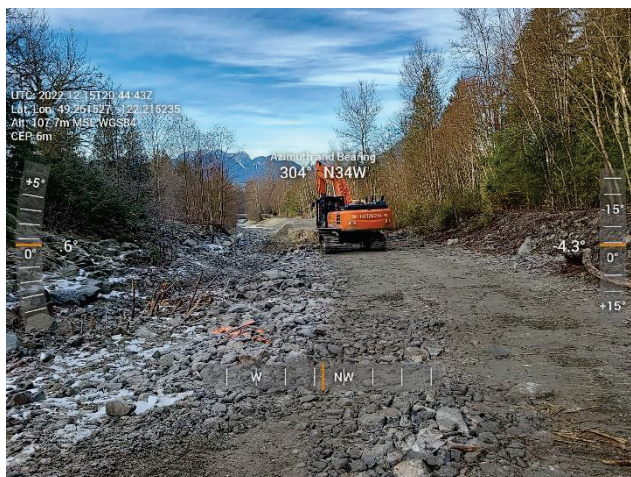


Figure 2-3
Richco – Sediment Removal Progress



Figure 2-4
Richco – Sediment Removal Progress



Figure 2-5
Jakes – Temporary Bridge Removal



Figure 2-6
Jakes – Sediment Removal Progress

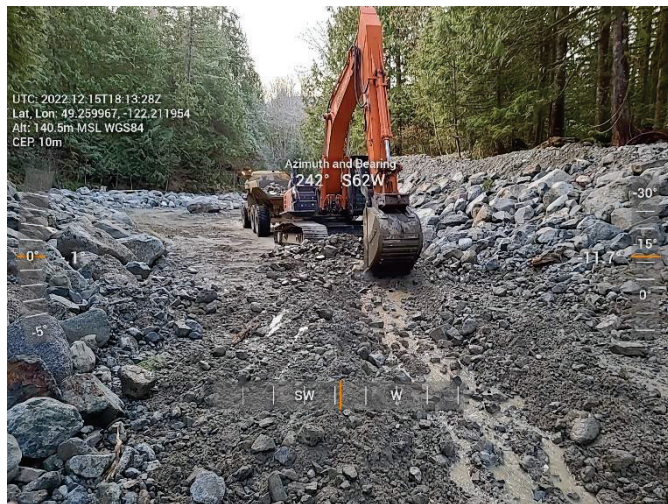


Figure 2-7
Jakes – Trough Creation



Figure 2-8
Jakes – Trough Creation



Figure 2-9
Jakes – Trail Through Upstream Bank Breach



Figure 2-10
Jakes – Access Trail onto Existing Dike



Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	17
Project:	Carratt Creek Emergency Works	Page:	1 of 3
Location:	Carratt Road, Fraser Valley, BC 49.262720, -122.217965	Project No.:	S-CR-28 2022-2632
Contractor:	Jakes Construction, Richco Contracting Ltd.	File No.:	
Contract:		Date:	December 16, 2022
Contract No.:		Temperature:	High: 5 Low: -2
Weather:	Sunny, Fog		

Labour Force: Jakes: 1x Equipment Operators, 1x Safety Representative, 1x Truck Driver, 1x Foreman

Richco: 3x Excavator Operators (Foreman), 3x Truck Drivers, 2x Labourer

Contractor's Equipment: Jakes: 1x Hitachi 350 Excavator, 1x John Deere 345G Excavator, 2x Deere 300D Rock Trucks

Richco: 1x Hitachi 345 Excavator, 1x Hitachi 245 Excavator (Eng Pit),
3x Tandem Axle Dump Trucks, 1x Kubota SSV75 Wheel Loader (w/ Street Sweep), Watering station

1.0 Report:

- Arrived on site 8:30 AM.
- Jakes Construction end of day at 3:00 PM.
- Hoyeon Lee (AE) departed site at 4:00 PM.
- Tina (FN) and Rick (FN) on site from approx 1:30PM – 3:00PM
- Richco Contracting end of day at 4:30 PM.

1.1 Downstream Extents – Richco Contracting:

- Excavation of in-stream sediment deposition underway. 1 rock truck dumping material near stockpile and 1 excavator (350) removing material from created stockpile and loading tandem axle dump trucks (x3).

General methodology involved establishment of streamflow adjacent to the left (south) bank, followed by removal of materials within the center of the channel and stockpile of excavated materials adjacent to the right (north) bank.

- AE to confirm entity responsible for excavation directly under Carratt Road Bridge (MOTI?).
- Washing station is present at the entrance of pit.
- The below estimates are based on % of total works that are complete (Channel centerline station used for estimate). Does not account for interim progress.



- Estimated total sediment removal progress = 90%. Based on % of total works that are complete (Channel centerline station used for estimate), does not account for interim progress.
- Estimated HESCO basket progress = 95%
- HESCO Baskets to remain unfinished until diversion works has been completed

1.2 Upstream Extents – Jakes Construction

- 1x Excavator (350) is currently aiding Richco remove sediment stockpiled on the right bank downstream of the temporary bridge.
- Plan in place to divert flow into main channel on Monday (Dec 19).
- Jakes to demobilize machinery, leaving 1x Rock Truck and 1x Excavator (350).
- AE Field Engineer provided direction on bank restoration:
 - Contractor to match existing ground/grade at top of right bank and left bank of diversion channel.
 - Contractor to excavate main channel sediment as deep as needed to redivert flow.
 - Channel side slopes to maintain 1.5H:1V min. slope, preferred 2H:1V min. on inside corner.
 - Restored channel right bank height to be 1.5 m above rediverted channel invert.
 - Bucket compaction, max. 0.5 m particle size for material placed in restored bank.
 - Restored bank dimensions 4.0 m top width, 3H:1V fore slope and back slope.
 - Contractor to provide AE notice prior to construction of diversion, Field Engineer to be on site.
- Estimated total sediment removal progress = 100%
- Estimated diversion channel / bank restoration works progress = 90%

1.3 Environmental Monitoring

- Jenn (Aqua Silva) is monitoring the water levels and quality.
- Jenn expressed concerns with opening the diversion channel before all the sediment in the channel has been removed, Jakes now planning on diverting flow on Monday (Dec 19)

1.4 Archaeology / First Nations

- Woody debris will be collected and disposed further upstream near benched area.

2.0 Site Photograph



Figure 2-1
Richco - Washing Station



Figure 2-1
Richco - Excavator Exit Trail

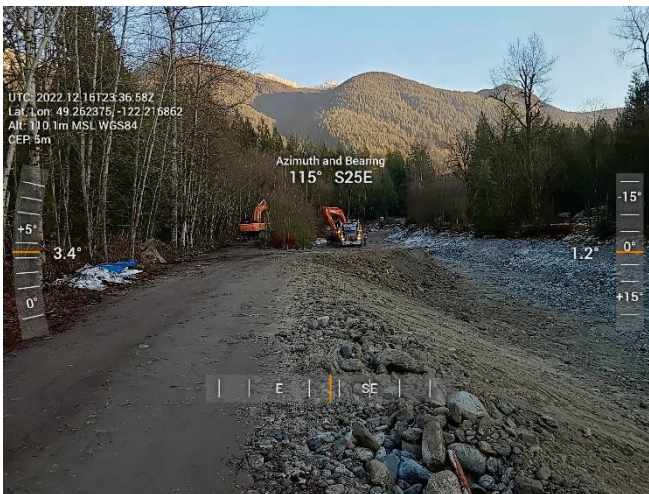


Figure 2-3
Richco/Jakes - Sediment Removal Progress



Figure 2-4
Richco/Jakes - Sediment Removal Progress



Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	18
Project:	Carratt Creek Emergency Works	Page:	1 of 2
Location:	Carratt Road, Fraser Valley, BC 49.262720, -122.217965	Project No.:	S-CR-28 2022-2632
Contractor:	Jakes Construction, Richco Contracting Ltd.	File No.:	
Contract:		Date:	December 17, 2022
Contract No.:		Temperature:	High: 6 Low: -1
Weather:	Overcast, Fog		

Labour Force: Jakes: 1x Safety Representative

Richco: 2x Excavator Operators (Foreman), 3x Truck Drivers, 2x Labourer

Contractor's Equipment:

Richco: 1x Hitachi 345 Excavator, 1x Hitachi 245 Excavator (Eng Pit),
3x Tandem Axle Dump Trucks, 1x Kubota SSV75 Wheel Loader (w/ Street Sweep), Watering station

1.0 Report:

- Arrived on site 9:30 AM.
- Jakes Construction foreman/operators not present on site, no work ongoing.
- Trevor Friedmann (AE) departed site at 1:00 PM.
- Jenn (Aqua Silva) and Rick (FN) on site from approximately 8:30 AM – 1:00 PM
- Richco Contracting end of day at approximately 1:30 PM.

1.1 Downstream Extents – Richco Contracting:

- Excavation of in-stream sediment deposition underway, loading tandem axle dump trucks (x3). No Jakes rock trucks operating. Richco intends to complete sediment removal by noon on Monday, Dec. 19th to allow for Jake's streamflow diversion upstream.
- Washing station is present at Eng Road.
- Gouge noted in Carratt Road bridge wooden surface. Cause of gouge unknown, to be further monitored.

The below estimates are based on % of total works that are complete (Channel centerline station used for estimate).

- Estimated total sediment removal progress = 95%. Based on % of total works that are complete (Channel centerline station used for estimate).
- Estimated HESCO basket progress = 95%.



HESCO Baskets to remain unfinished until diversion works has been completed

1.2 Upstream Extents – Jakes Construction

No progress occurred.

1.3 Environmental Monitoring

- Jenn (Aqua Silva) is monitoring the water levels and quality.

1.4 Archaeology / First Nations

- No additional concerns.

Site meeting to occur before upstream streamflow diversion, including Aqua Silva, Leq'á:mel, and Trevor Friedmann (AE).

2.0 Site Photograph



Figure 2-1
Richco - Sediment Removal Progress



Figure 2-1
Richco - Sediment Removal Progress



Figure 2-3
Gouge in Bridge Surface

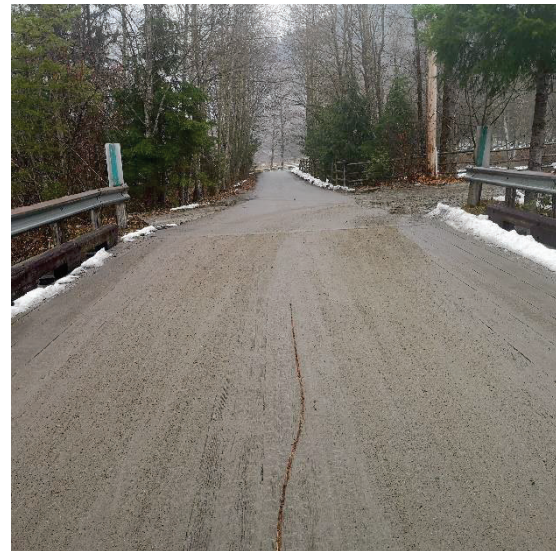


Figure 2-4
Gouge in Bridge Surface



Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	19
Project:	Carratt Creek Emergency Works	Page:	1 of 3
Location:	Carratt Road, Fraser Valley, BC 49.262720, -122.217965	Project No.:	S-CR-28 2022-2632
Contractor:	Jakes Construction, Richco Contracting Ltd.	File No.:	
Contract:		Date:	December 19, 2022
Contract No.:		Temperature:	High: 1 Low: -8
Weather:	Sunny, Fog		

Labour Force: Jakes: 1x Equipment Operators, 1x Safety Representative, 1x Foreman

Richco: 3x Excavator Operators (Foreman), 3x Truck Drivers, 2x Labourer

Contractor's Equipment: Jakes: 1x Hitachi 350 Excavator,

Richco: 1x Hitachi 345 Excavator, 1x Hitachi 245 Excavator (Eng Pit),

3x Tandem Axle Dump Trucks, 1x Kubota SSV75 Wheel Loader (w/ Street Sweep), Watering station

1.0 Report:

- Arrived on site 8:30 AM.
- Jakes Construction end of day at 2:30 PM.
- Hoyeon Lee (AE) departed site at 3:30 PM.
- Trevor (AE) on site
- Tina (FN), Rick (FN) and Jason (FN) on site from approx 8:30AM – 2:00PM
- Richco Contracting end of day at 4:00 PM.

1.1 Downstream Extents – Richco Contracting:

- AE to confirm entity responsible for excavation directly under Carratt Road Bridge (MOTI?).
- Contractor to remove stockpiled material directly downstream of Carratt Road Bridge tomorrow.
- Washing station is present at the entrance of pit.
- The below estimates are based on % of total works that are complete (Channel centerline station used for estimate). Does not account for interim progress.
- Estimated total sediment removal progress = 100%. Based on % of total works that are complete (Channel centerline station used for estimate), does not account for interim progress.



- Estimated HESCO basket progress = 100% (Complete)

1.2 Upstream Extents – Jakes Construction

- Site meeting with Leq'a mel, Associated Engineering, Aqua Silva and Jakes representatives.
- AE Field Engineer provided direction on bank restoration:
 - Contractor to match existing ground/grade at top of right bank and left bank of diversion channel.
 - Contractor to excavate main channel sediment as deep as needed to redirect flow.
 - Main channel to have continuous longitudinal slope.
 - Channel side slopes to maintain 1.5H:1V min. slope, preferred 2H:1V min. on inside corner.
 - Restored channel right bank height to be 1.5 m above redirected channel invert.
 - Bucket compaction, max. 0.5 m particle size for material placed in restored bank.
 - Restored bank dimensions 5.0 m top width, min. 2H:1V fore slope and min. 3H:1V back slope.
- Contractor removing large woody debris and depositing above high-water mark.
- Estimated total sediment removal progress = 100% (Complete)
- Estimated diversion channel / bank restoration works progress = 100% (Complete)

1.3 Environmental Monitoring

- Jenn (Aqua Silva) is monitoring the water levels and quality.
- Jenn expressed concerns with opening the diversion channel before all the sediment in the channel has been removed, Jakes now planning on diverting flow on Monday (Dec 19)

1.4 Archaeology / First Nations

- Woody debris will be collected and disposed further upstream near benched area.

2.0 Site Photograph

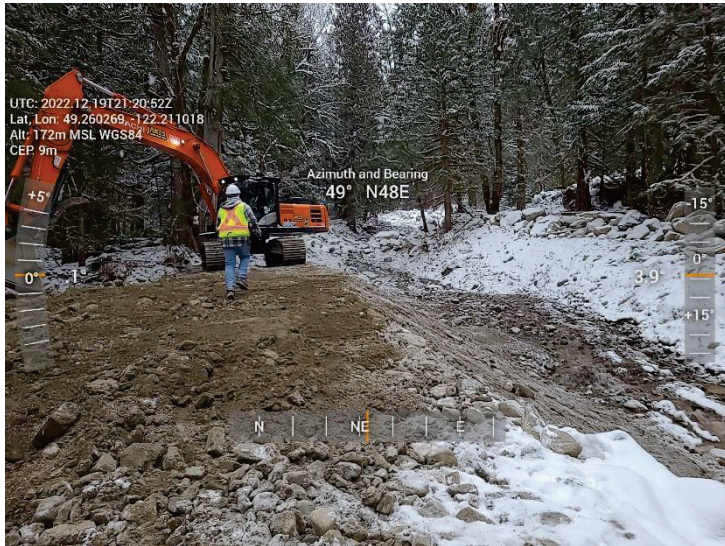


Figure 2-1
Jakes – Completion of Diversion Work



Figure 2-1
Richco – Completion of Sediment Removal



Figure 2-3
Richco – HESCO Baskets Progress



Figure 2-4
Richco- Completion of HESCO Baskets



Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	20
Project:	Carratt Creek Emergency Works	Page:	1 of 3
Location:	Carratt Road, Fraser Valley, BC 49.262720, -122.217965	Project No.:	S-CR-28 2022-2632
Contractor:	Richco Contracting Ltd.	File No.:	
Contract:		Date:	December 21, 2022
Contract No.:		Temperature:	High: 1 Low: -8
Weather:	Sunny, Fog		

Labour Force:

Richco: 1x Excavator Operators (Foreman), 1x Truck Drivers, 1x Labourer

Contractor's Equipment:

Richco: 1x Hitachi 345 Excavator,
1x Tandem Axle Dump Trucks, 1x Kubota SSV75 Wheel Loader (w/ Street Sweep)

1.0 Report:

- Arrived on site 8:30 AM.
- Hoyeon Lee (AE) departed site at 1:30 PM.
- Rick (FN) on site from approx 8:30AM – 1:30PM
- Richco Contracting end of day at 1:30 PM.

1.1 Downstream Extents – Richco Contracting:

- Contractor to remove stockpiled material directly downstream of Carratt Road Bridge.

1.2 Environmental Monitoring

- Jenn (Aqua Silva) is monitoring the water levels and quality.

No significant concerns

1.3 Archaeology / First Nations

No significant concerns

2.0 Site Photograph



Figure 2-1
Richco – Sediment Removal Progress



Figure 2-1
Richco – Sediment Removal Progress

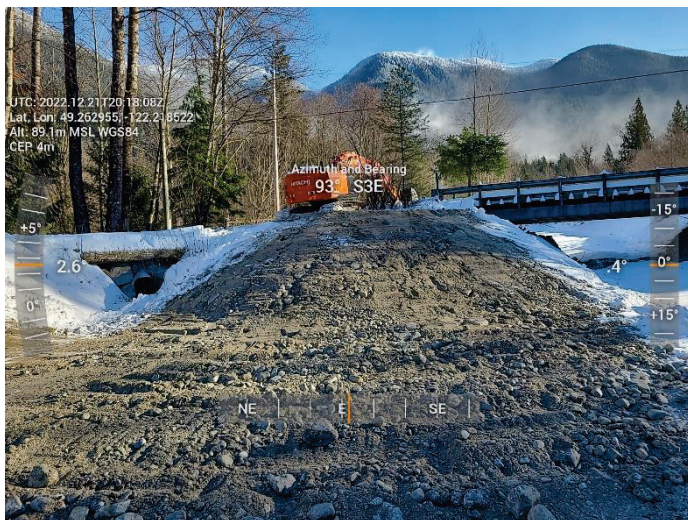


Figure 2-3
Richco – Completed Sediment Removal



Figure 2-4
Richco- Completed Sediment Removal



Richco CONTRACTING LTD.

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Environmental Inspection Report for Dec 10th, 2022

Project Name: Carratt Creek Flood Mitigation Works

Reporting Period: December 10th, 2022

Time of Day: All-day monitoring

Weather: 2; Rain; Snow on ground

Environmental Monitor: Jennifer Heldt, B. Env.

Client: Richco Contracting Ltd.

Date Submitted: December 10th, 2022

Submitted to: Rich Van Geel (rich@richco.ca)

AquaSilva Resource Management (AQS) is conducting Environmental Monitoring for the Carratt Creek Flood Mitigation Works to confirm compliance with regulatory requirements.

Monitoring activities include photo documentation, Environmental & ESC observations, observing potential impacts on fish/wildlife habitat, and observing all in-stream works.

Notes from December 10th, 2022:

- Works continued while marginal flows were observed infiltrating into the streambed approximately 100 meters downstream of the Carratt road bridge (ie not surficially connected downstream).
- Downstream observed a “dry channel” all the way to the confluence of Cascade Creek, resulting in no ability for turbid water to flow into Cascade Creek.
- Contractors continue to keep stream bypassing on the left bank (facing downstream).
- Marginal flows from Carratt Creek observed within Richco’s work site. Jakes has small flows surficially appearing in site for about 200 meters but infiltrates stream bed downstream.
- Richco continued to load trucks using the stock piles built up on the dry side of channel (right bank when facing downstream).
- Jakes continued to remove material and load rock trucks. Rock trucks were depositing loads into Richco's stockpile.
- Richco continued to install HESCO barrier baskets along path. Material removed from the stream bed was used to fill baskets.
- Upstream turbidity = 3.96 NTU; Downstream turbidity = 7.53 NTU
- Leaks and spills: A couple of oil drips were observed on the dike road. AQS informed Richco and advised to clean up as necessary.
- All machinery used in or near the stream channel were observed to be in good operating condition and free of leaks, excess oil and grease.
- Spill kits remain on-site in a readily accessible location for both contractors at all times during activities.
- The completed sections have a gentle slope towards the thalweg within the stream bed left in a reasonably smooth state with no depressions that could strand fish.
- All excavated material being removed from the site continues to be deposited at the Eng Pit.
- AQS visited Eng Pit and observed more knotweed in multiple locations. Richco was informed and is keeping machinery a minimum of 30 meters way from any knotweed observed.
- Machines and equipment are parked at the top of bank on the dike overnight.



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- Observed drip trays underneath machinery.
- No knotweed has been observed in Carratt Creek to date.

Action Items:

Current Status: Identified

Priority: High

Issue Description: Oil drips on dike road

Action Taken/Recommended: Continue to watch for spills. If a spill is identified, contact the AQS monitor and Mark at Richco, deploy spill pads, and clean up as necessary.

Date Identified: Dec 10th, 2022

Target Completion Date: Every day

Current Status: Identified

Priority: High

Issue Description: Knotweed at Eng Pit

Action Taken/Recommended: Continue to keep works a minimum of 30 meters away from all Knotweed identified.

Date Identified: Dec 10th, 2022

Target Completion Date: Every day

--

Jennifer Heldt, B.Env.

Environmental Technician

AquaSilva Resource Management Ltd.

Cell: 778-982-3180



PO Box 42
Fort Langley, B.C., V1M 2R4
Tel: 604-725-2914
Email: info@aqsrme.com

Environmental Monitoring Inspection Report for December 16th, 2022

Project Name:	Carratt Creek Flood Mitigation Works
Reporting Period:	December 16 th , 2022
Time of day:	All-day
Weather:	3°C; Clear
Environmental Monitor:	Jennifer Heldt, B.Env.
Report authored by:	Jennifer Heldt, B.Env.
Report reviewed by:	Patrick Ehnes, R.B.Tech, ASCT., BC-CESCL
Client:	Richco Contracting Ltd.
Date submitted:	Via email - December 16 th , 2022
Submitted to:	Rich Van Geel rich@richco.ca

AquaSilva Resource Management (AQS) is conducting Environmental Monitoring for the Carratt Creek Flood Mitigation Works to confirm compliance with provincial and federal regulatory requirements. Monitoring activities include photo documentation, Environmental & ESC observations, observing potential impacts on fish/wildlife habitat, and observing all in-stream works.

Environmental Monitoring (EM) and Erosion and Sediment Control (ESC) monitoring was conducted by AquaSilva Resource Management Ltd. (AQS) to confirm site compliance with provincial and federal requirements.

Acronyms:

AE	Associated Engineering Ltd.
BCWQG	British Columbia Water Quality Guidelines
CEMP	Construction Environmental Management Plan
DFO	Fisheries and Oceans Canada
EM	Environmental Monitor
EMP	Environmental Management Plan
FVRD	Fraser Valley Regional District
LFNM	Leq'á:mel First Nation Monitor
MOF	Ministry of Forest
MOT	Ministry of Transportation
RICHCO	Richco Contracting Ltd.
JAKES	Jakes Construction Ltd.

ENVIRONMENTAL MONITORING ACTIVITIES DURING THIS PERIOD

Environmental Monitoring Activity	Yes	No	Comments
In-situ Water Quality Testing	√		Turbidity samples were obtained directly upstream and downstream from the worksite.
Photo Documentation	√		Photographs of the works were taken.
Environmental & Erosion and Sediment Control Observations	√		• Marginal flows were observed infiltrating into the streambed approximately 200 meters upstream of Carratt Road Bridge (ie no surficial connection to downstream habitat). • A “dry channel” was observed from the site downstream to the confluence with Cascade Creek. • Richco - No flows observed in work site. • Jakes – Minimal flows observed beside site. However; infiltrates to ground approx. 10 metres upstream of where they were working. • Richco - continued to load trucks using temporary stockpiles located on the dry side of channel (right bank). • Jakes - continued to remove material and load trucks. Rock trucks were depositing loads into Richco’s temporary stockpile for transport. • Upon recent information being provided of known Japanese Knotweed at the Eng Pit site by AE, AE requested that EM conduct assessment of active site for Knotweed. No Knotweed was observed within Carratt Creek to date.
Site Isolation & Bypass Measures Implemented	√		• Channel flow is currently disconnected / flows terminate to ground downstream. • Flows within site diverted to left bank (facing downstream) to allow flows to bypass around worksite. • No bypass pumping and site isolation currently required today (ie meter bag dams or steel plates) • Water within the site terminates to ground.
Fish & amphibian salvages		√	• Channel dry, area scanned for potential amphibians, none observed, and no salvages required. • Fish fence installed at downstream end to prevent fish from entering work site. • No fish salvages required today due to dry channel.

Environmental Monitoring Activity	Yes	No	Comments
Invasive Species Management	√		- Japanese Knotweed (noxious weed) and Flowering Rush have been identified at the Eng Pit disposal site. Items outlined in revised CEMP and email from MoF to be followed. - Due to crew safety concerns, the wash station was moved further down Eng Road where no Knotweed or Flowering Rush was observed and no watercourses nearby.
Equipment/Vehicle Inspection and on-site storage	√		- All machinery used in or near the stream channel were observed to be in good operating condition and free of leaks, excess oil, and grease. - Drip trays not observed underneath parked Jakes machinery at end of day. - All machines and equipment are parked at the top of bank on the dike overnight in a stable location.
Visual Inspection for Contamination (Odour/staining)	√		No spills observed.
Dust Generation		√	No concerns observed.
Noise Monitoring		√	N/A
SPEA Integrity and Protection		√	N/A
Impacts on Habitat		√	Upon direction from AE, tree removal was required in order for equipment to access the channel at Station 1-020 on November 28 th , 2022 (see Figure 1).
Action Items	√		See table below.
Spill Kit Contents and Accessibility	√		Spill kits remain on-site in a readily accessible location for both contractors at all times during activities.
Garbage	√		Garbage is collected and stored on vehicles to avoid potential for encounters with wildlife.
Spill Response Procedures Posted	√		Within EMP & CEMP
Environmental Incidents Identified/Reported to EM or by EM		√	N/A
Fuelling procedures compliance check	√		All refueling occurred on the existing access dike road.
Complete CEOR with crews/contractors	√		CEOR for project has been reviewed with Richco and Jakes.

Water Quality Summary Data

Monitoring Location	Date	Turbidity (NTU)
(1) Upstream of Site (Background)	Dec 16 th , 2022	0.09 NTU & 1.17 NTU
(2) Downstream of Site	Dec 16 th , 2022	0.26 NTU & 0.62 NTU *Infiltrates to ground

Upcoming Activities

- Contractors to continue with instream works weather permitting.

Figures & Photographs

Photo 1. Richco loading haul trucks with temporary stockpile.



Photo 2. Jakes loading rock truck to be hauled to Richco's temporary stockpile.



Photo 3. New wash station location on Eng Road to clean off haul trucks after exiting Eng Pit.

Action Items Tracking Table

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
1	1	Resolved	H	Completion of Contractor Environmental Orientation and record provided	CEOR has been completed and forwarded to the Contractors for distribution.	Dec 01/22	Dec 13/22	Dec 13/22	N/A
2	2 & 3	Resolved	L	Environmental monitoring reporting	AQS has been providing daily reporting through field inspection memos.	Dec 01/22	Everyday	Dec 13/22	N/A
3	5	Resolved	L	ESC and site isolation	Stockpiles within creek or near creek are temporary and hauled off site within the same working day since the commencement of the works. If rain (and increased surface flow) is anticipated, the mitigation measure thus far has been the Contractors pulling their equipment out of the stream and either continuing to work from the top of bank while deploying suitable bypass measures to allow increased flows to move around	Dec 01/22	Dec 13/22	Dec 13/22	N/A

¹L = Low Priority, complete as time permits
M = Medium Priority, ongoing maintenance or complete within one week
H = High Priority, complete immediately

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					the worksite or pausing works until flows have subsided.				
4	10	Resolved	L	No waste containers or bear-proof bins onsite	There is no action item other than reiterating that the contractors have kept the site clean, and garbage is contained on vehicles to be taken away at the end of the day.	Dec 01/22	Everyday		Garbage cans are not kept onsite as garbage may attract animals and pose a risk to work crews. All workers are advised to keep garbage within their vehicles and dispose off-site daily.
5	13	Resolved	H	Leaking equipment	All parked trucks will be inspected for leaks and to ensure a drip tray is placed underneath and overnight for all vehicles and machines.	Dec 01/22	Everyday		Trucks have been inspected and leaking vehicles have been removed from the site resulting in no more oil drips observed. Drip trays should be placed underneath all vehicles and machines that are left on site overnight.
6	16 & 19	Resolved	H	Upstream fish passage maintained	Maintaining fish passage is not an option in a stream where it is currently evident that fish stranding can occur due to lower water conditions that are being encountered this year because of the late rains (i.e., sections of channel are dry). Any spawning activity is likely done now (Bull/dolly), and the	Dec 01/22	Dec 13/22	Dec 13/22	AQS staff are well aware of the "plan" to salvage fish when required. In the event a salvage is required, fish will not be relocated upstream from the site. Fish stranding locations are

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					presence of anadromous salmonids in this system is likely nil given the fact that Hayward Lake is not anadromous salmon habitat. Fisheries Act Conditions of Authorization #22-HPAC-01308, Section 2.4.2: "Fish passage is to be maintained around the isolated work zones through the implementation of a diversion channel where practicable. Sites with expected adult salmon presence with spawning and/or overwintering habitat upstream should be prioritized for a diversion channel. If a diversion channel is not practicable and fish are observed holding below the work zone, ongoing fish salvage is required to relocate fish around the work zone;"				very evident in this stream due to lower water conditions. All fish and amphibians salvaged will be re-located downstream to Cascade Creek where permanent flows are observed and into suitable habitat that provides depth for cover.
7	24	Resolved	H	Reporting of turbidity event	AQS has been conducting full-time monitoring since requested by the contractor.	Dec 01/22	Everyday	Nov 26/22	AQS was initially requested to complete part-time monitoring at Carratt Creek. Once AQS was informed of the requirement for full-time monitoring, an EM has been on site every day to

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
									complete daily reporting and documentation of any non-compliance items. AQS did conduct part-time monitoring that day @ 3:45PM: DS turbidity: 3.67 NTUs. Therefore, AQS cannot provide comment on "turbidity event". Please provide details on the background and downstream NTUs readings during this "turbidity event".
8	28	Resolved	H	Best Management Practices to prevent spread of invasive species	AE has requested the contractor have AQS revise CEMP to reflect the recent updated environmental assessment information provided by AE to include mitigation measures and BMPs to address invasive Japanese Knotweed that exists at Eng Pit. AE also advised contractor to have AQS conduct assessment: "When the QP completes the site assessment, particular care should be taken to thoroughly search the upper polygon where it abuts Eng Pit. If it is determined that knotweed is not		Dec 15/22	Dec 15/22	Upon this request, AQS has conducted an assessment at Eng Pit site and Japanese Knotweed exists at the site. AQS also observed works near the Eng Pit. No Knotweed was observed within the channel works area. Avoidance is the main mitigation to be applied. Further details of mitigation have been

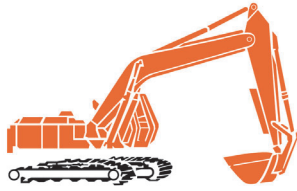
No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					present within 30m of the project polygons and machinery will be limited to the polygon boundaries, then no further invasive plant measures are needed on this site". AE also notes: "Just to be clear, the QP in this would be the Environmental Monitor. Our environmental staff did a survey of the site before the definitive work extents were known. Now that we understand the full footprint, it would be up to the Environmental Monitor (AquaSilva) to assess the site and try and locate any invasive species." Richco has requested clarification from AE: "The recommendation of in place Mechanisms and Protocols to prevent the spread of invasive species is this for Carratt Creek Exiting Vehicles or Eng Pit? Is another Monitor required to manually inspect trucks and machinery activities? I don't believe there has been any Invasive plants observed at Carratt only Eng Pit where Knotweed has been identified an area Cautioned off to prevent entry." AE to provide updated response to Richco for the above questions.			outlined in the revised AQS CEMP. Also note that the CEMP is revised to reflect knotweed conditions at the site and contractors have been notified by AE.	

**AQUA
SILVA** ESC Inspection Memo

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					Dianna from AE has advised Richco to set up a wash station at Eng Pit. A wash station was setup on Eng road. Every vehicle exiting Eng Pit is being washed down before leaving.				
9	N/A	Resolved	H	Relocation of portable toilet	Portable toilets located adjacent to streambank of Carratt Creek must be moved to a location that is at least 15m away from the top of the bank.	Dec 14/22	Dec 15/22	Dec 15/22	N/A
10	N/A	Resolved	H	AE to provide LFN inspection memos to Richco/Jakes/AQS	Discussed with Rick onsite today and LFN and AE agreed to provide Richco/Jakes/AE with daily inspection memos	Dec 14/22	Dec 14/22	Dec 14/22	Dianna (AE) provided LFN report to date. AE will also provide our reports to LFN for review (ie LFN will be included in daily memos email).
11	N/A	Identified	L		Upon direction from AE, tree removal was required in order for equipment to access the channel at Station 1-020 on November 28 th , 2022 (see Figure 1).	Nov 28/22			Per the AE EMP – “Exposed areas caused from access clearing will be recontoured and seeded with grass after construction.”
12	N/A	Resolved	H	Washing station location	Wash station was relocated well away from watercourse.	Dec 15/22	Dec 15/22	Dec 15/22	N/A
13	N/A	Identified	M	Drip trays not underneath parked machinery overnight	Drip trays should be placed underneath all machinery parked on the dike overnight.	Dec 16/22	Dec 16/22		Jakes did not put drip tray underneath the excavator before leaving for the day.

REFERENCES

Figure 1 – Design Drawing



Richco CONTRACTING LTD.

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Environmental Inspection Report for November 28th & 29th

Project Name: Carratt Creek Flood Mitigation Works

Reporting Period: November 28th and 29th

Time of Day: All-day monitoring

Weather: November 28th: -3 degrees; clear skies

November 29th: -2; cloudy & light snow

Environmental Monitor: Jennifer Heldt

Client: Richco Contracting Ltd.

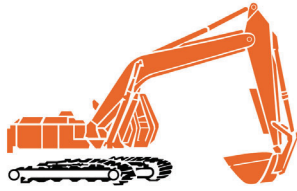
Date Submitted: November 30th, 2022

Submitted to: Rich Van Geel (rich@richco.ca)

AquaSilva Resource Management (AQS) is conducting Environmental Monitoring for the Carratt Creek Flood Mitigation Works to confirm compliance with regulatory requirements. Monitoring activities include photo documentation, Environmental & ESC observations, observing potential impacts on fish/wildlife habitat, and observing all in-stream works.

Notes from November 28th, 2022:

- Fish exclusion fencing installed on downstream side of works to prevent fish from entering site
- Works continue during marginal flows which infiltrate into stream bed approximately 100 meters downstream of the bridge. Downstream remains dry all the way to the confluence of Cascade creek, resulting in no turbid water entering
- Contractors continue to keep stream bypassing on the left bank (facing downstream) with minimal contact with flows (Downstream turbidity = 4.71 NTU)
- All machinery and equipment used in or near the stream channel are in good operating condition and free of leaks, excess oil and grease
- Spill containment kits are readily accessible on-site at both the lower and upper half of Carratt Creek
- Excavators are using environmentally sensitive hydraulic fluids
- All excavated material is being removed from the site and deposited at the Eng Pit
- Access to creek is from existing dike road, however, minor removal of trees is required in upper section where there is no dike road to access site
- Contractors continue to maintain cross sectional profile of watercourse (no over-excavation observed)
- Temporary Bailey bridge installed across creek to reduce impact during excavators crossing
- Richco continues to remove and haul material from the lower half of Carratt creek
- Jakes continue to stock pile sediment by debris jam in preparation to be removed the next day
- Informed by Jakes that they need to remove 5 immature Red Alders beside the debris jam in order for the machines to access the material needed to be removed
 - Tree #1 DBH = 31inch; Nesting survey performed: none observed
 - Tree #2 DBH = 25.1inch; Nesting survey performed: none observed
 - Tree #3 DBH = 31inch; Nesting survey performed: none observed
 - Tree #4 DBH = 19inch; Nesting survey performed: none observed
 - Tree #5 DBH = 20.5inch; Nesting survey performed: none observed



Richco CONTRACTING LTD.

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Notes from November 29th, 2022:

- Flows have receded approximately 50 meters further upstream from the previous day, reducing risk of turbid water entering downstream. No flows observed flowing into Cascade Creek
- Completed sections have been graded to prevent fish stranding
- Flows continue to be contained on left bank (facing downstream), allowing stream to bypass works
- Richco continues to work on removing sediment and loading haul trucks at lower section of Carratt Creek
- Jakes continues to remove sediment near debris jam and loading rock trucks
- Tina, Leq'a;mel First Nation monitor, informed AquaSilva of a possible leak occurring in Jakes equipment - was discussed during the morning meeting & operators continue to check that their machines are in good condition
- Drip trays were not being placed under machines overnight prior to today (made sure they were used this evening)
- Machines and equipment are parked at the top of bank overnight
- Upstream turbidity = 0.38 NTU & 1.02 NTU; Downstream turbidity = 2.05 NTU & 1.47 NTU

Action Items:

Current Status: Identified

Priority: High

Issue Description: Leaks observed by Tina, the Leq'a;mel First Nations monitor

Action Taken/Recommended: Continue to inspect machines and equipment daily to confirm they are in good condition. If any leak is identified, immediately shut off the machine, contain the leak, and clean up spill

Date Identified: Nov 29th

Target Completion Date: Every day

Current Status: Identified

Priority: Medium

Issue Description: Potential leak

Action Taken/Recommended: Install drip trays under machines overnight. If leak is found, repair immediately. Confirm with environmental monitor that leak has been repaired.

Date Identified: Nov 29th

Target Completion Date: Every time at the end of day

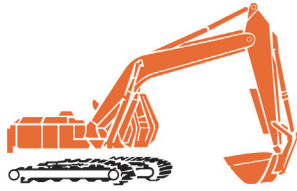
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Jennifer Heldt, B.Env.

Environmental Technician

AquaSilva Resource Management Ltd.

Cell: 778-982-3180



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Environmental Inspection Report for November 28th & 29th

Project Name: Carratt Creek Flood Mitigation Works

Reporting Period: November 28th and 29th

Time of Day: All-day monitoring

Weather: November 28th: -3 degrees; clear skies

November 29th: -2; cloudy & light snow

Environmental Monitor: Jennifer Heldt

Client: Richco Contracting Ltd.

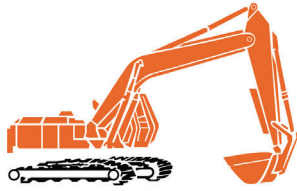
Date Submitted: November 30th, 2022

Submitted to: Rich Van Geel (rich@richco.ca)

AquaSilva Resource Management (AQS) is conducting Environmental Monitoring for the Carratt Creek Flood Mitigation Works to confirm compliance with regulatory requirements. Monitoring activities include photo documentation, Environmental & ESC observations, observing potential impacts on fish/wildlife habitat, and observing all in-stream works.

Notes from November 28th, 2022:

- Fish exclusion fencing installed on downstream side of works to prevent fish from entering site
- Works continue during marginal flows which infiltrate into stream bed approximately 100 meters downstream of the bridge. Downstream remains dry all the way to the confluence of Cascade creek, resulting in no turbid water entering
- Contractors continue to keep stream bypassing on the left bank (facing downstream) with minimal contact with flows (Downstream turbidity = 4.71 NTU)
- All machinery and equipment used in or near the stream channel are in good operating condition and free of leaks, excess oil and grease
- Spill containment kits are readily accessible on-site at both the lower and upper half of Carratt Creek
- Excavators are using environmentally sensitive hydraulic fluids
- All excavated material is being removed from the site and deposited at the Eng Pit
- Access to creek is from existing dike road, however, minor removal of trees is required in upper section where there is no dike road to access site
- Contractors continue to maintain cross sectional profile of watercourse (no over-excavation observed)
- Temporary Bailey bridge installed across creek to reduce impact during excavators crossing
- Richco continues to remove and haul material from the lower half of Carratt creek
- Jakes continue to stock pile sediment by debris jam in preparation to be removed the next day
- Informed by Jakes that they need to remove 5 immature Red Alders beside the debris jam in order for the machines to access the material needed to be removed
 - Tree #1 DBH = 31inch; Nesting survey performed: none observed
 - Tree #2 DBH = 25.1inch; Nesting survey performed: none observed
 - Tree #3 DBH = 31inch; Nesting survey performed: none observed
 - Tree #4 DBH = 19inch; Nesting survey performed: none observed
 - Tree #5 DBH = 20.5inch; Nesting survey performed: none observed



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Notes from November 29th, 2022:

- Flows have receded approximately 50 meters further upstream from the previous day, reducing risk of turbid water entering downstream. No flows observed flowing into Cascade Creek
- Completed sections have been graded to prevent fish stranding
- Flows continue to be contained on left bank (facing downstream), allowing stream to bypass works
- Richco continues to work on removing sediment and loading haul trucks at lower section of Carratt Creek
- Jakes continues to remove sediment near debris jam and loading rock trucks
- Tina, Leq'a;mel First Nation monitor, informed AquaSilva of a possible leak occurring in Jakes equipment - was discussed during the morning meeting & operators continue to check that their machines are in good condition
- Drip trays were not being placed under machines overnight prior to today (made sure they were used this evening)
- Machines and equipment are parked at the top of bank overnight
- Upstream turbidity = 0.38 NTU & 1.02 NTU; Downstream turbidity = 2.05 NTU & 1.47 NTU

Action Items:

Current Status: Identified

Priority: High

Issue Description: Leaks observed by Tina, the Leq'a;mel First Nations monitor

Action Taken/Recommended: Continue to inspect machines and equipment daily to confirm they are in good condition. If any leak is identified, immediately shut off the machine, contain the leak, and clean up spill

Date Identified: Nov 29th

Target Completion Date: Every day

Current Status: Identified

Priority: Medium

Issue Description: Potential leak

Action Taken/Recommended: Install drip trays under machines overnight. If leak is found, repair immediately. Confirm with environmental monitor that leak has been repaired.

Date Identified: Nov 29th

Target Completion Date: Every time at the end of day

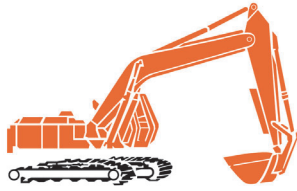
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Jennifer Heldt, B.Env.

Environmental Technician

AquaSilva Resource Management Ltd.

Cell: 778-982-3180



Richco CONTRACTING LTD.

25349 60th Avenue, Aldergrove B.C. V4W 1G9
Ph: (604) 856-8866 Fax: (604) 856-8834 admin@richco.ca

Environmental Inspection Report for December 1st, 2022

Project Name: Carratt Creek Flood Mitigation Works

Reporting Period: December 1st, 2022

Time of Day: All-day monitoring

Weather: -6; clear sky; snow on ground

Environmental Monitor: Jennifer Heldt, B. Env.

Client: Richco Contracting Ltd.

Date Submitted: December 1st, 2022

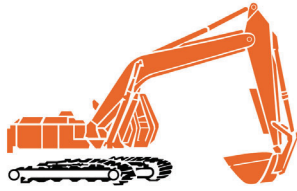
Submitted to: Rich Van Geel (rich@richco.ca)

AquaSilva Resource Management (AQS) is conducting Environmental Monitoring for the Carratt Creek Flood Mitigation Works to confirm compliance with regulatory requirements.

Monitoring activities include photo documentation, Environmental & ESC observations, observing potential impacts on fish/wildlife habitat, and observing all in-stream works.

Notes from December 1st, 2022:

- No work occurred on Nov 30th due to weather conditions (Heavy snowfall)
- Works continued while marginal flows were observed infiltrating into the streambed approximately 100 meters upstream of the Carratt road bridge (ie not surficially connected downstream)
- Downstream observed a “dry channel” all the way to the confluence of Cascade creek, resulting in no ability for turbid water to flow into Cascade Creek
- Contractors continue to keep stream bypassing on the left bank (facing downstream)
- No flows observed within Jakes work site
- Richco continued to load trucks using the stock piles built up on the dry side of channel (right bank when facing downstream)
- Jakes continued to remove stockpiles and load rock trucks. Rock trucks were depositing loads into Richco's stockpile
- Upstream turbidity = 0.95 NTU; Downstream turbidity = 0.12 NTU
- Continued to look for any signs of leaks or spills on site - none observed
- All machinery and equipment used in or near the stream channel are in good operating condition and free of leaks, excess oil and grease
- Spill kits remain on-site in a readily accessible location for both contractors at all times during activities
- All excavated material being removed from the site continues to be deposited at the Eng Pit
- AQS was informed by Richco that there are a few smaller trees that will need to be removed for the installation of a temporary HESCO barrier and redirecting Carratt Creek flows. Mark, from Richco, plans to show AQS the area that will be impacted and tree's that they want to remove tomorrow morning.



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- Mark from Richco informed AQS that they have enough drip trays for their own machines but not for Jakes. After speaking to Brent, from Jakes, they do not have drip trays on site, but they said they will be onsite by tomorrow.
- Machines and equipment are parked at the top of bank on the dike overnight
- Richco placed drip trays under machines for overnight
- All refuelling that is to occur, must occur on the existing dike road, or if capable, 30 metres away from the top of bank of the streams.

Action Items:

Current Status: Identified

Priority: High

Issue Description: Refueling machines and equipment

Action Taken/Recommended: Refueling must occur on dike road, or if capable, a minimum of 30 meters away from all streams

Date Identified: Dec 1st, 2022

Target Completion Date: Every day

Current Status: Identified

Priority: Medium

Issue Description: Drip trays under machines

Action Taken/Recommended: Stockpile of spill equipment and drip trays must be onsite, and must be deployed under machines while parked overnight

Date Identified: Dec 1st, 2022

Target Completion Date: Every time at the end of day

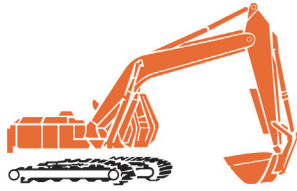
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Jennifer Heldt, B.Env.

Environmental Technician

AquaSilva Resource Management Ltd.

Cell: 778-982-3180



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Environmental Inspection Report for Dec 2nd, 2022

Project Name: Carratt Creek Flood Mitigation Works

Reporting Period: December 2nd, 2022

Time of Day: All-day monitoring

Weather: -5; overcast; snow on ground

Environmental Monitor: Jennifer Heldt, B. Env.

Client: Richco Contracting Ltd.

Date Submitted: December 2nd, 2022

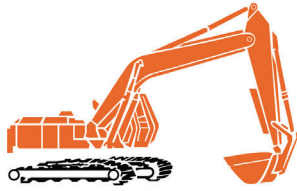
Submitted to: Rich Van Geel (rich@richco.ca)

AquaSilva Resource Management (AQS) is conducting Environmental Monitoring for the Carratt Creek Flood Mitigation Works to confirm compliance with regulatory requirements.

Monitoring activities include photo documentation, Environmental & ESC observations, observing potential impacts on fish/wildlife habitat, and observing all in-stream works.

Notes from December 2nd, 2022:

- Works continued working from where to where (are there some sort of ref stations or locations that you can refer to?) while marginal flows were observed infiltrating into the streambed approximately 300 meters upstream of the Carratt road bridge (ie not surficially connected downstream).
- Downstream observed a “dry channel” all the way to the confluence of Cascade creek, resulting in no ability for turbid water to flow into Cascade Creek.
- Contractors continue to keep stream bypassing on the left bank (facing downstream)
- No flows observed within Richco and Jakes work site. Both worked in “dry” conditions
- Richco continued to load trucks using the stock piles built up on the dry side of channel (right bank when facing downstream).
- Jakes continued to remove stockpiles and load rock trucks. Rock trucks were depositing loads into Richco's stockpile. Jakes begun creating a berm just downstream of debris jam and armouring banks per engineer design.
- Richco created a path within the “dry” avulsion channel for the HESCO barrier that is to be placed next week.
- For the preparation of the HESCO barrier path, nine tree's required removal. Richco tried to find an alternative access point, but based on upstream and downstream assessment, this location was the best viable option. Richco, AQS, and AE engineers came to the conclusion that this was the least intrusive location within the riparian area. No visible nests were observed within the trees. Fallen tree's were then scattered along the edges of the path to provide wildlife complexing within the riparian area. Tree's removed:
 - Tree #1= Western Red Cedar; DBH= 29.1; Nesting survey performed= none observed
 - Tree #2= Western Red Cedar; DBH= 24.0; Nesting survey performed= none observed
 - Tree #3= Western Red Cedar; DBH= 29.1; Nesting survey performed= none observed



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- Tree #4= Black Cottonwood; DBH= 25.5; Nesting survey performed= none observed
- Tree #5= Western Red Cedar; DBH= 26.0; Nesting survey performed= none observed
- Tree #6= Western Red Cedar; DBH= 21.2; Nesting survey performed= none observed
- Tree #7=Black Cottonwood; DBH= 30.6; Nesting survey performed= none observed
- Tree #8= Western Red Cedar; DBH= 21.2; Nesting survey performed= none observed
- Tree #9= Western Red Cedar; DBH=23.7; Nesting survey performed= none observed
- Upstream turbidity = 2.30 NTU; Downstream turbidity = 1.15 NTU
- Continued to look for any signs of leaks or spills on site - none observed
- All machinery and equipment used in or near the stream channel are in good operating condition and free of leaks, excess oil and grease
- Spill kits remain on-site in a readily accessible location for both contractors at all times during activities
- All excavated material being removed from the site continues to be deposited at the Eng Pit
- Machines and equipment are parked at the top of bank on the dike overnight and not below the top of bank
- Richco placed drip trays under machines for overnight. Jake's machines did not have drip trays underneath.
- All refuelling occurred on the existing dike road

Action Items:

Current Status: Identified

Priority: Medium

Issue Description: Drip trays under machines

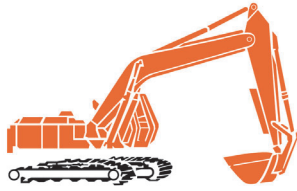
Action Taken/Recommended: Stockpile of spill equipment and drip trays must be onsite, and must be deployed under machines while parked overnight

Date Identified: Dec 2nd, 2022

Target Completion Date: Every time at the end of day

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Jennifer Heldt, B.Env.
Environmental Technician
AquaSilva Resource Management Ltd.
Cell: 778-982-3180



Richco CONTRACTING LTD.

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Ph: (604) 856-8866 Fax: (604) 856-8834 admin@richco.ca

Environmental Inspection Report for December 1st, 2022

Project Name: Carratt Creek Flood Mitigation Works

Reporting Period: December 1st, 2022

Time of Day: All-day monitoring

Weather: -6; clear sky; snow on ground

Environmental Monitor: Jennifer Heldt, B. Env.

Client: Richco Contracting Ltd.

Date Submitted: December 1st, 2022

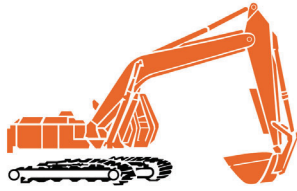
Submitted to: Rich Van Geel (rich@richco.ca)

AquaSilva Resource Management (AQS) is conducting Environmental Monitoring for the Carratt Creek Flood Mitigation Works to confirm compliance with regulatory requirements.

Monitoring activities include photo documentation, Environmental & ESC observations, observing potential impacts on fish/wildlife habitat, and observing all in-stream works.

Notes from December 1st, 2022:

- No work occurred on Nov 30th due to weather conditions (Heavy snowfall)
- Works continued while marginal flows were observed infiltrating into the streambed approximately 100 meters upstream of the Carratt road bridge (ie not surficially connected downstream)
- Downstream observed a “dry channel” all the way to the confluence of Cascade creek, resulting in no ability for turbid water to flow into Cascade Creek
- Contractors continue to keep stream bypassing on the left bank (facing downstream)
- No flows observed within Jakes work site
- Richco continued to load trucks using the stock piles built up on the dry side of channel (right bank when facing downstream)
- Jakes continued to remove stockpiles and load rock trucks. Rock trucks were depositing loads into Richco's stockpile
- Upstream turbidity = 0.95 NTU; Downstream turbidity = 0.12 NTU
- Continued to look for any signs of leaks or spills on site - none observed
- All machinery and equipment used in or near the stream channel are in good operating condition and free of leaks, excess oil and grease
- Spill kits remain on-site in a readily accessible location for both contractors at all times during activities
- All excavated material being removed from the site continues to be deposited at the Eng Pit
- AQS was informed by Richco that there are a few smaller trees that will need to be removed for the installation of a temporary HESCO barrier and redirecting Carratt Creek flows. Mark, from Richco, plans to show AQS the area that will be impacted and tree's that they want to remove tomorrow morning.



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- Mark from Richco informed AQS that they have enough drip trays for their own machines but not for Jakes. After speaking to Brent, from Jakes, they do not have drip trays on site, but they said they will be onsite by tomorrow.
- Machines and equipment are parked at the top of bank on the dike overnight
- Richco placed drip trays under machines for overnight
- All refuelling that is to occur, must occur on the existing dike road, or if capable, 30 metres away from the top of bank of the streams.

Action Items:

Current Status: Identified

Priority: High

Issue Description: Refueling machines and equipment

Action Taken/Recommended: Refueling must occur on dike road, or if capable, a minimum of 30 meters away from all streams

Date Identified: Dec 1st, 2022

Target Completion Date: Every day

Current Status: Identified

Priority: Medium

Issue Description: Drip trays under machines

Action Taken/Recommended: Stockpile of spill equipment and drip trays must be onsite, and must be deployed under machines while parked overnight

Date Identified: Dec 1st, 2022

Target Completion Date: Every time at the end of day

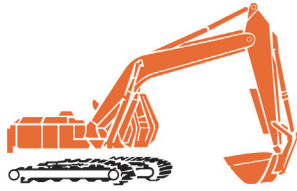
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Jennifer Heldt, B.Env.

Environmental Technician

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Environmental Inspection Report for Dec 2nd, 2022

Project Name: Carratt Creek Flood Mitigation Works

Reporting Period: December 2nd, 2022

Time of Day: All-day monitoring

Weather: -5; overcast; snow on ground

Environmental Monitor: Jennifer Heldt, B. Env.

Client: Richco Contracting Ltd.

Date Submitted: December 2nd, 2022

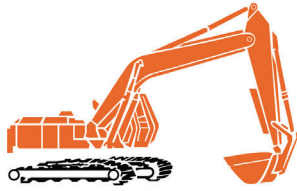
Submitted to: Rich Van Geel (rich@richco.ca)

AquaSilva Resource Management (AQS) is conducting Environmental Monitoring for the Carratt Creek Flood Mitigation Works to confirm compliance with regulatory requirements.

Monitoring activities include photo documentation, Environmental & ESC observations, observing potential impacts on fish/wildlife habitat, and observing all in-stream works.

Notes from December 2nd, 2022:

- Works continued working from where to where (are there some sort of ref stations or locations that you can refer to?) while marginal flows were observed infiltrating into the streambed approximately 300 meters upstream of the Carratt road bridge (ie not surficially connected downstream).
- Downstream observed a “dry channel” all the way to the confluence of Cascade creek, resulting in no ability for turbid water to flow into Cascade Creek.
- Contractors continue to keep stream bypassing on the left bank (facing downstream)
- No flows observed within Richco and Jakes work site. Both worked in “dry” conditions
- Richco continued to load trucks using the stock piles built up on the dry side of channel (right bank when facing downstream).
- Jakes continued to remove stockpiles and load rock trucks. Rock trucks were depositing loads into Richco's stockpile. Jakes begun creating a berm just downstream of debris jam and armouring banks per engineer design.
- Richco created a path within the “dry” avulsion channel for the HESCO barrier that is to be placed next week.
- For the preparation of the HESCO barrier path, nine tree's required removal. Richco tried to find an alternative access point, but based on upstream and downstream assessment, this location was the best viable option. Richco, AQS, and AE engineers came to the conclusion that this was the least intrusive location within the riparian area. No visible nests were observed within the trees. Fallen tree's were then scattered along the edges of the path to provide wildlife complexing within the riparian area. Tree's removed:
 - Tree #1= Western Red Cedar; DBH= 29.1; Nesting survey performed= none observed
 - Tree #2= Western Red Cedar; DBH= 24.0; Nesting survey performed= none observed
 - Tree #3= Western Red Cedar; DBH= 29.1; Nesting survey performed= none observed



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- Tree #4= Black Cottonwood; DBH= 25.5; Nesting survey performed= none observed
- Tree #5= Western Red Cedar; DBH= 26.0; Nesting survey performed= none observed
- Tree #6= Western Red Cedar; DBH= 21.2; Nesting survey performed= none observed
- Tree #7=Black Cottonwood; DBH= 30.6; Nesting survey performed= none observed
- Tree #8= Western Red Cedar; DBH= 21.2; Nesting survey performed= none observed
- Tree #9= Western Red Cedar; DBH=23.7; Nesting survey performed= none observed
- Upstream turbidity = 2.30 NTU; Downstream turbidity = 1.15 NTU
- Continued to look for any signs of leaks or spills on site - none observed
- All machinery and equipment used in or near the stream channel are in good operating condition and free of leaks, excess oil and grease
- Spill kits remain on-site in a readily accessible location for both contractors at all times during activities
- All excavated material being removed from the site continues to be deposited at the Eng Pit
- Machines and equipment are parked at the top of bank on the dike overnight and not below the top of bank
- Richco placed drip trays under machines for overnight. Jake's machines did not have drip trays underneath.
- All refuelling occurred on the existing dike road

Action Items:

Current Status: Identified

Priority: Medium

Issue Description: Drip trays under machines

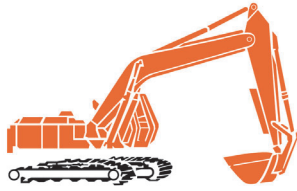
Action Taken/Recommended: Stockpile of spill equipment and drip trays must be onsite, and must be deployed under machines while parked overnight

Date Identified: Dec 2nd, 2022

Target Completion Date: Every time at the end of day

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Jennifer Heldt, B.Env.
Environmental Technician
AquaSilva Resource Management Ltd.
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Environmental Inspection Report for Dec 5th, 2022

Project Name: Carratt Creek Flood Mitigation Works

Reporting Period: December 5th, 2022

Time of Day: All-day monitoring

Weather: -4; overcast; snow on ground

Environmental Monitor: Jennifer Heldt, B. Env.

Client: Richco Contracting Ltd.

Date Submitted: December 5th, 2022

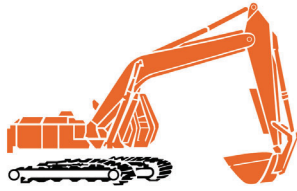
Submitted to: Rich Van Geel (rich@richco.ca)

AquaSilva Resource Management (AQS) is conducting Environmental Monitoring for the Carratt Creek Flood Mitigation Works to confirm compliance with regulatory requirements.

Monitoring activities include photo documentation, Environmental & ESC observations, observing potential impacts on fish/wildlife habitat, and observing all in-stream works.

Notes from December 5th, 2022:

- Works continued while marginal flows were observed infiltrating into the streambed approximately 300 meters upstream of the Carratt road bridge (ie not surficially connected downstream)
- Downstream observed a “dry channel” all the way to the confluence of Cascade creek, resulting in no ability for turbid water to flow into Cascade Creek
- Contractors continue to keep stream bypassing on the left bank (facing downstream)
- No flows observed within Richco and Jakes work site. Both worked in the “dry”
- Richco continued to load trucks using the stock piles built up on the dry side of channel (right bank when facing downstream)
- Mark from Richco continued to work on path for the HESCO barrier
- HESCO barrier to believed to be 225 feet long and will start installing on Wednesday (please see attached map file of path below)
- Jakes continued to remove stockpiles and load rock trucks. Rock trucks were depositing loads into Richco's stockpile. Jakes worked on a berm just downstream of debris jam and armouring banks.
- Upstream turbidity = 0.46 NTU; Downstream turbidity = 0.05 NTU
- Spoke with Mark from Richco about possible rainfall this week. If flows begin increasing, Richco will stay working at top of bank and removing material where there are no flows (all machinery will be operated from outside the wetted channel). A berm will be left between the bypass channel and where excavation is occurring
- Continued to look for any signs of leaks or spills on site - none observed
- All machinery and equipment used in or near the stream channel are in good operating condition and free of leaks, excess oil and grease



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- Spill kits remain on-site in a readily accessible location for both contractors at all times during activities
- The completed sections of the channel has a gentle “U” shape in the cross section with the stream bed left in a reasonably smooth state with no depressions that could strand fish
- Completed sections of the channel bottom maintains a gravel substrate – no fine-grained soils observed
- All excavated material being removed from the site continues to be deposited at the Eng Pit
- Machines and equipment are parked at the top of bank on the dike overnight
- Richco placed drip trays under machines for overnight. Jake’s machines did not have drip trays underneath – Brent (Jakes) ordered drip trays which should be onsite for tomorrow.
- All refuelling occurred on the existing dike road

Action Items:

Current Status: Identified

Priority: Medium

Issue Description: Drip trays under machines

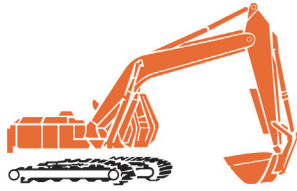
Action Taken/Recommended: Stockpile of spill equipment and drip trays must be onsite, and must be deployed under machines while parked overnight

Date Identified: Dec 5th, 2022

Target Completion Date: Every time at the end of day

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Jennifer Heldt, B.Env.
Environmental Technician
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Environmental Inspection Report for Dec 6th, 2022

Project Name: Carratt Creek Flood Mitigation Works

Reporting Period: December 6th, 2022

Time of Day: All-day monitoring

Weather: -3; rain; snow on ground

Environmental Monitor: Jennifer Heldt, B. Env.

Client: Richco Contracting Ltd.

Date Submitted: December 6th, 2022

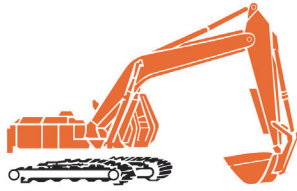
Submitted to: Rich Van Geel (rich@richco.ca)

AquaSilva Resource Management (AQS) is conducting Environmental Monitoring for the Carratt Creek Flood Mitigation Works to confirm compliance with regulatory requirements.

Monitoring activities include photo documentation, Environmental & ESC observations, observing potential impacts on fish/wildlife habitat, and observing all in-stream works.

Notes from December 6th, 2022:

- Works continued while marginal flows were observed infiltrating into the streambed approximately 300 meters upstream of the Carratt road bridge (ie not surficially connected downstream)
- Downstream observed a “dry channel” all the way to the confluence of Cascade creek, resulting in no ability for turbid water to flow into Cascade Creek
- Contractors continue to keep stream bypassing on the left bank (facing downstream)
- No flows observed within Richco and Jakes work site. Both worked in the “dry”
- Richco continued to load trucks using the stock piles built up on the dry side of channel (right bank when facing downstream)
- Jakes continued to remove material and load rock trucks. Rock trucks were depositing loads into Richco's stockpile. Jakes collected large rocks within stream bed and used to armour banks.
- More rock may be needed to armour banks. Advised Jakes and Richco to not retrieve material from Eng Pit due to invasive vegetation.
- Upstream turbidity = 0.30 NTU; Downstream turbidity = 0.28 NTU
- Continued to look for any signs of leaks or spills on site – multiple oil drips were observed along the dike road indicating they were coming from a haul truck. Richco and the truck drivers were informed. Absorbent pads were deployed on oil drips. Mark from Richco was advised to continue daily inspections of machines and equipment to determine where leak is and to immediately fix it.
- All machinery used in or near the stream channel are in good operating condition and free of leaks, excess oil and grease. At least one of the four haul trucks are not free of leaks.
- Spill kits remain on-site in a readily accessible location for both contractors at all times during activities



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- The completed sections of the channel has a gentle “U” shape in the cross section with the stream bed left in a reasonably smooth state with no depressions that could strand fish
- Completed sections of the channel bottom maintains a gravel substrate – no fine-grained soils observed
- Richco continues to clean off Carratt road of any mud/sand build up to prevent tracking onto roads
- Visited Eng Pit and observed stockpile location. Stockpile is observed to be in a stable location away from any streams.
- All excavated material being removed from the site continues to be deposited at the Eng Pit
- Machines and equipment are parked at the top of bank on the dike overnight
- Richco and Jakes placed drip trays under machines for overnight.
- All refuelling occurred on the existing dike road
- Mark from Richco informed AQS of more tree removal for HESCO barrier path occurring tomorrow. Area will be assessed tomorrow morning

Action Items:

Current Status: Identified

Priority: High

Issue Description: Oil drips on dike road

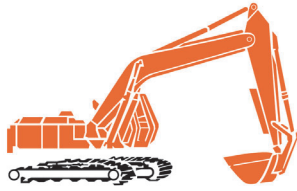
Action Taken/Recommended: Continue to inspect machines and equipment daily to confirm they are in good condition. If any leak is identified, immediately shut off the machine, contain the leak, and clean up spill

Date Identified: Dec 6th, 2022

Target Completion Date: Dec 7th, 2022

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Jennifer Heldt, B.Env.
Environmental Technician
AquaSilva Resource Management Ltd.
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Environmental Inspection Report for Dec 7th, 2022

Project Name: Carratt Creek Flood Mitigation Works

Reporting Period: December 7th, 2022

Time of Day: All-day monitoring

Weather: 1; light rain/cloud; snow on ground

Environmental Monitor: Jennifer Heldt, B. Env.

Client: Richco Contracting Ltd.

Date Submitted: December 7th, 2022

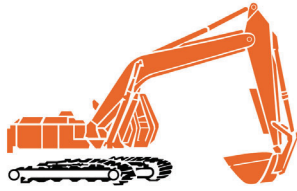
Submitted to: Rich Van Geel (rich@richco.ca)

AquaSilva Resource Management (AQS) is conducting Environmental Monitoring for the Carratt Creek Flood Mitigation Works to confirm compliance with regulatory requirements.

Monitoring activities include photo documentation, Environmental & ESC observations, observing potential impacts on fish/wildlife habitat, and observing all in-stream works.

Notes from December 7th, 2022:

- Works continued while marginal flows were observed infiltrating into the streambed approximately 300 meters upstream of the Carratt road bridge (ie not surficially connected downstream)
- Downstream observed a “dry channel” all the way to the confluence of Cascade creek, resulting in no ability for turbid water to flow into Cascade Creek
- Contractors continue to keep stream bypassing on the left bank (facing downstream)
- No flows from Carratt creek observed within Richco’s work site. Jakes has small flows surficially appearing in site for about 100 meters but infiltrates stream bed downstream.
- Richco continued to load trucks using the stock piles built up on the dry side of channel (right bank when facing downstream)
- Jakes continued to remove material and load rock trucks. Rock trucks were depositing loads into Richco's stockpile. Jakes collected large rocks within stream bed and used to armour banks.
- HESCO barrier path was extended further North by direction of AE engineers. Richco, AE engineers and AQS located a route of least impact within the forest. Richco tried to find a path to avoid trees, especially mature coniferous trees. In the process seven tree’s were removed. Most of this vegetation had severe root damage due to flows & material washed through the forest.
 - Tree #1= Western Red Cedar was fallen over and leaning across path. Bird nest survey completed-none observed. DBH= 15.3
 - Tree #2= Big Leaf Maple. Bird nest survey completed-none observed. DBH= 61.8
 - Tree #3= Western Red Cedar. Tree was damaged and leaning over across the path. Bird nest survey completed-none observed. DBH= 16.5
 - Tree #4= Western Red Cedar. Bird nest survey completed-none observed. DBH= 15.5
 - Tree #5= Unknown snag. Snag was rotten and unstable. Bird nest survey completed-none observed. DBH= 25.3
 - Tree #6= Western Red Cedar. Bird nest survey completed-none observed. DBH= 25.3



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- Tree #7= Big Leaf Maple snag. Snag was unstable and leaning over path. Bird nest survey completed-none observed. DBH= 26.7
- HESCO barrier baskets have begun being placed along path. Stream material pushed through forest was used to fill baskets.
- Upstream turbidity = 0.53 NTU; Downstream turbidity = 0.30 NTU
- Continued to look for any signs of leaks or spills on site – multiple oil drips were observed along the dike road indicating they were coming from a haul truck. Richco and the truck drivers were informed. Mark from Richco was advised to continue daily inspections of machines and equipment to determine where leak is and to immediately fix it. He was also advised to remove any oil drips from site. Truck with leak was identified and removed from site. No crew member from Richco was observed cleaning up drips on dike.
- All machinery used in or near the stream channel are in good operating condition and free of leaks, excess oil and grease. At least one of the four haul trucks are not free of leaks.
- Spill kits remain on-site in a readily accessible location for both contractors at all times during activities
- The completed sections of the channel has a gentle “U” shape in the cross section with the stream bed left in a reasonably smooth state with no depressions that could strand fish
- Completed sections of the channel bottom maintains a gravel substrate – no fine-grained soils observed
- All excavated material being removed from the site continues to be deposited at the Eng Pit
- Machines and equipment are parked at the top of bank on the dike overnight

Action Items:

Current Status: Identified

Priority: High

Issue Description: Oil drips on dike road

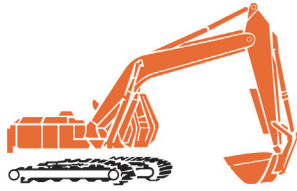
Action Taken/Recommended: Continue to inspect machines and equipment daily to confirm they are in good condition. If any leak is identified, immediately shut off the machine, contain the leak, and clean up spill

Date Identified: Dec 7th, 2022

Target Completion Date: Dec 8th, 2022

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Jennifer Heldt, B.Env.
Environmental Technician
AquaSilva Resource Management Ltd.
Cell: 778-982-3180



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Environmental Inspection Report for Dec 8th, 2022

Project Name: Carratt Creek Flood Mitigation Works

Reporting Period: December 8th, 2022

Time of Day: All-day monitoring

Weather: 2; Rain; Snow on ground

Environmental Monitor: Jennifer Heldt, B. Env.

Client: Richco Contracting Ltd.

Date Submitted: December 8th, 2022

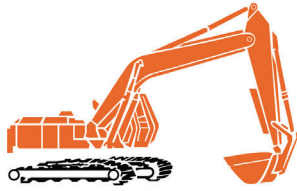
Submitted to: Rich Van Geel (rich@richco.ca)

AquaSilva Resource Management (AQS) is conducting Environmental Monitoring for the Carratt Creek Flood Mitigation Works to confirm compliance with regulatory requirements.

Monitoring activities include photo documentation, Environmental & ESC observations, observing potential impacts on fish/wildlife habitat, and observing all in-stream works.

Notes from December 8th, 2022:

- Works continued while marginal flows were observed infiltrating into the streambed approximately 300 meters upstream of the Carratt road bridge (ie not surficially connected downstream).
- Downstream observed a “dry channel” all the way to the confluence of Cascade Creek, resulting in no ability for turbid water to flow into Cascade Creek.
- Contractors continue to keep stream bypassing on the left bank (facing downstream).
- No flows from Carratt Creek observed within Richco’s work site. Jakes has small flows surficially appearing in site for about 100 meters but infiltrates stream bed downstream.
- Richco continued to load trucks using the stock piles built up on the dry side of channel (right bank when facing downstream).
- Jakes continued to remove material and load rock trucks. Rock trucks were depositing loads into Richco's stockpile. Jakes collected large rocks within stream bed and used to armour banks.
- Richco continued to install HESCO barrier baskets along path. Material removed from the stream bed was used to fill baskets.
- Upstream turbidity = 0.25 NTU; Downstream turbidity = 0.49 NTU
- Leaks and spills: Oil drips on dike road were collected and removed from site by Richco. Richco informed AQS that only leak-free trucks were requested to the dispatcher and were informed that future trucks will have a drip catch tray beneath trucks.
- All machinery used in or near the stream channel were observed to be in good operating condition and free of leaks, excess oil and grease.
- Spill kits remain on-site in a readily accessible location for both contractors at all times during activities.
- The completed sections have a gentle slope towards the thalweg within the stream bed left in a reasonably smooth state with no depressions that could strand fish.
- Completed sections of the stream bed observed to maintain the gravel substrate.
- All excavated material being removed from the site continues to be deposited at the Eng Pit.



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- Machines and equipment are parked at the top of bank on the dike overnight.

Action Items:

Current Status: Identified

Priority: High

Issue Description: Oil drips on dike road

Action Taken/Recommended: Continue to watch for spills. If a spill is identified, contact the AQS monitor and Mark at Richco, deploy spill pads, and clean up as necessary.

Date Identified: Dec 8th, 2022

Target Completion Date: Every day

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Jennifer Heldt, B.Env.
Environmental Technician
AquaSilva Resource Management Ltd.
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Environmental Inspection Report for Dec 9th, 2022

Project Name: Carratt Creek Flood Mitigation Works

Reporting Period: December 9th, 2022

Time of Day: All-day monitoring

Weather: 2; Cloudy; Snow on ground

Environmental Monitor: Jennifer Heldt, B. Env.

Client: Richco Contracting Ltd.

Date Submitted: December 9th, 2022

Submitted to: Rich Van Geel (rich@richco.ca)

AquaSilva Resource Management (AQS) is conducting Environmental Monitoring for the Carratt Creek Flood Mitigation Works to confirm compliance with regulatory requirements.

Monitoring activities include photo documentation, Environmental & ESC observations, observing potential impacts on fish/wildlife habitat, and observing all in-stream works.

Notes from December 9th, 2022:

- Works continued while marginal flows were observed infiltrating into the streambed approximately 300 meters upstream of the Carratt road bridge (ie not surficially connected downstream).
- Downstream observed a “dry channel” all the way to the confluence of Cascade Creek, resulting in no ability for turbid water to flow into Cascade Creek.
- Contractors continue to keep stream bypassing on the left bank (facing downstream).
- No flows from Carratt Creek observed within Richco’s work site. Jakes has small flows surficially appearing in site for about 100 meters but infiltrates stream bed downstream.
- Richco continued to load trucks using the stock piles built up on the dry side of channel (right bank when facing downstream).
- Jakes continued to remove material and load rock trucks. Rock trucks were depositing loads into Richco's stockpile. Jakes collected large rocks within stream bed and used to armour banks.
- Richco continued to install HESCO barrier baskets along path. Material removed from the stream bed was used to fill baskets.
- Upstream turbidity = 0.79 NTU; Downstream turbidity = 0.14 NTU
- Leaks and spills: A few oil drips were observed on the dike road. AQS informed Richco and advised to deploy spill pads and clean up as necessary.
- All machinery used in or near the stream channel was observed to be in good operating condition and free of leaks, excess oil and grease.
- Spill kits remain on-site in a readily accessible location for both contractors at all times during activities.
- The completed sections have a gentle slope towards the thalweg within the stream bed left in a reasonably smooth state with no depressions that could strand fish.
- All excavated material being removed from the site continues to be deposited at the Eng Pit.
- AQS observed knotweed at the Eng Pit in multiple locations. Richco was informed and is keeping machinery a minimum of 30 meters away from any knotweed found. Flagging and caution tape was used to keep crew aware and away from contaminated areas.
- No knotweed has been observed in Carratt Creek to date.



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Action Items:

Current Status: Identified

Priority: High

Issue Description: Oil drips on dike road

Action Taken/Recommended: Continue to watch for spills. If a spill is identified, contact the AQS monitor and Mark at Richco, deploy spill pads, and clean up as necessary.

Date Identified: Dec 9th, 2022

Target Completion Date: Every day

Current Status: Identified

Priority: High

Issue Description: Knotweed at Eng Pit

Action Taken/Recommended: Continue to keep works a minimum of 30 meters away from all Knotweed identified.

Date Identified: Dec 9th, 2022

Target Completion Date: Every day

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Jennifer Heldt, B.Env.

Environmental Technician

AquaSilva Resource Management Ltd.

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Environmental Monitoring Inspection Report for December 13th, 2022

Project Name:	Carratt Creek Flood Mitigation Works
Reporting Period:	December 13 th , 2022
Time of day:	All-day
Weather:	1°C; Cloudy
Environmental Monitor:	Jennifer Heldt, B.Env.
Report authored by:	Jennifer Heldt, B.Env.
Report reviewed by:	Patrick Ehnes, R.B.Tech, ASCT., BC-CESCL
Client:	Richco Contracting Ltd.
Date submitted:	Via email - December 14 th , 2022
Submitted to:	Rich Van Geel rich@richco.ca

AquaSilva Resource Management (AQS) is conducting Environmental Monitoring for the Carratt Creek Flood Mitigation Works to confirm compliance with provincial and federal regulatory requirements. Monitoring activities include photo documentation, Environmental & ESC observations, observing potential impacts on fish/wildlife habitat, and observing all in-stream works.

Environmental Monitoring (EM) and Erosion and Sediment Control (ESC) monitoring was conducted by AquaSilva Resource Management Ltd. (AQS) to confirm site compliance with provincial and federal requirements.

Acronyms:

AE	Associated Engineering Ltd.
BCWQG	British Columbia Water Quality Guidelines
CEMP	Construction Environmental Management Plan
DFO	Fisheries and Oceans Canada
EM	Environmental Monitor
EMP	Environmental Management Plan
FVRD	Fraser Valley Regional District
LFNM	Leq'á:mel First Nation Monitor
MOF	Ministry of Forest
MOT	Ministry of Transportation
RICHCO	Richco Contracting Ltd.
JAKES	Jakes Construction Ltd.

ENVIRONMENTAL MONITORING ACTIVITIES DURING THIS PERIOD

Environmental Monitoring Activity	Yes	No	Comments
In-situ Water Quality Testing	√		Turbidity samples were obtained directly upstream and downstream from the worksite.
Photo Documentation	√		Photographs of the works were taken.
Environmental & Erosion and Sediment Control Observations	√		• Marginal flows were observed infiltrating into the streambed approximately 200 meters upstream of Carratt Road Bridge (ie no surficial connection to downstream habitat). • A “dry channel” was observed from the site downstream to the confluence with Cascade Creek. • Richco - No flows observed in work site. • Jakes – Minimal flows observed within site. However; infiltrates to ground approx. 150 metres downstream. • Richco - continued to load trucks using temporary stockpiles located on the dry side of channel (right bank). • Jakes - continued to remove material and load trucks. Rock trucks were depositing loads into Richco’s temporary stockpile for transport. • Channel profile sloped to centre and thalweg to eliminate depressions and potential for fish stranding. • Upon recent information being provided of known Japanese Knotweed at the Eng Pit site by AE, AE requested that EM conduct assessment of active site for Knotweed. No Knotweed was observed within Carratt Creek to date.
Site Isolation & Bypass Measures Implemented	√		• Channel flow is currently disconnected / flows terminate to ground downstream. • Flows within site diverted to left bank (facing downstream) to allow flows to bypass around worksite. • No bypass pumping and site isolation currently required (ie meter bag dams or steel plates) • Sediment laden water within the site terminates to ground.
Fish & amphibian salvages		√	• Channel dry, area scanned for potential amphibians, none observed, and no salvages required.

Environmental Monitoring Activity	Yes	No	Comments
			- Fish fence installed at downstream end to prevent fish from entering work site. - No fish salvages required today due to dry channel.
Invasive Species Management			Japanese Knotweed (noxious weed) and Floowering Rush have been identified at the Eng Pit disposal site.
Equipment/Vehicle Inspection and on-site storage	√		- All machinery used in or near the stream channel were observed to be in good operating condition and free of leaks, excess oil, and grease. - Drip trays observed underneath parked machinery at end of day. - All machines and equipment are parked at the top of bank on the dike overnight in a stable location.
Visual Inspection for Contamination (Odour/staining)	√		No spills observed.
Dust Generation		√	No concerns observed.
Noise Monitoring		√	N/A
SPEA Integrity and Protection	√		Upon direction from AE, tree removal was required in order for equipment to access the channel at Station 1-020 (see Figure 1).
Impacts on Habitat	√		Tree removals required in order to access a section of site at about Station 1-700. Trees must be replaced per conditions outlined in the environmental impact assessment, and regulatory approval.
Action Items	√		See table below.
Spill Kit Contents and Accessibility	√		Spill kits remain on-site in a readily accessible location for both contractors at all times during activities.
Garbage	√		Garbage is collected and stored on vehicles to avoid potential for encounters with wildlife.
Spill Response Procedures Posted	√		Within EMP & CEMP
Environmental Incidents Identified/Reported to EM or by EM		√	N/A
Fuelling procedures compliance check	√		All refueling occurred on the existing access dike road.
Complete CEOR with crews/contractors	√		CEOR for project has been reviewed with Richco and Jakes.

Water Quality Summary Data

Monitoring Location	Date	Turbidity (NTU)
(1) Upstream of Site (Background)	Dec 13 th , 2022	0.23 NTU
(2) Downstream of Site	Dec 13 th , 2022	1.69 NTU

Upcoming Activities

- Contractors to continue with instream works weather permitting.

Figures & Photographs

Photo 1. Upstream view; dry channel.



Photo 2. Drip trays underneath machinery.



Photo 3. Machinery parked on top of bank along dike road overnight.

Action Items Tracking Table

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
1	1	Resolved	H	Completion of Contractor Environmental Orientation and record provided	CEOR has been completed and forwarded to the Contractors for distribution.	Dec 01/22	Dec 13/22	Dec 13/22	N/A
2	2 & 3	Resolved	L	Environmental monitoring reporting	AQS has been providing daily reporting through field inspection memos.	Dec 01/22	Everyday	Dec 13/22	N/A
3	5	Resolved	L	ESC and site isolation	Stockpiles within creek or near creek are temporary and hauled off site within the same working day since the commencement of the works. If rain (and increased surface flow) is anticipated, the mitigation measure thus far has been the Contractors pulling their equipment out of the stream and either continuing to work from the top of bank while deploying suitable bypass measures to allow increased flows to move around the worksite or pausing works until flows have subsided.	Dec 01/22	Dec 13/22	Dec 13/22	N/A

¹L = Low Priority, complete as time permits
M = Medium Priority, ongoing maintenance or complete within one week
H = High Priority, complete immediately

4	10	Identified	L	No waste containers or bear-proof bins onsite	There is no action item other than reiterating that the contractors have kept the site clean, and garbage is contained on vehicles to be taken away at the end of the day.	Dec 01/22	Everyday		Garbage cans are not kept onsite as garbage may attract animals and pose a risk to work crews. All workers are advised to keep garbage within their vehicles and dispose off-site daily.
5	13	Resolved	H	Leaking equipment	All parked trucks will be inspected for leaks and to ensure a drip tray is placed underneath and overnight for all vehicles and machines.	Dec 01/22	Everyday		Trucks have been inspected and leaking vehicles have been removed from the site resulting in no more oil drips observed. Drip trays are placed underneath all vehicles and machines that are left on site overnight.
6	16 & 19	Resolved	H	Upstream fish passage maintained	Maintaining fish passage is not an option in a stream where it is currently evident that fish stranding can occur due to lower water conditions that are being encountered this year because of the late rains (i.e., sections of channel are dry). Any spawning activity is likely done now (Bull/dolly), and the presence of anadromous salmonids in this system is likely nil given the fact that Hayward Lake is not anadromous salmon habitat. Fisheries Act Conditions of Authorization #22-HPAC-01308, Section 2.4.2: "Fish passage is to be maintained around the isolated work zones through the implementation of a diversion channel	Dec 01/22	Dec 13/22	Dec 13/22	AQS staff are well aware of the "plan" to salvage fish when required. In the event a salvage is required, fish will not be relocated upstream from the site. Fish stranding locations are very evident in this stream due to lower water conditions. All fish and amphibians salvaged will be re-located downstream to Cascade Creek where permanent flows are observed and into suitable

					where practicable. Sites with expected adult salmon presence with spawning and/or overwintering habitat upstream should be prioritized for a diversion channel. If a diversion channel is not practicable and fish are observed holding below the work zone, ongoing fish salvage is required to relocate fish around the work zone;”.					habitat that provides depth for cover.
7	24	Resolved	H	Reporting of turbidity event	AQS has been conducting full-time monitoring since requested by the contractor.	Dec 01/22	Everyday	Nov 26/22	AQS was initially requested to complete part-time monitoring at Carratt Creek. Once AQS was informed of the requirement for full-time monitoring, an EM has been on site every day to complete daily reporting and documentation of any non-compliance items. AQS did conduct part-time monitoring that day @ 3:45PM: DS turbidity: 3.67 NTUs. Therefore, AQS cannot provide comment on “turbidity event”.	Please provide details on the background and downstream NTUs readings during this “turbidity event”.
8	28	Identified	H	Best Management Practices to prevent	AE has requested the contractor have AQS revise CEMP to reflect the recent updated environmental				Upon this request, AQS has conducted an assessment at	

					assessment information provided by AE to include mitigation measures and BMPs to address invasive Japanese Knotweed that exists at Eng Pit. AE also advised contractor to have AQS conduct assessment: “When the QP completes the site assessment, particular care should be taken to thoroughly search the upper polygon where it abuts Eng Pit. If it is determined that knotweed is not present within 30m of the project polygons and machinery will be limited to the polygon boundaries, then no further invasive plant measures are needed on this site”. AE also notes: “Just to be clear, the QP in this would be the Environmental Monitor. Our environmental staff did a survey of the site before the definitive work extents were known. Now that we understand the full footprint, it would be up to the Environmental Monitor (AquaSilva) to assess the site and try and locate any invasive species.” Richco has requested clarification from AE: “The recommendation of in place Mechanisms and Protocols to prevent the spread of invasive species is this for Carratt Creek Exiting Vehicles or Eng Pit? Is another Monitor required to manually inspect trucks and machinery activities? I don’t believe there has been any Invasive plants observed at Carratt only Eng Pit where Knotweed has been identified an area Cautioned off to prevent entry.” AE to provide updated response to Richco.				Eng Pit site and Japanese Knotweed exists at the site. AQS also observed works near the Eng Pit. No Knotweed was observed within the channel works area. Avoidance is the main mitigation to be applied. Further details of mitigation have been outlined in the revised AQS CEMP. Also note that the CEMP is being revised to reflect knotweed conditions at the site and contractors have been notified by AE.
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REFERENCES

Figure 1 – Design Drawing



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Email: info@aqsrme.com

Environmental Monitoring Inspection Report for December 14th, 2022

Project Name:	Carratt Creek Flood Mitigation Works
Reporting Period:	December 14 th , 2022
Time of day:	All-day
Weather:	2°C; Clear
Environmental Monitor:	Jennifer Heldt, B.Env.
Report authored by:	Jennifer Heldt, B.Env.
Report reviewed by:	Patrick Ehnes, R.B.Tech, ASCT., BC-CESCL
Client:	Richco Contracting Ltd.
Date submitted:	Via email - December 14 th , 2022
Submitted to:	Rich Van Geel rich@richco.ca

AquaSilva Resource Management (AQS) is conducting Environmental Monitoring for the Carratt Creek Flood Mitigation Works to confirm compliance with provincial and federal regulatory requirements. Monitoring activities include photo documentation, Environmental & ESC observations, observing potential impacts on fish/wildlife habitat, and observing all in-stream works.

Environmental Monitoring (EM) and Erosion and Sediment Control (ESC) monitoring was conducted by AquaSilva Resource Management Ltd. (AQS) to confirm site compliance with provincial and federal requirements.

Acronyms:

AE	Associated Engineering Ltd.
BCWQG	British Columbia Water Quality Guidelines
CEMP	Construction Environmental Management Plan
DFO	Fisheries and Oceans Canada
EM	Environmental Monitor
EMP	Environmental Management Plan
FVRD	Fraser Valley Regional District
LFNM	Leq'á:mel First Nation Monitor
MOF	Ministry of Forest
MOT	Ministry of Transportation
RICHCO	Richco Contracting Ltd.
JAKES	Jakes Construction Ltd.

ENVIRONMENTAL MONITORING ACTIVITIES DURING THIS PERIOD

Environmental Monitoring Activity	Yes	No	Comments
In-situ Water Quality Testing	√		Turbidity samples were obtained directly upstream and downstream from the worksite.
Photo Documentation	√		Photographs of the works were taken.
Environmental & Erosion and Sediment Control Observations	√		• Marginal flows were observed infiltrating into the streambed approximately 200 meters upstream of Carratt Road Bridge (ie no surficial connection to downstream habitat). • A “dry channel” was observed from the site downstream to the confluence with Cascade Creek. • Richco - No flows observed in work site. • Jakes – Minimal flows observed within site. However; infiltrates to ground approx. 100 metres downstream. • Richco - continued to load trucks using temporary stockpiles located on the dry side of channel (right bank). • Jakes - continued to remove material and load trucks. Rock trucks were depositing loads into Richco’s temporary stockpile for transport. Banks were continued to be armoured. Jakes continued preparation for redirecting surface flows into Carratt Creek. • Channel profile sloped to centre and thalweg to eliminate depressions and potential for fish stranding. • Upon recent information being provided of known Japanese Knotweed at the Eng Pit site by AE, AE requested that EM conduct assessment of active site for Knotweed. No Knotweed was observed within Carratt Creek to date.
Site Isolation & Bypass Measures Implemented	√		• Channel flow is currently disconnected / flows terminate to ground downstream. • Flows within site diverted to left bank (facing downstream) to allow flows to bypass around worksite. • No bypass pumping and site isolation currently required today (ie meter bag dams or steel plates) • Water within the site terminates to ground.

Environmental Monitoring Activity	Yes	No	Comments
Fish & amphibian salvages		√	- Channel dry, area scanned for potential amphibians, none observed, and no salvages required. - Fish fence installed at downstream end to prevent fish from entering work site. - No fish salvages required today due to dry channel.
Invasive Species Management	√		Japanese Knotweed (noxious weed) and Flowering Rush have been identified at the Eng Pit disposal site. Items outlined in revised CEMP and email from MoF to be followed.
Equipment/Vehicle Inspection and on-site storage	√		- All machinery used in or near the stream channel were observed to be in good operating condition and free of leaks, excess oil, and grease. - Drip trays observed underneath parked machinery at end of day. - All machines and equipment are parked at the top of bank on the dike overnight in a stable location.
Visual Inspection for Contamination (Odour/staining)	√		No spills observed.
Dust Generation		√	No concerns observed.
Noise Monitoring		√	N/A
SPEA Integrity and Protection		√	N/A
Impacts on Habitat		√	Upon direction from AE, tree removal was required in order for equipment to access the channel at Station 1-020 on November 28 th , 2022 (see Figure 1).
Action Items	√		See table below.
Spill Kit Contents and Accessibility	√		Spill kits remain on-site in a readily accessible location for both contractors at all times during activities.
Garbage	√		Garbage is collected and stored on vehicles to avoid potential for encounters with wildlife.
Spill Response Procedures Posted	√		Within EMP & CEMP
Environmental Incidents Identified/Reported to EM or by EM		√	N/A
Fuelling procedures compliance check	√		All refueling occurred on the existing access dike road.

Environmental Monitoring Activity	Yes	No	Comments
Complete CEOR with crews/contractors	√		CEOR for project has been reviewed with Richco and Jakes.

Water Quality Summary Data

Monitoring Location	Date	Turbidity (NTU)
(1) Upstream of Site (Background)	Dec 14 th , 2022	0.54 NTU
(2) Downstream of Site	Dec 14 th , 2022	1.43 NTU

Upcoming Activities

- Contractors to continue with instream works weather permitting.

Figures & Photographs



Photo 1. Richco loading haul trucks with temporary stockpile.



Photo 2. Jakes loading rock truck to be hauled to Richco's temporary stockpile.



Photo 3. Jakes armouring banks downstream of the debris jam.



Photo 4. Portable toilet on top of the bank.

Action Items Tracking Table

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
1	1	Resolved	H	Completion of Contractor Environmental Orientation and record provided	CEOR has been completed and forwarded to the Contractors for distribution.	Dec 01/22	Dec 13/22	Dec 13/22	N/A
2	2 & 3	Resolved	L	Environmental monitoring reporting	AQS has been providing daily reporting through field inspection memos.	Dec 01/22	Everyday	Dec 13/22	N/A
3	5	Resolved	L	ESC and site isolation	Stockpiles within creek or near creek are temporary and hauled off site within the same working day since the commencement of the works. If rain (and increased surface flow) is anticipated, the mitigation measure thus far has been the Contractors pulling their equipment out of the stream and either continuing to work from the top of bank while deploying suitable bypass measures to allow increased flows to move around	Dec 01/22	Dec 13/22	Dec 13/22	N/A

¹L = Low Priority, complete as time permits
M = Medium Priority, ongoing maintenance or complete within one week
H = High Priority, complete immediately

AQUA SILVA	ESC Inspection Memo
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No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					the worksite or pausing works until flows have subsided.				
4	10	Identified	L	No waste containers or bear-proof bins onsite	There is no action item other than reiterating that the contractors have kept the site clean, and garbage is contained on vehicles to be taken away at the end of the day.	Dec 01/22	Everyday		Garbage cans are not kept onsite as garbage may attract animals and pose a risk to work crews. All workers are advised to keep garbage within their vehicles and dispose off-site daily.
5	13	Resolved	H	Leaking equipment	All parked trucks will be inspected for leaks and to ensure a drip tray is placed underneath and overnight for all vehicles and machines.	Dec 01/22	Everyday		Trucks have been inspected and leaking vehicles have been removed from the site resulting in no more oil drips observed. Drip trays are placed underneath all vehicles and machines that are left on site overnight.
6	16 & 19	Resolved	H	Upstream fish passage maintained	Maintaining fish passage is not an option in a stream where it is currently evident that fish stranding can occur due to lower water conditions that are being encountered this year because of the late rains (i.e., sections of channel are dry). Any spawning activity is likely done now (Bull/dolly), and the	Dec 01/22	Dec 13/22	Dec 13/22	AQS staff are well aware of the "plan" to salvage fish when required. In the event a salvage is required, fish will not be relocated upstream from the site. Fish stranding locations are

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					presence of anadromous salmonids in this system is likely nil given the fact that Hayward Lake is not anadromous salmon habitat. Fisheries Act Conditions of Authorization #22-HPAC-01308, Section 2.4.2: "Fish passage is to be maintained around the isolated work zones through the implementation of a diversion channel where practicable. Sites with expected adult salmon presence with spawning and/or overwintering habitat upstream should be prioritized for a diversion channel. If a diversion channel is not practicable and fish are observed holding below the work zone, ongoing fish salvage is required to relocate fish around the work zone;"				very evident in this stream due to lower water conditions. All fish and amphibians salvaged will be re-located downstream to Cascade Creek where permanent flows are observed and into suitable habitat that provides depth for cover.
7	24	Resolved	H	Reporting of turbidity event	AQS has been conducting full-time monitoring since requested by the contractor.	Dec 01/22	Everyday	Nov 26/22	AQS was initially requested to complete part-time monitoring at Carratt Creek. Once AQS was informed of the requirement for full-time monitoring, an EM has been on site every day to

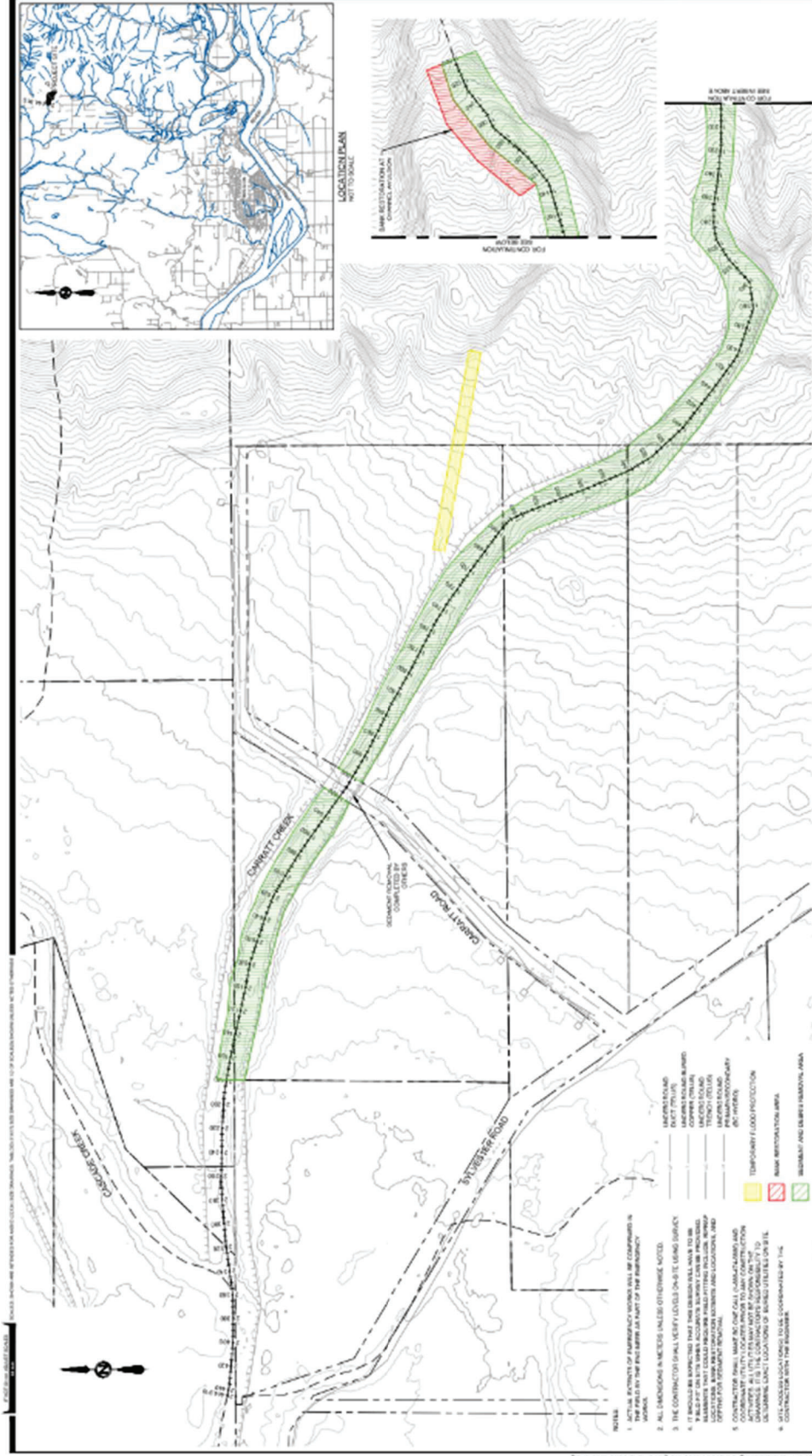
No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
									complete daily reporting and documentation of any non-compliance items. AQS did conduct part-time monitoring that day @ 3:45PM: DS turbidity: 3.67 NTUs. Therefore, AQS cannot provide comment on "turbidity event". Please provide details on the background and downstream NTUs readings during this "turbidity event".
8	28	Identified	H	Best Management Practices to prevent spread of invasive species	AE has requested the contractor have AQS revise CEMP to reflect the recent updated environmental assessment information provided by AE to include mitigation measures and BMPs to address invasive Japanese Knotweed that exists at Eng Pit. AE also advised contractor to have AQS conduct assessment: "When the QP completes the site assessment, particular care should be taken to thoroughly search the upper polygon where it abuts Eng Pit. If it is determined that knotweed is not		Dec 15/22		Upon this request, AQS has conducted an assessment at Eng Pit site and Japanese Knotweed exists at the site. AQS also observed works near the Eng Pit. No Knotweed was observed within the channel works area. Avoidance is the main mitigation to be applied. Further details of mitigation have been

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					present within 30m of the project polygons and machinery will be limited to the polygon boundaries, then no further invasive plant measures are needed on this site". AE also notes: "Just to be clear, the QP in this would be the Environmental Monitor. Our environmental staff did a survey of the site before the definitive work extents were known. Now that we understand the full footprint, it would be up to the Environmental Monitor (AquaSilva) to assess the site and try and locate any invasive species." Richco has requested clarification from AE: "The recommendation of in place Mechanisms and Protocols to prevent the spread of invasive species is this for Carratt Creek Exiting Vehicles or Eng Pit? Is another Monitor required to manually inspect trucks and machinery activities? I don't believe there has been any Invasive plants observed at Carratt only Eng Pit where Knotweed has been identified an area Cautioned off to prevent entry." AE to provide updated response to Richco for the above questions.			outlined in the revised AQS CEMP. Also note that the CEMP is being revised to reflect knotweed conditions at the site and contractors have been notified by AE. Wash station setup tomorrow morning.	

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					Dianna from AE has advised Richco to set up a wash station at Eng Pit.				
9	N/A	Identified	H	Relocation of portable toilet	Portable toilets located adjacent to streambank of Carratt Creek must be moved to a location that is at least 15m away from the top of the bank.	Dec 14/22	Dec 15/22		N/A
10	N/A	Identified	H	AE to provide LFN inspection memos to Richco/Jakes/AQS	Discussed with Rick onsite today and LFN and AE agreed to provide Richco/Jakes/AE with daily inspection memos	Dec 14/22	Dec 14/22	Dec 14/22	Dianna (AE) provided LFM report to date. AE will also provide our reports to LFM for review (ie LFN will be included in daily memos email).
11	N/A	Identified	L		Upon direction from AE, tree removal was required in order for equipment to access the channel at Station 1-020 on November 28 th , 2022 (see Figure 1).	Nov 28/22			Per the AE EMP – “Exposed areas caused from access clearing will be recontoured and seeded with grass after construction.”

REFERENCES

Figure 1 – Design Drawing



DRAFT

PRICE/WATERHOUSE COOPERS
BC MINISTRY OF ENVIRONMENT
WATERWAY SEDIMENT ASSESSMENT
PROPOSED EMERGENCY WORK
S-CR-28 CARRATT CREEK

PLAN

EMERGENCY WORKS

CHARTING

2482-00-C-2102

0000-0001-9786-400X



**Associated
Engineering**

**1987
MEMBERED
COMPANIES**

Hydrex

AQUASILVA RESOU

[illegible]



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Email: info@aqsrme.com

Environmental Monitoring Inspection Report for December 15th, 2022

Project Name:	Carratt Creek Flood Mitigation Works
Reporting Period:	December 15 th , 2022
Time of day:	All-day
Weather:	2°C; Partially cloudy
Environmental Monitor:	Jennifer Heldt, B.Env.
Report authored by:	Jennifer Heldt, B.Env.
Report reviewed by:	Patrick Ehnes, R.B.Tech, ASCT., BC-CESCL
Client:	Richco Contracting Ltd.
Date submitted:	Via email - December 15 th , 2022
Submitted to:	Rich Van Geel rich@richco.ca

AquaSilva Resource Management (AQS) is conducting Environmental Monitoring for the Carratt Creek Flood Mitigation Works to confirm compliance with provincial and federal regulatory requirements. Monitoring activities include photo documentation, Environmental & ESC observations, observing potential impacts on fish/wildlife habitat, and observing all in-stream works.

Environmental Monitoring (EM) and Erosion and Sediment Control (ESC) monitoring was conducted by AquaSilva Resource Management Ltd. (AQS) to confirm site compliance with provincial and federal requirements.

Acronyms:

AE	Associated Engineering Ltd.
BCWQG	British Columbia Water Quality Guidelines
CEMP	Construction Environmental Management Plan
DFO	Fisheries and Oceans Canada
EM	Environmental Monitor
EMP	Environmental Management Plan
FVRD	Fraser Valley Regional District
LFNM	Leq'á:mel First Nation Monitor
MOF	Ministry of Forest
MOT	Ministry of Transportation
RICHCO	Richco Contracting Ltd.
JAKES	Jakes Construction Ltd.

ENVIRONMENTAL MONITORING ACTIVITIES DURING THIS PERIOD

Environmental Monitoring Activity	Yes	No	Comments
In-situ Water Quality Testing	√		Turbidity samples were obtained directly upstream and downstream from the worksite.
Photo Documentation	√		Photographs of the works were taken.
Environmental & Erosion and Sediment Control Observations	√		• Marginal flows were observed infiltrating into the streambed approximately 200 meters upstream of Carratt Road Bridge (ie no surficial connection to downstream habitat). • A “dry channel” was observed from the site downstream to the confluence with Cascade Creek. • Richco - No flows observed in work site. • Jakes – Minimal flows observed within site. However; infiltrates to ground approx. 200 metres downstream. • Richco - continued to load trucks using temporary stockpiles located on the dry side of channel (right bank). • Jakes - continued to remove material and load trucks. Rock trucks were depositing loads into Richco’s temporary stockpile for transport. Jakes prepared an “escape route” through the dry avulsion channel for the excavator when flows are redirected into Carratt Creek. The operator was careful to avoid vegetation and minimize impact by using a pre-existing dike and the dry gravel pad left from previous flooding. • Upon recent information being provided of known Japanese Knotweed at the Eng Pit site by AE, AE requested that EM conduct assessment of active site for Knotweed. No Knotweed was observed within Carratt Creek to date.
Site Isolation & Bypass Measures Implemented	√		• Channel flow is currently disconnected / flows terminate to ground downstream. • Flows within site diverted to left bank (facing downstream) to allow flows to bypass around worksite. • No bypass pumping and site isolation currently required today (ie meter bag dams or steel plates) • Water within the site terminates to ground.

Environmental Monitoring Activity	Yes	No	Comments
Fish & amphibian salvages		√	- Channel dry, area scanned for potential amphibians, none observed, and no salvages required. - Fish fence installed at downstream end to prevent fish from entering work site. - No fish salvages required today due to dry channel.
Invasive Species Management	√		- Japanese Knotweed (noxious weed) and Flowering Rush have been identified at the Eng Pit disposal site. Items outlined in revised CEMP and email from MoF to be followed. - Upon arrival, AQS observed a washing station at the entrance of Eng Pit. This was not a suitable location. Richco was immediately notified and resolved the situation by moving the wash station in an area where no Knotweed or Flowering Rush was observed and no watercourses nearby.
Equipment/Vehicle Inspection and on-site storage	√		- All machinery used in or near the stream channel were observed to be in good operating condition and free of leaks, excess oil, and grease. - Drip trays observed underneath parked machinery at end of day. - All machines and equipment are parked at the top of bank on the dike overnight in a stable location.
Visual Inspection for Contamination (Odour/staining)	√		No spills observed.
Dust Generation		√	No concerns observed.
Noise Monitoring		√	N/A
SPEA Integrity and Protection		√	N/A
Impacts on Habitat		√	Upon direction from AE, tree removal was required in order for equipment to access the channel at Station 1-020 on November 28 th , 2022 (see Figure 1).
Action Items	√		See table below.
Spill Kit Contents and Accessibility	√		Spill kits remain on-site in a readily accessible location for both contractors at all times during activities.
Garbage	√		Garbage is collected and stored on vehicles to avoid potential for encounters with wildlife.

Environmental Monitoring Activity	Yes	No	Comments
Spill Response Procedures Posted	√		Within EMP & CEMP
Environmental Incidents Identified/Reported to EM or by EM		√	N/A
Fuelling procedures compliance check	√		All refueling occurred on the existing access dike road.
Complete CEOR with crews/contractors	√		CEOR for project has been reviewed with Richco and Jakes.

Water Quality Summary Data

Monitoring Location	Date	Turbidity (NTU)
(1) Upstream of Site (Background)	Dec 15 th , 2022	0.63 NTU & 0.15 NTU
(2) Downstream of Site	Dec 15 th , 2022	0.21 NTU & 0.47 NTU *Infiltrates to ground

Upcoming Activities

- Contractors to continue with instream works weather permitting.

Figures & Photographs



Photo 1. Richco loading haul trucks with temporary stockpile.



Photo 2. Jakes loading rock truck to be hauled to Richco's temporary stockpile.



Photo 3. Wash station on Eng Road to clean off haul trucks when exiting Eng Pit.

Action Items Tracking Table

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
1	1	Resolved	H	Completion of Contractor Environmental Orientation and record provided	CEOR has been completed and forwarded to the Contractors for distribution.	Dec 01/22	Dec 13/22	Dec 13/22	N/A
2	2 & 3	Resolved	L	Environmental monitoring reporting	AQS has been providing daily reporting through field inspection memos.	Dec 01/22	Everyday	Dec 13/22	N/A
3	5	Resolved	L	ESC and site isolation	Stockpiles within creek or near creek are temporary and hauled off site within the same working day since the commencement of the works. If rain (and increased surface flow) is anticipated, the mitigation measure thus far has been the Contractors pulling their equipment out of the stream and either continuing to work from the top of bank while deploying suitable bypass measures to allow increased flows to move around	Dec 01/22	Dec 13/22	Dec 13/22	N/A

¹L = Low Priority, complete as time permits
M = Medium Priority, ongoing maintenance or complete within one week
H = High Priority, complete immediately

AQUA SILVA	ESC Inspection Memo
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No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					the worksite or pausing works until flows have subsided.				
4	10	Resolved	L	No waste containers or bear-proof bins onsite	There is no action item other than reiterating that the contractors have kept the site clean, and garbage is contained on vehicles to be taken away at the end of the day.	Dec 01/22	Everyday		Garbage cans are not kept onsite as garbage may attract animals and pose a risk to work crews. All workers are advised to keep garbage within their vehicles and dispose off-site daily.
5	13	Resolved	H	Leaking equipment	All parked trucks will be inspected for leaks and to ensure a drip tray is placed underneath and overnight for all vehicles and machines.	Dec 01/22	Everyday		Trucks have been inspected and leaking vehicles have been removed from the site resulting in no more oil drips observed. Drip trays are placed underneath all vehicles and machines that are left on site overnight.
6	16 & 19	Resolved	H	Upstream fish passage maintained	Maintaining fish passage is not an option in a stream where it is currently evident that fish stranding can occur due to lower water conditions that are being encountered this year because of the late rains (i.e., sections of channel are dry). Any spawning activity is likely done now (Bull/dolly), and the	Dec 01/22	Dec 13/22	Dec 13/22	AQS staff are well aware of the "plan" to salvage fish when required. In the event a salvage is required, fish will not be relocated upstream from the site. Fish stranding locations are

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					presence of anadromous salmonids in this system is likely nil given the fact that Hayward Lake is not anadromous salmon habitat. Fisheries Act Conditions of Authorization #22-HPAC-01308, Section 2.4.2: "Fish passage is to be maintained around the isolated work zones through the implementation of a diversion channel where practicable. Sites with expected adult salmon presence with spawning and/or overwintering habitat upstream should be prioritized for a diversion channel. If a diversion channel is not practicable and fish are observed holding below the work zone, ongoing fish salvage is required to relocate fish around the work zone;"				very evident in this stream due to lower water conditions. All fish and amphibians salvaged will be re-located downstream to Cascade Creek where permanent flows are observed and into suitable habitat that provides depth for cover.
7	24	Resolved	H	Reporting of turbidity event	AQS has been conducting full-time monitoring since requested by the contractor.	Dec 01/22	Everyday	Nov 26/22	AQS was initially requested to complete part-time monitoring at Carratt Creek. Once AQS was informed of the requirement for full-time monitoring, an EM has been on site every day to

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
									complete daily reporting and documentation of any non-compliance items. AQS did conduct part-time monitoring that day @ 3:45PM: DS turbidity: 3.67 NTUs. Therefore, AQS cannot provide comment on "turbidity event". Please provide details on the background and downstream NTUs readings during this "turbidity event".
8	28	Resolved	H	Best Management Practices to prevent spread of invasive species	AE has requested the contractor have AQS revise CEMP to reflect the recent updated environmental assessment information provided by AE to include mitigation measures and BMPs to address invasive Japanese Knotweed that exists at Eng Pit. AE also advised contractor to have AQS conduct assessment: "When the QP completes the site assessment, particular care should be taken to thoroughly search the upper polygon where it abuts Eng Pit. If it is determined that knotweed is not		Dec 15/22	Dec 15/22	Upon this request, AQS has conducted an assessment at Eng Pit site and Japanese Knotweed exists at the site. AQS also observed works near the Eng Pit. No Knotweed was observed within the channel works area. Avoidance is the main mitigation to be applied. Further details of mitigation have been

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					present within 30m of the project polygons and machinery will be limited to the polygon boundaries, then no further invasive plant measures are needed on this site". AE also notes: "Just to be clear, the QP in this would be the Environmental Monitor. Our environmental staff did a survey of the site before the definitive work extents were known. Now that we understand the full footprint, it would be up to the Environmental Monitor (AquaSilva) to assess the site and try and locate any invasive species." Richco has requested clarification from AE: "The recommendation of in place Mechanisms and Protocols to prevent the spread of invasive species is this for Carratt Creek Exiting Vehicles or Eng Pit? Is another Monitor required to manually inspect trucks and machinery activities? I don't believe there has been any Invasive plants observed at Carratt only Eng Pit where Knotweed has been identified an area Cautioned off to prevent entry." AE to provide updated response to Richco for the above questions.			outlined in the revised AQS CEMP. Also note that the CEMP is revised to reflect knotweed conditions at the site and contractors have been notified by AE.	

**AQUA
SILVA** ESC Inspection Memo

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					Dianna from AE has advised Richco to set up a wash station at Eng Pit. A wash station was setup this morning. Every vehicle exiting Eng Pit is being washed down before leaving.				
9	N/A	Resolved	H	Relocation of portable toilet	Portable toilets located adjacent to streambank of Carratt Creek must be moved to a location that is at least 15m away from the top of the bank.	Dec 14/22	Dec 15/22	Dec 15/22	N/A
10	N/A	Resolved	H	AE to provide LFN inspection memos to Richco/Jakes/AQS	Discussed with Rick onsite today and LFN and AE agreed to provide Richco/Jakes/AE with daily inspection memos	Dec 14/22	Dec 14/22	Dec 14/22	Dianna (AE) provided LFN report to date. AE will also provide our reports to LFN for review (ie LFN will be included in daily memos email).
11	N/A	Identified	L		Upon direction from AE, tree removal was required in order for equipment to access the channel at Station 1-020 on November 28 th , 2022 (see Figure 1).	Nov 28/22			Per the AE EMP – “Exposed areas caused from access clearing will be recontoured and seeded with grass after construction.”
12	N/A	Resolved	H	Washing station location	Wash station was relocated well away from watercourse.	Dec 15/22	Dec 15/22	Dec 15/22	N/A

REFERENCES

Figure 1 – Design Drawing



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Tel: 604-725-2914
Email: info@aqsrme.com

Environmental Monitoring Inspection Report for December 16th, 2022

Project Name:	Carratt Creek Flood Mitigation Works
Reporting Period:	December 16 th , 2022
Time of day:	All-day
Weather:	3°C; Clear
Environmental Monitor:	Jennifer Heldt, B.Env.
Report authored by:	Jennifer Heldt, B.Env.
Report reviewed by:	Patrick Ehnes, R.B.Tech, ASCT., BC-CESCL
Client:	Richco Contracting Ltd.
Date submitted:	Via email - December 16 th , 2022
Submitted to:	Rich Van Geel rich@richco.ca

AquaSilva Resource Management (AQS) is conducting Environmental Monitoring for the Carratt Creek Flood Mitigation Works to confirm compliance with provincial and federal regulatory requirements. Monitoring activities include photo documentation, Environmental & ESC observations, observing potential impacts on fish/wildlife habitat, and observing all in-stream works.

Environmental Monitoring (EM) and Erosion and Sediment Control (ESC) monitoring was conducted by AquaSilva Resource Management Ltd. (AQS) to confirm site compliance with provincial and federal requirements.

Acronyms:

AE	Associated Engineering Ltd.
BCWQG	British Columbia Water Quality Guidelines
CEMP	Construction Environmental Management Plan
DFO	Fisheries and Oceans Canada
EM	Environmental Monitor
EMP	Environmental Management Plan
FVRD	Fraser Valley Regional District
LFNM	Leq'á:mel First Nation Monitor
MOF	Ministry of Forest
MOT	Ministry of Transportation
RICHCO	Richco Contracting Ltd.
JAKES	Jakes Construction Ltd.

ENVIRONMENTAL MONITORING ACTIVITIES DURING THIS PERIOD

Environmental Monitoring Activity	Yes	No	Comments
In-situ Water Quality Testing	√		Turbidity samples were obtained directly upstream and downstream from the worksite.
Photo Documentation	√		Photographs of the works were taken.
Environmental & Erosion and Sediment Control Observations	√		• Marginal flows were observed infiltrating into the streambed approximately 200 meters upstream of Carratt Road Bridge (ie no surficial connection to downstream habitat). • A “dry channel” was observed from the site downstream to the confluence with Cascade Creek. • Richco - No flows observed in work site. • Jakes – Minimal flows observed beside site. However; infiltrates to ground approx. 10 metres upstream of where they were working. • Richco - continued to load trucks using temporary stockpiles located on the dry side of channel (right bank). • Jakes - continued to remove material and load trucks. Rock trucks were depositing loads into Richco’s temporary stockpile for transport. • Upon recent information being provided of known Japanese Knotweed at the Eng Pit site by AE, AE requested that EM conduct assessment of active site for Knotweed. No Knotweed was observed within Carratt Creek to date.
Site Isolation & Bypass Measures Implemented	√		• Channel flow is currently disconnected / flows terminate to ground downstream. • Flows within site diverted to left bank (facing downstream) to allow flows to bypass around worksite. • No bypass pumping and site isolation currently required today (ie meter bag dams or steel plates) • Water within the site terminates to ground.
Fish & amphibian salvages		√	• Channel dry, area scanned for potential amphibians, none observed, and no salvages required. • Fish fence installed at downstream end to prevent fish from entering work site. • No fish salvages required today due to dry channel.

Environmental Monitoring Activity	Yes	No	Comments
Invasive Species Management	√		- Japanese Knotweed (noxious weed) and Flowering Rush have been identified at the Eng Pit disposal site. Items outlined in revised CEMP and email from MoF to be followed. - Due to crew safety concerns, the wash station was moved further down Eng Road where no Knotweed or Flowering Rush was observed and no watercourses nearby.
Equipment/Vehicle Inspection and on-site storage	√		- All machinery used in or near the stream channel were observed to be in good operating condition and free of leaks, excess oil, and grease. - Drip trays not observed underneath parked Jakes machinery at end of day. - All machines and equipment are parked at the top of bank on the dike overnight in a stable location.
Visual Inspection for Contamination (Odour/staining)	√		No spills observed.
Dust Generation		√	No concerns observed.
Noise Monitoring		√	N/A
SPEA Integrity and Protection		√	N/A
Impacts on Habitat		√	Upon direction from AE, tree removal was required in order for equipment to access the channel at Station 1-020 on November 28 th , 2022 (see Figure 1).
Action Items	√		See table below.
Spill Kit Contents and Accessibility	√		Spill kits remain on-site in a readily accessible location for both contractors at all times during activities.
Garbage	√		Garbage is collected and stored on vehicles to avoid potential for encounters with wildlife.
Spill Response Procedures Posted	√		Within EMP & CEMP
Environmental Incidents Identified/Reported to EM or by EM		√	N/A
Fuelling procedures compliance check	√		All refueling occurred on the existing access dike road.
Complete CEOR with crews/contractors	√		CEOR for project has been reviewed with Richco and Jakes.

Water Quality Summary Data

Monitoring Location	Date	Turbidity (NTU)
(1) Upstream of Site (Background)	Dec 16 th , 2022	0.09 NTU & 1.17 NTU
(2) Downstream of Site	Dec 16 th , 2022	0.26 NTU & 0.62 NTU *Infiltrates to ground

Upcoming Activities

- Contractors to continue with instream works weather permitting.

Figures & Photographs

Photo 1. Richco loading haul trucks with temporary stockpile.



Photo 2. Jakes loading rock truck to be hauled to Richco's temporary stockpile.



Photo 3. New wash station location on Eng Road to clean off haul trucks after exiting Eng Pit.

Action Items Tracking Table

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
1	1	Resolved	H	Completion of Contractor Environmental Orientation and record provided	CEOR has been completed and forwarded to the Contractors for distribution.	Dec 01/22	Dec 13/22	Dec 13/22	N/A
2	2 & 3	Resolved	L	Environmental monitoring reporting	AQS has been providing daily reporting through field inspection memos.	Dec 01/22	Everyday	Dec 13/22	N/A
3	5	Resolved	L	ESC and site isolation	Stockpiles within creek or near creek are temporary and hauled off site within the same working day since the commencement of the works. If rain (and increased surface flow) is anticipated, the mitigation measure thus far has been the Contractors pulling their equipment out of the stream and either continuing to work from the top of bank while deploying suitable bypass measures to allow increased flows to move around	Dec 01/22	Dec 13/22	Dec 13/22	N/A

¹L = Low Priority, complete as time permits
M = Medium Priority, ongoing maintenance or complete within one week
H = High Priority, complete immediately

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					the worksite or pausing works until flows have subsided.				
4	10	Resolved	L	No waste containers or bear-proof bins onsite	There is no action item other than reiterating that the contractors have kept the site clean, and garbage is contained on vehicles to be taken away at the end of the day.	Dec 01/22	Everyday		Garbage cans are not kept onsite as garbage may attract animals and pose a risk to work crews. All workers are advised to keep garbage within their vehicles and dispose off-site daily.
5	13	Resolved	H	Leaking equipment	All parked trucks will be inspected for leaks and to ensure a drip tray is placed underneath and overnight for all vehicles and machines.	Dec 01/22	Everyday		Trucks have been inspected and leaking vehicles have been removed from the site resulting in no more oil drips observed. Drip trays should be placed underneath all vehicles and machines that are left on site overnight.
6	16 & 19	Resolved	H	Upstream fish passage maintained	Maintaining fish passage is not an option in a stream where it is currently evident that fish stranding can occur due to lower water conditions that are being encountered this year because of the late rains (i.e., sections of channel are dry). Any spawning activity is likely done now (Bull/dolly), and the	Dec 01/22	Dec 13/22	Dec 13/22	AQS staff are well aware of the "plan" to salvage fish when required. In the event a salvage is required, fish will not be relocated upstream from the site. Fish stranding locations are

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					presence of anadromous salmonids in this system is likely nil given the fact that Hayward Lake is not anadromous salmon habitat. Fisheries Act Conditions of Authorization #22-HPAC-01308, Section 2.4.2: "Fish passage is to be maintained around the isolated work zones through the implementation of a diversion channel where practicable. Sites with expected adult salmon presence with spawning and/or overwintering habitat upstream should be prioritized for a diversion channel. If a diversion channel is not practicable and fish are observed holding below the work zone, ongoing fish salvage is required to relocate fish around the work zone;"				very evident in this stream due to lower water conditions. All fish and amphibians salvaged will be re-located downstream to Cascade Creek where permanent flows are observed and into suitable habitat that provides depth for cover.
7	24	Resolved	H	Reporting of turbidity event	AQS has been conducting full-time monitoring since requested by the contractor.	Dec 01/22	Everyday	Nov 26/22	AQS was initially requested to complete part-time monitoring at Carratt Creek. Once AQS was informed of the requirement for full-time monitoring, an EM has been on site every day to

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
									complete daily reporting and documentation of any non-compliance items. AQS did conduct part-time monitoring that day @ 3:45PM: DS turbidity: 3.67 NTUs. Therefore, AQS cannot provide comment on "turbidity event". Please provide details on the background and downstream NTUs readings during this "turbidity event".
8	28	Resolved	H	Best Management Practices to prevent spread of invasive species	AE has requested the contractor have AQS revise CEMP to reflect the recent updated environmental assessment information provided by AE to include mitigation measures and BMPs to address invasive Japanese Knotweed that exists at Eng Pit. AE also advised contractor to have AQS conduct assessment: "When the QP completes the site assessment, particular care should be taken to thoroughly search the upper polygon where it abuts Eng Pit. If it is determined that knotweed is not		Dec 15/22	Dec 15/22	Upon this request, AQS has conducted an assessment at Eng Pit site and Japanese Knotweed exists at the site. AQS also observed works near the Eng Pit. No Knotweed was observed within the channel works area. Avoidance is the main mitigation to be applied. Further details of mitigation have been

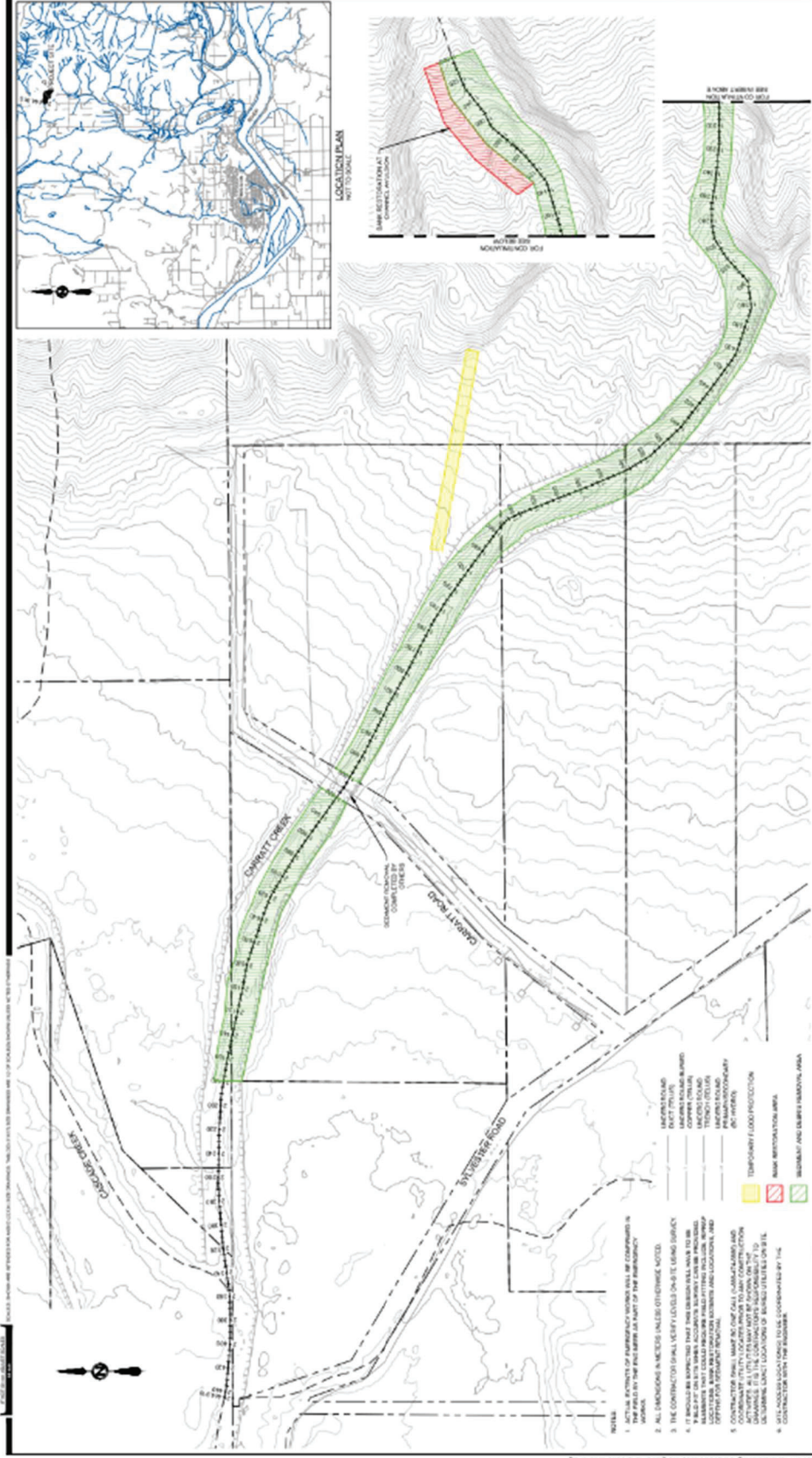
No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					present within 30m of the project polygons and machinery will be limited to the polygon boundaries, then no further invasive plant measures are needed on this site". AE also notes: "Just to be clear, the QP in this would be the Environmental Monitor. Our environmental staff did a survey of the site before the definitive work extents were known. Now that we understand the full footprint, it would be up to the Environmental Monitor (AquaSilva) to assess the site and try and locate any invasive species." Richco has requested clarification from AE: "The recommendation of in place Mechanisms and Protocols to prevent the spread of invasive species is this for Carratt Creek Exiting Vehicles or Eng Pit? Is another Monitor required to manually inspect trucks and machinery activities? I don't believe there has been any Invasive plants observed at Carratt only Eng Pit where Knotweed has been identified an area Cautioned off to prevent entry." AE to provide updated response to Richco for the above questions.			outlined in the revised AQS CEMP. Also note that the CEMP is revised to reflect knotweed conditions at the site and contractors have been notified by AE.	

**AQUA
SILVA** ESC Inspection Memo

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					Dianna from AE has advised Richco to set up a wash station at Eng Pit. A wash station was setup on Eng road. Every vehicle exiting Eng Pit is being washed down before leaving.				
9	N/A	Resolved	H	Relocation of portable toilet	Portable toilets located adjacent to streambank of Carratt Creek must be moved to a location that is at least 15m away from the top of the bank.	Dec 14/22	Dec 15/22	Dec 15/22	N/A
10	N/A	Resolved	H	AE to provide LFN inspection memos to Richco/Jakes/AQS	Discussed with Rick onsite today and LFN and AE agreed to provide Richco/Jakes/AE with daily inspection memos	Dec 14/22	Dec 14/22	Dec 14/22	Dianna (AE) provided LFN report to date. AE will also provide our reports to LFN for review (ie LFN will be included in daily memos email).
11	N/A	Identified	L		Upon direction from AE, tree removal was required in order for equipment to access the channel at Station 1-020 on November 28 th , 2022 (see Figure 1).	Nov 28/22			Per the AE EMP – “Exposed areas caused from access clearing will be recontoured and seeded with grass after construction.”
12	N/A	Resolved	H	Washing station location	Wash station was relocated well away from watercourse.	Dec 15/22	Dec 15/22	Dec 15/22	N/A
13	N/A	Identified	M	Drip trays not underneath parked machinery overnight	Drip trays should be placed underneath all machinery parked on the dike overnight.	Dec 16/22	Dec 16/22		Jakes did not put drip tray underneath the excavator before leaving for the day.

REFERENCES

Figure 1 – Design Drawing



PRICEWATERHOUSE COOPERS
BC MINISTRY OF ENVIRONMENT

WATERWAY SEDIMENT ASSESSMENT
PROPOSED EMERGENCY WORK
S-CR-28 CARRATT CREEK
2022-2462-00

SCALE: 1:1000

BRITISH COLUMBIA

pwc

PLAN
EMERGENCY WORKS

2462-00-C-2102

1 2

DRAFT

REV	DATE	REVISION	DESCRIPTION
1	2022-08-01	1	ISSUED FOR REVIEW
2	2022-08-01	1	ISSUED FOR REVIEW

Associated Engineering

AE

Associated Engineering



PO Box 42
Fort Langley, B.C., V1M 2R4
Tel: 604-725-2914
Email: info@aqsrme.com

Environmental Monitoring Inspection Report for December 17th, 2022

Project Name:	Carratt Creek Flood Mitigation Works
Reporting Period:	December 17 th , 2022
Time of day:	All-day
Weather:	-1°C; Cloudy/snow
Environmental Monitor:	Jennifer Heldt, B.Env.
Report authored by:	Jennifer Heldt, B.Env.
Report reviewed by:	Patrick Ehnes, R.B.Tech, ASCT., BC-CESCL
Client:	Richco Contracting Ltd.
Date submitted:	Via email - December 17 th , 2022
Submitted to:	Rich Van Geel rich@richco.ca

AquaSilva Resource Management (AQS) is conducting Environmental Monitoring for the Carratt Creek Flood Mitigation Works to confirm compliance with provincial and federal regulatory requirements. Monitoring activities include photo documentation, Environmental & ESC observations, observing potential impacts on fish/wildlife habitat, and observing all in-stream works.

Environmental Monitoring (EM) and Erosion and Sediment Control (ESC) monitoring was conducted by AquaSilva Resource Management Ltd. (AQS) to confirm site compliance with provincial and federal requirements.

Acronyms:

AE	Associated Engineering Ltd.
BCWQG	British Columbia Water Quality Guidelines
CEMP	Construction Environmental Management Plan
DFO	Fisheries and Oceans Canada
EM	Environmental Monitor
EMP	Environmental Management Plan
FVRD	Fraser Valley Regional District
LFNM	Leq'á:mel First Nation Monitor
MOF	Ministry of Forest
MOT	Ministry of Transportation
RICHCO	Richco Contracting Ltd.
JAKES	Jakes Construction Ltd.

ENVIRONMENTAL MONITORING ACTIVITIES DURING THIS PERIOD

Environmental Monitoring Activity	Yes	No	Comments
In-situ Water Quality Testing	√		Turbidity samples were obtained directly upstream and downstream from the worksite.
Photo Documentation	√		Photographs of the works were taken.
Environmental & Erosion and Sediment Control Observations	√		• Marginal flows were observed infiltrating into the streambed approximately 300 meters upstream of Carratt Road Bridge (ie no surficial connection to downstream habitat). • A “dry channel” was observed from the site downstream to the confluence with Cascade Creek. • Richco - No flows observed in work site. • Richco - continued to load trucks from the dike road. • Jakes – Not on site. • Upon recent information being provided of known Japanese Knotweed at the Eng Pit site by AE, AE requested that EM conduct assessment of active site for Knotweed. No Knotweed was observed within Carratt Creek to date.
Site Isolation & Bypass Measures Implemented	√		• Channel flow is currently disconnected / flows terminate to ground downstream. • Flows within site diverted to left bank (facing downstream) to allow flows to bypass around worksite. • No bypass pumping and site isolation currently required today (ie meter bag dams or steel plates) • Water within the site terminates to ground.
Fish & amphibian salvages		√	• Channel dry, area scanned for potential amphibians, none observed, and no salvages required. • Fish fence installed at downstream end to prevent fish from entering work site. • No fish salvages required today due to dry channel.
Invasive Species Management	√		• Japanese Knotweed (noxious weed) and Flowering Rush have been identified at the Eng Pit disposal site. Items outlined in revised CEMP and email from MoF to be followed.

Environmental Monitoring Activity	Yes	No	Comments
			Wash station located on Eng Road where no Knotweed or Flowering Rush was observed and no watercourses nearby.
Equipment/Vehicle Inspection and on-site storage	√		- All machinery used in or near the stream channel were observed to be in good operating condition and free of leaks, excess oil, and grease. - Drip trays observed underneath parked machinery at end of day. - All machines and equipment are parked at the top of bank on the dike overnight in a stable location.
Visual Inspection for Contamination (Odour/staining)	√		No spills observed.
Dust Generation		√	No concerns observed.
Noise Monitoring		√	N/A
SPEA Integrity and Protection		√	N/A
Impacts on Habitat		√	Upon direction from AE, tree removal was required in order for equipment to access the channel at Station 1-020 on November 28 th , 2022 (see Figure 1).
Action Items	√		See table below.
Spill Kit Contents and Accessibility	√		Spill kits remain on-site in a readily accessible location for both contractors at all times during activities.
Garbage	√		Garbage is collected and stored on vehicles to avoid potential for encounters with wildlife.
Spill Response Procedures Posted	√		Within EMP & CEMP
Environmental Incidents Identified/Reported to EM or by EM		√	N/A
Fuelling procedures compliance check	√		All refueling occurred on the existing access dike road.
Complete CEOR with crews/contractors	√		CEOR for project has been reviewed with Richco and Jakes.

Water Quality Summary Data

Monitoring Location	Date	Turbidity (NTU)
(1) Upstream of Site (Background)	Dec 17 th , 2022	0.09 NTU

(2) Downstream of Site	Dec 17 th , 2022	0.42 NTU *Infiltrates to ground
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Upcoming Activities

- Contractors to continue with instream works weather permitting.

Figures & Photographs

Photo 1. Richco loading haul trucks.



Photo 2. Richco's work location along the dike road.

Action Items Tracking Table

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
1	1	Resolved	H	Completion of Contractor Environmental Orientation and record provided	CEOR has been completed and forwarded to the Contractors for distribution.	Dec 01/22	Dec 13/22	Dec 13/22	N/A
2	2 & 3	Resolved	L	Environmental monitoring reporting	AQS has been providing daily reporting through field inspection memos.	Dec 01/22	Everyday	Dec 13/22	N/A
3	5	Resolved	L	ESC and site isolation	Stockpiles within creek or near creek are temporary and hauled off site within the same working day since the commencement of the works. If rain (and increased surface flow) is anticipated, the mitigation measure thus far has been the Contractors pulling their equipment out of the stream and either continuing to work from the top of bank while deploying suitable bypass measures to allow increased flows to move around	Dec 01/22	Dec 13/22	Dec 13/22	N/A

¹L = Low Priority, complete as time permits
M = Medium Priority, ongoing maintenance or complete within one week
H = High Priority, complete immediately

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					the worksite or pausing works until flows have subsided.				
4	10	Resolved	L	No waste containers or bear-proof bins onsite	There is no action item other than reiterating that the contractors have kept the site clean, and garbage is contained on vehicles to be taken away at the end of the day.	Dec 01/22	Everyday		Garbage cans are not kept onsite as garbage may attract animals and pose a risk to work crews. All workers are advised to keep garbage within their vehicles and dispose off-site daily.
5	13	Resolved	H	Leaking equipment	All parked trucks will be inspected for leaks and to ensure a drip tray is placed underneath and overnight for all vehicles and machines.	Dec 01/22	Everyday		Trucks have been inspected and leaking vehicles have been removed from the site resulting in no more oil drips observed. Drip trays should be placed underneath all vehicles and machines that are left on site overnight.
6	16 & 19	Resolved	H	Upstream fish passage maintained	Maintaining fish passage is not an option in a stream where it is currently evident that fish stranding can occur due to lower water conditions that are being encountered this year because of the late rains (i.e., sections of channel are dry). Any spawning activity is likely done now (Bull/dolly), and the	Dec 01/22	Dec 13/22	Dec 13/22	AQS staff are well aware of the "plan" to salvage fish when required. In the event a salvage is required, fish will not be relocated upstream from the site. Fish stranding locations are

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					presence of anadromous salmonids in this system is likely nil given the fact that Hayward Lake is not anadromous salmon habitat. Fisheries Act Conditions of Authorization #22-HPAC-01308, Section 2.4.2: "Fish passage is to be maintained around the isolated work zones through the implementation of a diversion channel where practicable. Sites with expected adult salmon presence with spawning and/or overwintering habitat upstream should be prioritized for a diversion channel. If a diversion channel is not practicable and fish are observed holding below the work zone, ongoing fish salvage is required to relocate fish around the work zone;"				very evident in this stream due to lower water conditions. All fish and amphibians salvaged will be re-located downstream to Cascade Creek where permanent flows are observed and into suitable habitat that provides depth for cover.
7	24	Resolved	H	Reporting of turbidity event	AQS has been conducting full-time monitoring since requested by the contractor.	Dec 01/22	Everyday	Nov 26/22	AQS was initially requested to complete part-time monitoring at Carratt Creek. Once AQS was informed of the requirement for full-time monitoring, an EM has been on site every day to

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
									complete daily reporting and documentation of any non-compliance items. AQS did conduct part-time monitoring that day @ 3:45PM: DS turbidity: 3.67 NTUs. Therefore, AQS cannot provide comment on "turbidity event". Please provide details on the background and downstream NTUs readings during this "turbidity event".
8	28	Resolved	H	Best Management Practices to prevent spread of invasive species	AE has requested the contractor have AQS revise CEMP to reflect the recent updated environmental assessment information provided by AE to include mitigation measures and BMPs to address invasive Japanese Knotweed that exists at Eng Pit. AE also advised contractor to have AQS conduct assessment: "When the QP completes the site assessment, particular care should be taken to thoroughly search the upper polygon where it abuts Eng Pit. If it is determined that knotweed is not		Dec 15/22	Dec 15/22	Upon this request, AQS has conducted an assessment at Eng Pit site and Japanese Knotweed exists at the site. AQS also observed works near the Eng Pit. No Knotweed was observed within the channel works area. Avoidance is the main mitigation to be applied. Further details of mitigation have been

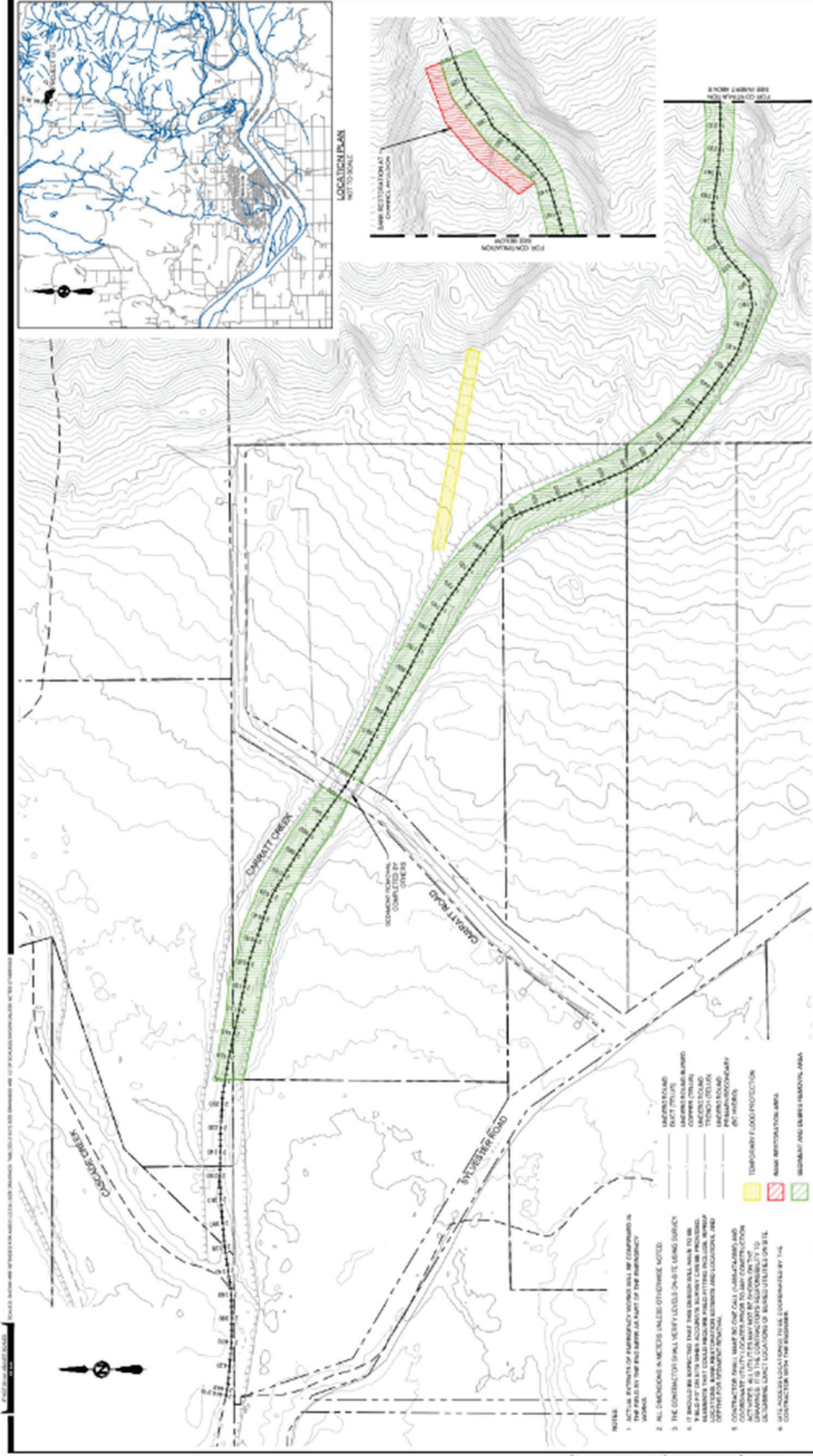
No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					present within 30m of the project polygons and machinery will be limited to the polygon boundaries, then no further invasive plant measures are needed on this site". AE also notes: "Just to be clear, the QP in this would be the Environmental Monitor. Our environmental staff did a survey of the site before the definitive work extents were known. Now that we understand the full footprint, it would be up to the Environmental Monitor (AquaSilva) to assess the site and try and locate any invasive species." Richco has requested clarification from AE: "The recommendation of in place Mechanisms and Protocols to prevent the spread of invasive species is this for Carratt Creek Exiting Vehicles or Eng Pit? Is another Monitor required to manually inspect trucks and machinery activities? I don't believe there has been any Invasive plants observed at Carratt only Eng Pit where Knotweed has been identified an area Cautioned off to prevent entry." AE to provide updated response to Richco for the above questions.			outlined in the revised AQS CEMP. Also note that the CEMP is revised to reflect knotweed conditions at the site and contractors have been notified by AE.	

**AQUA
SILVA** ESC Inspection Memo

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					Dianna from AE has advised Richco to set up a wash station at Eng Pit. A wash station was setup on Eng road. Every vehicle exiting Eng Pit is being washed down before leaving.				
9	N/A	Resolved	H	Relocation of portable toilet	Portable toilets located adjacent to streambank of Carratt Creek must be moved to a location that is at least 15m away from the top of the bank.	Dec 14/22	Dec 15/22	Dec 15/22	N/A
10	N/A	Resolved	H	AE to provide LFN inspection memos to Richco/Jakes/AQS	Discussed with Rick onsite today and LFN and AE agreed to provide Richco/Jakes/AE with daily inspection memos	Dec 14/22	Dec 14/22	Dec 14/22	Dianna (AE) provided LFN report to date. AE will also provide our reports to LFN for review (ie LFN will be included in daily memos email).
11	N/A	Identified	L		Upon direction from AE, tree removal was required in order for equipment to access the channel at Station 1-020 on November 28 th , 2022 (see Figure 1).	Nov 28/22			Per the AE EMP – “Exposed areas caused from access clearing will be recontoured and seeded with grass after construction.”
12	N/A	Resolved	H	Washing station location	Wash station was relocated well away from watercourse.	Dec 15/22	Dec 15/22	Dec 15/22	N/A
13	N/A	Resolved	M	Drip trays not underneath parked machinery overnight	Drip trays should be placed underneath all machinery parked on the dike overnight.	Dec 16/22	Dec 16/22	Dec 16/22	Jakes did not put drip tray underneath the excavator before leaving for the day.

REFERENCES

Figure 1 – Design Drawing



PRICEWATERHOUSE COOPERS
BC MINISTRY OF ENVIRONMENT

WATERWAY SEDIMENT ASSESSMENT
PROPOSED EMERGENCY WORK
S-CR-28 CARRATT CREEK
2022-2462-00

SCALE: 1:1000

BRITISH COLUMBIA

pwc

PLAN
EMERGENCY WORKS

2462-00-C-2102

1 2

DRAFT

REV	DATE	REVISION	DESCRIPTION
1	2022-08-01	1	ISSUED FOR REVIEW
2	2022-08-01	1	ISSUED FOR REVIEW

Associated Engineering

WEST COAST ENGINEERING



PO Box 42
Fort Langley, B.C., V1M 2R4
Tel: 604-725-2914
Email: info@aqsrme.com

Environmental Monitoring Inspection Report for December 19th, 2022

Project Name:	Carratt Creek Flood Mitigation Works
Reporting Period:	December 19 th , 2022
Time of day:	All-day
Weather:	-10°C; Cloudy/snow
Environmental Monitor:	Jennifer Heldt, B.Env.
Report authored by:	Jennifer Heldt, B.Env.
Report reviewed by:	Patrick Ehnes, R.B.Tech, ASCT., BC-CESCL
Client:	Richco Contracting Ltd.
Date submitted:	Via email - December 21 st , 2022
Submitted to:	Rich Van Geel rich@richco.ca

AquaSilva Resource Management (AQS) is conducting Environmental Monitoring for the Carratt Creek Flood Mitigation Works to confirm compliance with provincial and federal regulatory requirements. Monitoring activities include photo documentation, Environmental & ESC observations, observing potential impacts on fish/wildlife habitat, and observing all in-stream works.

Environmental Monitoring (EM) and Erosion and Sediment Control (ESC) monitoring was conducted by AquaSilva Resource Management Ltd. (AQS) to confirm site compliance with provincial and federal requirements.

Acronyms:

AE	Associated Engineering Ltd.
BCWQG	British Columbia Water Quality Guidelines
CEMP	Construction Environmental Management Plan
DFO	Fisheries and Oceans Canada
EM	Environmental Monitor
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FVRD	Fraser Valley Regional District
LFNM	Leq'á:mel First Nation Monitor
MOF	Ministry of Forest
MOT	Ministry of Transportation
RICHCO	Richco Contracting Ltd.
JAKES	Jakes Construction Ltd.

ENVIRONMENTAL MONITORING ACTIVITIES DURING THIS PERIOD

Environmental Monitoring Activity	Yes	No	Comments
In-situ Water Quality Testing	√		Turbidity samples were obtained directly upstream and downstream from the worksite.
Photo Documentation	√		Photographs of the works were taken.
Environmental & Erosion and Sediment Control Observations	√		• Marginal flows were observed infiltrating into the streambed approximately 400 meters upstream of Carratt Road Bridge (ie no surficial connection to downstream habitat) before flow reintroduction. • A “dry channel” was observed from the site downstream to the confluence with Cascade Creek. • Large woody debris within the channel was moved above the highwater mark. • Richco - No flows observed in work site. • Richco - Continued to load trucks from the dike road. Removing material upstream of Carratt Road bridge was completed. HECSO basket installation was completed. • Jakes – Diversion plan was discussed with onsite AE, Richco, Jakes and AQS. Jakes created a berm across the avulsion channel to slowly reintroduce flows into Carratt Creek. Once diversion was place and flows flowed into the main channel, the excavator walked through the forest/avulsion area in the dry to the existing dike road. • Water flowed through the excavated channel to a point where it infiltrated to ground approximately 700 meters upstream of the confluence with Cascade Creek. • Upon recent information being provided of known Japanese Knotweed at the Eng Pit site by AE, AE requested that EM conduct assessment of active site for Knotweed. No Knotweed was observed within Carratt Creek to date.
Site Isolation & Bypass Measures Implemented	√		• Channel flow is currently disconnected/flows terminate to ground downstream. • No bypass pumping and site isolation currently required today (ie meter bag dams or steel plates) • Water within the site terminates to ground.

Environmental Monitoring Activity	Yes	No	Comments
Fish & amphibian salvages		√	- Channel dry, area scanned for potential amphibians, none observed, and no salvages required. - Fish fence installed at downstream end to prevent fish from entering work site. - No fish salvages required today due to dry channel.
Invasive Species Management	√		- Japanese Knotweed (noxious weed) and Flowering Rush have been identified at the Eng Pit disposal site area. - Items outlined in revised CEMP and email from MoF to be followed. - Wash station created issues near pit entrance due to icy conditions and posed a safety issue for trucks, wash station truck and crews (water freezing on road). Wash station was relocated further down road to flat area as it was the only accessible location due to steep slopes during the inclement weather. Rick noted that they will watch the lower wash site location for any potential presence of flowering rush or knotweed in the spring.
Equipment/Vehicle Inspection and on-site storage	√		- All machinery used in or near the stream channel were observed to be in good operating condition and free of leaks, excess oil, and grease. - All machines and equipment are parked at the top of bank on the dike overnight in a stable location.
Visual Inspection for Contamination (Odour/staining)	√		No spills observed.
Dust Generation		√	No concerns observed.
Noise Monitoring		√	N/A
SPEA Integrity and Protection		√	N/A
Impacts on Habitat		√	Upon direction from AE, tree removal was required in order for equipment to access the channel at Station 1-020 on November 28 th , 2022 (see Figure 1).
Action Items	√		See table below.
Spill Kit Contents and Accessibility	√		Spill kits remain on-site in a readily accessible location for both contractors at all times during activities.

Environmental Monitoring Activity	Yes	No	Comments
Garbage	√		Garbage is collected and stored on vehicles to avoid potential for encounters with wildlife.
Spill Response Procedures Posted	√		Within EMP & CEMP
Environmental Incidents Identified/Reported to EM or by EM		√	N/A
Fuelling procedures compliance check	√		All refueling occurred on the existing access dike road.
Complete CEOR with crews/contractors	√		CEOR for project has been reviewed with Richco and Jakes.

Water Quality Summary Data

Monitoring Location	Date	Turbidity (NTU)
(1) Upstream of Site (Background)	Dec 19 th , 2022	2.46 NTU
(2) Downstream of Site	Dec 19 th , 2022	Overrange*

*However, infiltrates to ground within dry channel area 700 metres upstream from confluence with Cascade Creek.

Upcoming Activities

- Contractors to continue with instream works weather permitting.

Figures & Photographs



Photo 1. Richco loading haul trucks.



Photo 2. Jakes creating a berm across avulsion channel.



Photo 3. Reintroduced flows within Carratt Creek.

Action Items Tracking Table

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
1	1	Resolved	H	Completion of Contractor Environmental Orientation and record provided	CEOR has been completed and forwarded to the Contractors for distribution.	Dec 01/22	Dec 13/22	Dec 13/22	N/A
2	2 & 3	Resolved	L	Environmental monitoring reporting	AQS has been providing daily reporting through field inspection memos.	Dec 01/22	Everyday	Dec 13/22	N/A
3	5	Resolved	L	ESC and site isolation	Stockpiles within creek or near creek are temporary and hauled off site within the same working day since the commencement of the works. If rain (and increased surface flow) is anticipated, the mitigation measure thus far has been the Contractors pulling their equipment out of the stream and either continuing to work from the top of bank while deploying suitable bypass measures to allow increased flows to move around	Dec 01/22	Dec 13/22	Dec 13/22	N/A

¹L = Low Priority, complete as time permits
M = Medium Priority, ongoing maintenance or complete within one week
H = High Priority, complete immediately

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					the worksite or pausing works until flows have subsided.				
4	10	Resolved	L	No waste containers or bear-proof bins onsite	There is no action item other than reiterating that the contractors have kept the site clean, and garbage is contained on vehicles to be taken away at the end of the day.	Dec 01/22	Everyday		Garbage cans are not kept onsite as garbage may attract animals and pose a risk to work crews. All workers are advised to keep garbage within their vehicles and dispose off-site daily.
5	13	Resolved	H	Leaking equipment	All parked trucks will be inspected for leaks and to ensure a drip tray is placed underneath and overnight for all vehicles and machines.	Dec 01/22	Everyday		Trucks have been inspected and leaking vehicles have been removed from the site resulting in no more oil drips observed. Drip trays should be placed underneath all vehicles and machines that are left on site overnight.
6	16 & 19	Resolved	H	Upstream fish passage maintained	Maintaining fish passage is not an option in a stream where it is currently evident that fish stranding can occur due to lower water conditions that are being encountered this year because of the late rains (i.e., sections of channel are dry). Any spawning activity is likely done now (Bull/dolly), and the	Dec 01/22	Dec 13/22	Dec 13/22	AQS staff are well aware of the "plan" to salvage fish when required. In the event a salvage is required, fish will not be relocated upstream from the site. Fish stranding locations are

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					presence of anadromous salmonids in this system is likely nil given the fact that Hayward Lake is not anadromous salmon habitat. Fisheries Act Conditions of Authorization #22-HPAC-01308, Section 2.4.2: "Fish passage is to be maintained around the isolated work zones through the implementation of a diversion channel where practicable. Sites with expected adult salmon presence with spawning and/or overwintering habitat upstream should be prioritized for a diversion channel. If a diversion channel is not practicable and fish are observed holding below the work zone, ongoing fish salvage is required to relocate fish around the work zone;"				very evident in this stream due to lower water conditions. All fish and amphibians salvaged will be re-located downstream to Cascade Creek where permanent flows are observed and into suitable habitat that provides depth for cover.
7	24	Resolved	H	Reporting of turbidity event	AQS has been conducting full-time monitoring since requested by the contractor.	Dec 01/22	Everyday	Nov 26/22	AQS was initially requested to complete part-time monitoring at Carratt Creek. Once AQS was informed of the requirement for full-time monitoring, an EM has been on site every day to

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
									complete daily reporting and documentation of any non-compliance items. AQS did conduct part-time monitoring that day @ 3:45PM: DS turbidity: 3.67 NTUs. Therefore, AQS cannot provide comment on "turbidity event". Please provide details on the background and downstream NTUs readings during this "turbidity event".
8	28	Resolved	H	Best Management Practices to prevent spread of invasive species	AE has requested the contractor have AQS revise CEMP to reflect the recent updated environmental assessment information provided by AE to include mitigation measures and BMPs to address invasive Japanese Knotweed that exists at Eng Pit. AE also advised contractor to have AQS conduct assessment: "When the QP completes the site assessment, particular care should be taken to thoroughly search the upper polygon where it abuts Eng Pit. If it is determined that knotweed is not		Dec 15/22	Dec 15/22	Upon this request, AQS has conducted an assessment at Eng Pit site and Japanese Knotweed exists at the site. AQS also observed works near the Eng Pit. No Knotweed was observed within the channel works area. Avoidance is the main mitigation to be applied. Further details of mitigation have been

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					present within 30m of the project polygons and machinery will be limited to the polygon boundaries, then no further invasive plant measures are needed on this site". AE also notes: "Just to be clear, the QP in this would be the Environmental Monitor. Our environmental staff did a survey of the site before the definitive work extents were known. Now that we understand the full footprint, it would be up to the Environmental Monitor (AquaSilva) to assess the site and try and locate any invasive species." Richco has requested clarification from AE: "The recommendation of in place Mechanisms and Protocols to prevent the spread of invasive species is this for Carratt Creek Exiting Vehicles or Eng Pit? Is another Monitor required to manually inspect trucks and machinery activities? I don't believe there has been any Invasive plants observed at Carratt only Eng Pit where Knotweed has been identified an area Cautioned off to prevent entry." AE to provide updated response to Richco for the above questions.			outlined in the revised AQS CEMP. Also note that the CEMP is revised to reflect knotweed conditions at the site and contractors have been notified by AE.	

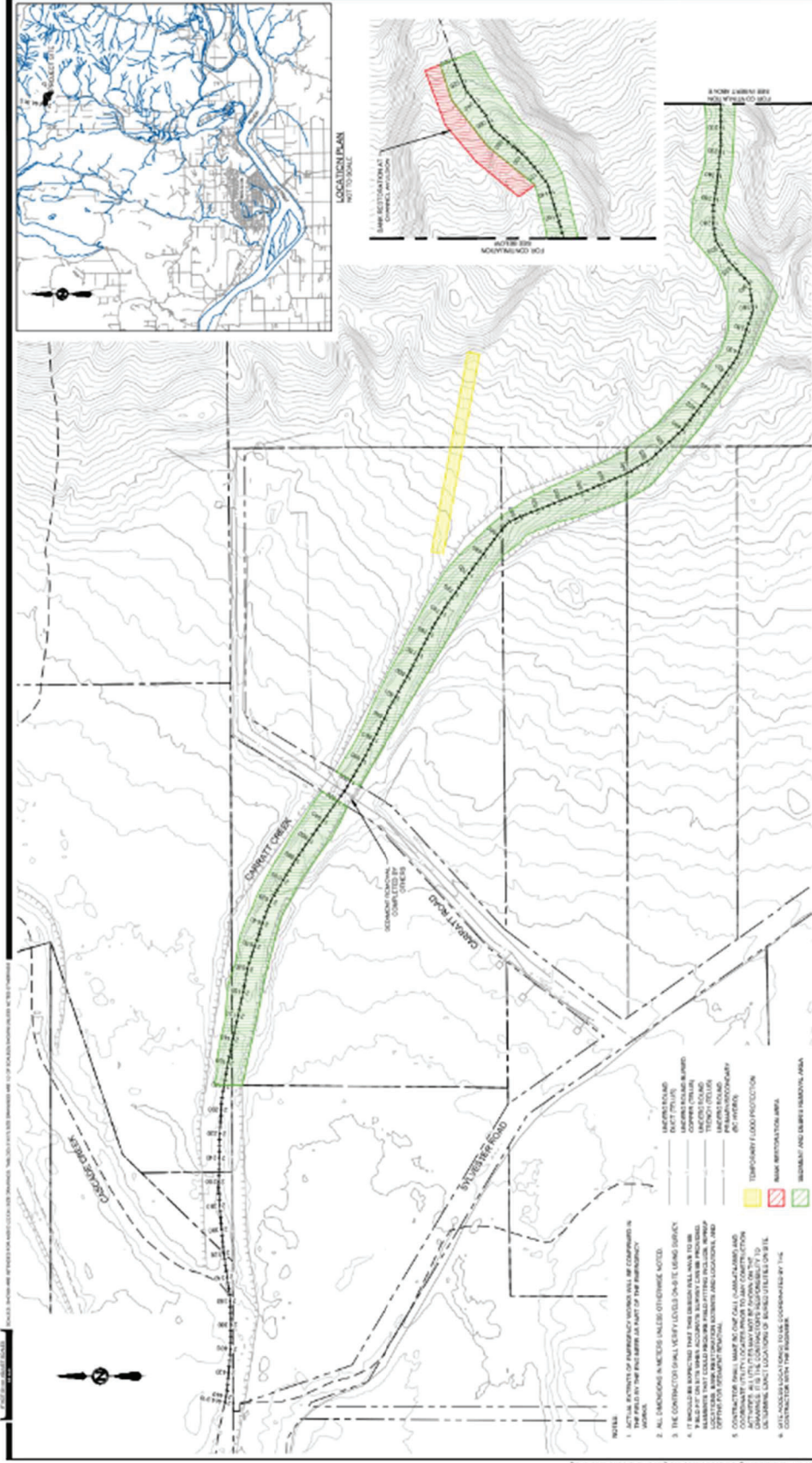
**AQUA
SILVA** ESC Inspection Memo

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					Dianna from AE has advised Richco to set up a wash station at Eng Pit. A wash station was setup on Eng road. Every vehicle exiting Eng Pit is being washed down before leaving.				
9	N/A	Resolved	H	Relocation of portable toilet	Portable toilets located adjacent to streambank of Carratt Creek must be moved to a location that is at least 15m away from the top of the bank.	Dec 14/22	Dec 15/22	Dec 15/22	N/A
10	N/A	Resolved	H	AE to provide LFN inspection memos to Richco/Jakes/AQS	Discussed with Rick onsite today and LFN and AE agreed to provide Richco/Jakes/AE with daily inspection memos	Dec 14/22	Dec 14/22	Dec 14/22	Dianna (AE) provided LFN report to date. AE will also provide our reports to LFN for review (ie LFN will be included in daily memos email).
11	N/A	Identified	L		Upon direction from AE, tree removal was required in order for equipment to access the channel at Station 1-020 on November 28 th , 2022 (see Figure 1).	Nov 28/22			Per the AE EMP – “Exposed areas caused from access clearing will be recontoured and seeded with grass after construction.”
12	N/A	Resolved	H	Washing station location	Wash station was relocated well away from watercourse.	Dec 15/22	Dec 15/22	Dec 15/22	N/A
13	N/A	Resolved	M	Drip trays not underneath parked machinery overnight	Drip trays should be placed underneath all machinery parked on the dike overnight.	Dec 16/22	Dec 16/22	Dec 16/22	Jakes did not put drip tray underneath the excavator before leaving for the day.

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
14	N/A	Identified	L	Wash station runoff	Follow up in the spring to assess wash station location to see if Knotweed and/or Flowering Rush is observed.	Dec 19/22	Spring 2023		Rick Mckamey (Leq'ámel First Nation Monitor) noted following up onsite in the spring to observe potential presence of the invasive vegetation.

REFERENCES

Figure 1 – Design Drawing



PRICEWATERHOUSE COOPERS
BC MINISTRY OF ENVIRONMENT

WATERWAY SEDIMENT ASSESSMENT
PROPOSED EMERGENCY WORK
S-CR-28 CARRATT CREEK
2022-2462-00

SCALE: 1:1000

DRAFT

Associated Engineering

AE

BRITISH COLUMBIA

pwc

PLAN
EMERGENCY WORKS

2462-00-C-2102

1 2



PO Box 42
Fort Langley, B.C., V1M 2R4
Tel: 604-725-2914
Email: info@aqsrme.com

Environmental Monitoring Inspection Report for December 21st, 2022

Project Name:	Carratt Creek Flood Mitigation Works
Reporting Period:	December 21 st , 2022
Time of day:	All-day
Weather:	-16°C; Clear/windy
Environmental Monitor:	Jennifer Heldt, B.Env.
Report authored by:	Jennifer Heldt, B.Env.
Report reviewed by:	Patrick Ehnes, R.B.Tech, ASCT., BC-CESCL
Client:	Richco Contracting Ltd.
Date submitted:	Via email - December 23 rd , 2022
Submitted to:	Rich Van Geel rich@richco.ca

AquaSilva Resource Management (AQS) is conducting Environmental Monitoring for the Carratt Creek Flood Mitigation Works to confirm compliance with provincial and federal regulatory requirements. Monitoring activities include photo documentation, Environmental & ESC observations, observing potential impacts on fish/wildlife habitat, and observing all in-stream works.

Environmental Monitoring (EM) and Erosion and Sediment Control (ESC) monitoring was conducted by AquaSilva Resource Management Ltd. (AQS) to confirm site compliance with provincial and federal requirements.

Acronyms:

AE	Associated Engineering Ltd.
BCWQG	British Columbia Water Quality Guidelines
CEMP	Construction Environmental Management Plan
DFO	Fisheries and Oceans Canada
EM	Environmental Monitor
EMP	Environmental Management Plan
FVRD	Fraser Valley Regional District
LFNM	Leq'á:mel First Nation Monitor
MOF	Ministry of Forest
MOT	Ministry of Transportation
RICHCO	Richco Contracting Ltd.
JAKES	Jakes Construction Ltd.

ENVIRONMENTAL MONITORING ACTIVITIES DURING THIS PERIOD

Environmental Monitoring Activity	Yes	No	Comments
In-situ Water Quality Testing	√		Turbidity samples were obtained within the worksite where flows infiltrate to ground.
Photo Documentation	√		Photographs of the works were taken.
Environmental & Erosion and Sediment Control Observations	√		• Marginal flows were observed infiltrating into the streambed approximately 450 meters upstream of Carratt Road Bridge (ie no surficial connection to downstream habitat) before flow reintroduction. • A “dry channel” was observed from the site downstream to the confluence with Cascade Creek. • Richco - No flows observed in work site. • Richco – Removed material from downstream of Carratt Bridge. Material was loaded into a truck from top of bank. • Jakes – Not on Site. • Contractors’ belongings were collected off the site (spill kits, equipment, garbage, etc.) • Portable toilets were removed from site and stored in the parking lot for transfer when weather permits. • Upon recent information being provided of known Japanese Knotweed at the Eng Pit site by AE, AE requested that EM conduct assessment of active site for Knotweed. No Knotweed was observed within Carratt Creek to date.
Site Isolation & Bypass Measures Implemented	√		• Channel flow is currently disconnected/flows terminate to ground downstream. • No bypass pumping and site isolation currently required today (ie meter bag dams or steel plates) • Water within the site terminates to ground.
Fish & amphibian salvages		√	• Channel dry, area scanned for potential amphibians, none observed, and no salvages required. • Fish fence installed at downstream end to prevent fish from entering work site. • No fish salvages required today due to dry channel.

Environmental Monitoring Activity	Yes	No	Comments
Invasive Species Management	√		- Japanese Knotweed (noxious weed) and Flowering Rush have been identified at the Eng Pit disposal site area. - Items outlined in revised CEMP and email from MoF to be followed.
Equipment/Vehicle Inspection and on-site storage	√		All machinery used in or near the stream channel were observed to be in good operating condition and free of leaks, excess oil, and grease.
Visual Inspection for Contamination (Odour/staining)	√		No spills observed.
Dust Generation		√	No concerns observed.
Noise Monitoring		√	N/A
SPEA Integrity and Protection		√	N/A
Impacts on Habitat		√	Upon direction from AE, tree removal was required in order for equipment to access the channel at Station 1-020 on November 28 th , 2022 (see Figure 1).
Action Items	√		See table below.
Spill Kit Contents and Accessibility	√		Spill kits remain on-site in a readily accessible location for both contractors at all times during activities.
Garbage	√		Garbage is collected and stored on vehicles to avoid potential for encounters with wildlife.
Spill Response Procedures Posted	√		Within EMP & CEMP
Environmental Incidents Identified/Reported to EM or by EM		√	N/A
Fuelling procedures compliance check	√		All refueling occurred on the existing access dike road.
Complete CEOR with crews/contractors	√		CEOR for project has been reviewed with Richco and Jakes.

Water Quality Summary Data

Monitoring Location	Date	Turbidity (NTU)
(1) Upstream of Site (Background)	Dec 21 st , 2022	Unable to obtain due to weather conditions
(2) Downstream of Site	Dec 21 st , 2022	31.4 NTU

*However, infiltrates to ground within dry channel area 750 metres upstream from confluence with Cascade Creek.

Upcoming Activities

- Contractors' works are complete.

Figures & Photographs



Photo 1. Richco removing material from downstream of Carratt Road bridge.



Photo 2. Completed works downstream of bridge.

Action Items Tracking Table

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
1	1	Resolved	H	Completion of Contractor Environmental Orientation and record provided	CEOR has been completed and forwarded to the Contractors for distribution.	Dec 01/22	Dec 13/22	Dec 13/22	N/A
2	2 & 3	Resolved	L	Environmental monitoring reporting	AQS has been providing daily reporting through field inspection memos.	Dec 01/22	Everyday	Dec 13/22	N/A
3	5	Resolved	L	ESC and site isolation	Stockpiles within creek or near creek are temporary and hauled off site within the same working day since the commencement of the works. If rain (and increased surface flow) is anticipated, the mitigation measure thus far has been the Contractors pulling their equipment out of the stream and either continuing to work from the top of bank while deploying suitable bypass measures to allow increased flows to move around	Dec 01/22	Dec 13/22	Dec 13/22	N/A

¹L = Low Priority, complete as time permits
M = Medium Priority, ongoing maintenance or complete within one week
H = High Priority, complete immediately

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					the worksite or pausing works until flows have subsided.				
4	10	Resolved	L	No waste containers or bear-proof bins onsite	There is no action item other than reiterating that the contractors have kept the site clean, and garbage is contained on vehicles to be taken away at the end of the day.	Dec 01/22	Everyday		Garbage cans are not kept onsite as garbage may attract animals and pose a risk to work crews. All workers are advised to keep garbage within their vehicles and dispose off-site daily.
5	13	Resolved	H	Leaking equipment	All parked trucks will be inspected for leaks and to ensure a drip tray is placed underneath and overnight for all vehicles and machines.	Dec 01/22	Everyday		Trucks have been inspected and leaking vehicles have been removed from the site resulting in no more oil drips observed. Drip trays should be placed underneath all vehicles and machines that are left on site overnight.
6	16 & 19	Resolved	H	Upstream fish passage maintained	Maintaining fish passage is not an option in a stream where it is currently evident that fish stranding can occur due to lower water conditions that are being encountered this year because of the late rains (i.e., sections of channel are dry). Any spawning activity is likely done now (Bull/dolly), and the	Dec 01/22	Dec 13/22	Dec 13/22	AQS staff are well aware of the "plan" to salvage fish when required. In the event a salvage is required, fish will not be relocated upstream from the site. Fish stranding locations are

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					presence of anadromous salmonids in this system is likely nil given the fact that Hayward Lake is not anadromous salmon habitat. Fisheries Act Conditions of Authorization #22-HPAC-01308, Section 2.4.2: "Fish passage is to be maintained around the isolated work zones through the implementation of a diversion channel where practicable. Sites with expected adult salmon presence with spawning and/or overwintering habitat upstream should be prioritized for a diversion channel. If a diversion channel is not practicable and fish are observed holding below the work zone, ongoing fish salvage is required to relocate fish around the work zone;"				very evident in this stream due to lower water conditions. All fish and amphibians salvaged will be re-located downstream to Cascade Creek where permanent flows are observed and into suitable habitat that provides depth for cover.
7	24	Resolved	H	Reporting of turbidity event	AQS has been conducting full-time monitoring since requested by the contractor.	Dec 01/22	Everyday	Nov 26/22	AQS was initially requested to complete part-time monitoring at Carratt Creek. Once AQS was informed of the requirement for full-time monitoring, an EM has been on site every day to

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
									complete daily reporting and documentation of any non-compliance items. AQS did conduct part-time monitoring that day @ 3:45PM: DS turbidity: 3.67 NTUs. Therefore, AQS cannot provide comment on "turbidity event". Please provide details on the background and downstream NTUs readings during this "turbidity event".
8	28	Resolved	H	Best Management Practices to prevent spread of invasive species	AE has requested the contractor have AQS revise CEMP to reflect the recent updated environmental assessment information provided by AE to include mitigation measures and BMPs to address invasive Japanese Knotweed that exists at Eng Pit. AE also advised contractor to have AQS conduct assessment: "When the QP completes the site assessment, particular care should be taken to thoroughly search the upper polygon where it abuts Eng Pit. If it is determined that knotweed is not		Dec 15/22	Dec 15/22	Upon this request, AQS has conducted an assessment at Eng Pit site and Japanese Knotweed exists at the site. AQS also observed works near the Eng Pit. No Knotweed was observed within the channel works area. Avoidance is the main mitigation to be applied. Further details of mitigation have been

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					present within 30m of the project polygons and machinery will be limited to the polygon boundaries, then no further invasive plant measures are needed on this site". AE also notes: "Just to be clear, the QP in this would be the Environmental Monitor. Our environmental staff did a survey of the site before the definitive work extents were known. Now that we understand the full footprint, it would be up to the Environmental Monitor (AquaSilva) to assess the site and try and locate any invasive species." Richco has requested clarification from AE: "The recommendation of in place Mechanisms and Protocols to prevent the spread of invasive species is this for Carratt Creek Exiting Vehicles or Eng Pit? Is another Monitor required to manually inspect trucks and machinery activities? I don't believe there has been any Invasive plants observed at Carratt only Eng Pit where Knotweed has been identified an area Cautioned off to prevent entry." AE to provide updated response to Richco for the above questions.			outlined in the revised AQS CEMP. Also note that the CEMP is revised to reflect knotweed conditions at the site and contractors have been notified by AE.	

**AQUA
SILVA** ESC Inspection Memo

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
					Dianna from AE has advised Richco to set up a wash station at Eng Pit. A wash station was setup on Eng road. Every vehicle exiting Eng Pit is being washed down before leaving.				
9	N/A	Resolved	H	Relocation of portable toilet	Portable toilets located adjacent to streambank of Carratt Creek must be moved to a location that is at least 15m away from the top of the bank.	Dec 14/22	Dec 15/22	Dec 15/22	N/A
10	N/A	Resolved	H	AE to provide LFN inspection memos to Richco/Jakes/AQS	Discussed with Rick onsite today and LFN and AE agreed to provide Richco/Jakes/AE with daily inspection memos	Dec 14/22	Dec 14/22	Dec 14/22	Dianna (AE) provided LFN report to date. AE will also provide our reports to LFN for review (ie LFN will be included in daily memos email).
11	N/A	Identified	L		Upon direction from AE, tree removal was required in order for equipment to access the channel at Station 1-020 on November 28 th , 2022 (see Figure 1).	Nov 28/22			Per the AE EMP – “Exposed areas caused from access clearing will be recontoured and seeded with grass after construction.”
12	N/A	Resolved	H	Washing station location	Wash station was relocated well away from watercourse.	Dec 15/22	Dec 15/22	Dec 15/22	N/A
13	N/A	Resolved	M	Drip trays not underneath parked machinery overnight	Drip trays should be placed underneath all machinery parked on the dike overnight.	Dec 16/22	Dec 16/22	Dec 16/22	Jakes did not put drip tray underneath the excavator before leaving for the day.

No.	AE Item No. (if applicable)	Current Status	Priority ¹	Issue Description	Action Taken/Recommended	Date Identified	Target Completion Date	Date Completed	Comments
14	N/A	Identified	L	Wash station runoff	Follow up in the spring to assess wash station location to see if Knotweed and/or Flowering Rush is observed.	Dec 19/22	Spring 2023		Rick Mckamey (Leq'ámel First Nation Monitor) noted following up onsite in the spring to observe potential presence of the invasive vegetation.

REFERENCES

Figure 1 – Design Drawing



Leq'á:mel First Nation

43101 Leq'á:mel Way, Deroche BC V0M 1G0
(604) 826-7976 www.leqamel.ca

Natural Resource Department: Daily Environmental Monitoring Report

Report Number: 006		Location (Or Closest Address): Carratt Creek, Carratt Cr. Rd. – Hatzic Prairie			
Date: 2022-12-10	Time: 8:30am – 3pm				
Monitor Name: Tina Pederson		Signature:			
Meetings: NA					
Meeting Participants: NA					
Contractor(s) On Site: - Jakes Construction - Richco Construction - Aqua Silva Environmental - Associated Engineering		Name of Construction Representative Present: - Brett (Jakes) - Mark (Richco) - Jenn (A.S.) - Hoiyen (A.E.)			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 1°- 2° Low cloud coverage, consistent rain fall in the morning tapering off in the afternoon.					
Ground Conditions: Dry ☐ Wet ☒ Saturated ☐					
Completed Construction Activities (Since Last Visit): - Hesco basket line approximately 75%. - Upper reach bank stabilization/armoring					
Construction Activities: - Hesco Basket install - Rock and bedload removal upper reach / toe - Bedload removal lower reach - Transfer of bedload/rock upper reach to lower reach with haul truck. - Lower reach loading bedload/rock for transfer to Eng Rd. Pit. - Prepping toe of upper reach for opening to main channel.			Photos: # 1 # 2		
Construction Equipment Being Used: - Hitachi 245 - Hitachi 350 - Hitachi 350 - 2 X Deere 300D haul truck - 3 X Dump trucks			Photos: 		
Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)					
Boundary Flagging	OK	NC	NA	Comments & Mitigation	Photos:
General Construction	X				# 3
Riparian Zone(s)	X				
Env. Sensitive Features	X				
Other					
Water Quality	OK	NC	NA	Comments & Mitigation	Photos:
Turbidity	X			Low levels of turbidity visible.	
Temperature			X		

Natural Resource Department: Daily Environmental Monitoring Report

DO			X		
pH			X		
Conductivity			X		
Other					
Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing	X				
Bank Stabilization	X				
Soil Stockpiles			X		
Drainage & Diversions	X				
Detention Facilities			X		
Other					
Fuel & Oil Management	OK	NC	NA	Comments & Mitigation	Photos:
Spill Kits/SPER Plan	X				
Fuel Storage	X				
Other					
Equipment	OK	NC	NA	Comments & Mitigation	Photos:
Condition (leaks, etc.)	X				
Initial Cleaning (Mud, Seeds)	X				
Other					
Waste Management	OK	NC	NA	Comments & Mitigation	Photos:
Sanitary Facilities	X				
Solid Waste & Recycling		X		No visible waste or recycling.	
Special Waste & Hazardous Materials			X		
Other					
Atmosphere	OK	NC	NA	Comments & Mitigation	Photos:
Dust	X				
Air Quality	X				
Other					
Vegetation Management	OK	NC	NA	Comments & Mitigation	Photos:
Invasive Plants		X		Invasive plants found at Eng Rd pit (tipping location for Carratt Cr. materials).	
Other					
General Observations & Comments (Wildlife, New Sensitive Features, etc.):					Photos:
No visible signs or finding of archaeological or cultural evidence in upper/lower reach areas. No visible signs of Japanese Knotweed or flowering rush, in upper/lower reach areas of Carratt Creek.					
Other Comments:					Photos:
A.S Rep, found a significant amount of Japanese Knotweed at the Eng Rd pit on 2022-12-09 (tipping spot for Carratt Cr. materials). She was prompted to take a closer look after receiving word that there may be invasive plant species present at Eng Rd pit. Upon closer inspection the Knotweed appeared to be throughout the original tipping location and in direct contact with the Richco Hitachi 245 machine. The Richco Hitachi 245 was used to manage the tipped materials at Eng Rd pit for the first week of this project. On approximately 2022-12-02 the hitachi 245 was transferred to Carratt Cr, to be used for the Hesco basket install. The hitachi 245 was not cleaned before it was transported from Eng Rd pit to Carratt Creek.					

4

Natural Resource Department: Daily Environmental Monitoring Report

Currently there are no known precautions being taken against spreading the invasive plants from Eng Rd pit to other locations. It was also noted that there may be other invasive plant species present at Eng Rd pit, as it has been used as a dumping location for other invasive species such as flowering rush.	
Upcoming Construction Events:	
Incident Report Required? Yes ☐ No ☒	



Photo # 1



Photo # 2



Photo # 3



Photo # 4



Leq'á:mel First Nation
 43101 Leq'á:mel Way, Deroche BC V0M 1G0
 (604) 826-7976 www.leqamel.ca

Natural Resource Department:
Daily Environmental Monitoring Report

Report Number:001		Location (Or Closest Address):	
Date:2022-11-24	Time: 8AM-11AM	Carratt Creek, Carratt RD – Hatzic Prairie	
Monitor Name: Jason Thompson		Signature:	
Meetings:			
Meeting Participants:			
Contractor(s) On Site: Jake's Construction; Richco		Name of Construction Representative Present:	
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 8°/4°; Cloud cover; no rain			
Ground Conditions: Dry ☐ Wet ☒ Saturated ☐			
Completed Construction Activities (Since Last Visit): Jake's and Richco moved some heavy equipment in to work area on 2022-11-23			
Construction Activities: Prepping access for lower reach(Richco Contracting); and upper reach (Jake's Contracting)			Photos:
Construction Equipment Being Used: 350 LC Hitachi(x2); 345 LC Hitachi(x1); 245 LC Hitachi(x1)			Photos:
Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)			
Boundary Flagging	OK	NC	NA
General Construction			
Riparian Zone(s)			
Env. Sensitive Features			
Other			
Water Quality	OK	NC	NA
Turbidity	X		
Temperature			
DO			
pH			
Conductivity			
Other			

**Natural Resource Department:
Daily Environmental Monitoring Report**

Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing			X		
Bank Stabilization			X		
Soil Stockpiles			X		
Drainage & Diversions			X		
Detention Facilities			X		
Other					
Fuel & Oil Management	OK	NC	NA	Comments & Mitigation	Photos:
Spill Kits/SPER Plan	X			Spill kits/trays onsite & in-use	
Fuel Storage	X				
Other					
Equipment	OK	NC	NA	Comments & Mitigation	Photos:
Condition (leaks, etc.)	X			Equipment appeared leak free before work start	
Initial Cleaning (Mud, Seeds)	X			Equipment appeared leak free before work start	
Other					
Waste Management	OK	NC	NA	Comments & Mitigation	Photos:
Sanitary Facilities			X	None visible on-site at the time of site visit	
Solid Waste & Recycling			X	None visible on-site at the time of site visit	
Special Waste & Hazardous Materials			X	None visible on-site at the time of site visit	
Other					
Atmosphere	OK	NC	NA	Comments & Mitigation	Photos:
Dust	X				
Air Quality	X				
Other					
Vegetation Management	OK	NC	NA	Comments & Mitigation	Photos:
Invasive Plants	X			No visible Japanese Knotweed nearby	
Other					
General Observations & Comments (Wildlife, New Sensitive Features, etc.): Riparian: mostly cottonwood, red cedar, big leaf maple and hemlock; some blackberry, no visible Japanese knotweed Const. Activity: Access prep for upper and lower reaches to mobilize excavators and rock trucks into excavation areas Creek Conditions: wetted approximately 1m width x 16-32cm in some places; gravel/cobble substrate in lower reach; large cobble/boulder in upper reach with large woody debris; no fish visible; eroded/exposed cedar/maple/hemlock root masses in upper reach in-stream					Photos:
Other Comments: Cultural Monitoring: no visible archaeological evidence during in-stream walk of lower & upper reaches; no visible culturally modified trees along riparian areas along upper reach. Other: two excavators and one bulldozer parked along downstream dyke of Carratt Creek are privately owned and do not belong to Jake's or Richco.					Photos:
Upcoming Construction Events: 					
Incident Report Required? Yes ☐ No ☐					

Natural Resource Department:
Daily Environmental Monitoring Report

PHOTO LOG – 2022/11/24

PHOTO #1 – Spill Response kits located onsite



PHOTO #2 - Jake's Excavation downstream of Carratt Rd Bridge; privately owned equipment parked along access rd of lower reach.



PHOTO #3 – Jake's excavation of lower reach upstream of Carrat Rd Bridge



PHOTO #4 – Richco's excavator prepping access for temporary crossings to upper reach





Leq'á:mel First Nation
 43101 Leq'á:mel Way, Deroche BC V0M 1G0
 (604) 826-7976 www.leqamel.ca

Natural Resource Department:
Daily Environmental Monitoring Report

Report Number:002		Location (Or Closest Address):			
Date:2022-11-25	Time: 8AM-11AM	Carratt Creek, Carratt RD – Hatzic Prairie			
Monitor Name: Jason Thompson		Signature:			
Meetings:					
Meeting Participants:					
Contractor(s) On Site: Jake's Construction; Richco		Name of Construction Representative Present:			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 8°/4°; Heavy rain and overcast					
Ground Conditions: Dry ☐ Wet ☒ Saturated ☐					
Completed Construction Activities (Since Last Visit): Prepping access for lower reach(Richco Contracting); and upper reach (Jake's Contracting)					
Construction Activities:			Photos:		
Construction Equipment Being Used: 350 LC Hitachi(x2); 345 LC Hitachi(x1); 245 LC Hitachi(x1)			Photos:		
Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)					
Boundary Flagging	OK	NC	NA	Comments & Mitigation	Photos:
General Construction	X			Street Sweeper brought in for track-out on road	
Riparian Zone(s)					
Env. Sensitive Features					
Other					
Water Quality	OK	NC	NA	Comments & Mitigation	Photos:
Turbidity		X			
Temperature					
DO					
pH					
Conductivity					
Other					

**Natural Resource Department:
Daily Environmental Monitoring Report**

Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing			X		
Bank Stabilization			X		
Soil Stockpiles			X		
Drainage & Diversions		X			
Detention Facilities			X		
Other					
Fuel & Oil Management	OK	NC	NA	Comments & Mitigation	Photos:
Spill Kits/SPER Plan	X			Spill kits/trays onsite & in-use during time of site visit	
Fuel Storage	X				
Other					
Equipment	OK	NC	NA	Comments & Mitigation	Photos:
Condition (leaks, etc.)	X			Equipment appeared leak free before work start	
Initial Cleaning (Mud, Seeds)	X			Equipment appeared leak free before work start	
Other					
Waste Management	OK	NC	NA	Comments & Mitigation	Photos:
Sanitary Facilities			X	None visible on-site at the time of site visit	
Solid Waste & Recycling			X	None visible on-site at the time of site visit	
Special Waste & Hazardous Materials			X	None visible on-site at the time of site visit	
Other					
Atmosphere	OK	NC	NA	Comments & Mitigation	Photos:
Dust	X				
Air Quality	X				
Other					
Vegetation Management	OK	NC	NA	Comments & Mitigation	Photos:
Invasive Plants	X			No visible Japanese Knotweed nearby	
Other					
General Observations & Comments (Wildlife, New Sensitive Features, etc.): Const. Activity:: Richco operating in upper reach to continue work on temporary crossing into upper reach; Jake's operating in lower reach to centralize stream channel and loading into gravel trucks for transport to pit on Eng Rd Creek Conditions: Visibly turbid water due to excavation activities and heavy rains					Photos:
Other Comments: Cultural Monitoring: No visible cultural heritage or archeological evidence during downstream walk of Carratt Creek to main channel; no visible signs of fish or amphibians Other:					Photos:
Upcoming Construction Events:					
Incident Report Required? Yes ☐ No ☐					

Natural Resource Department:
Daily Environmental Monitoring Report

PHOTO LOG – 2022/11/24

PHOTO #1 – Richco working on temporary crossing into upper reach



PHOTO #2 - Jake's working on diversion channel; visibly turbid water seen downstream

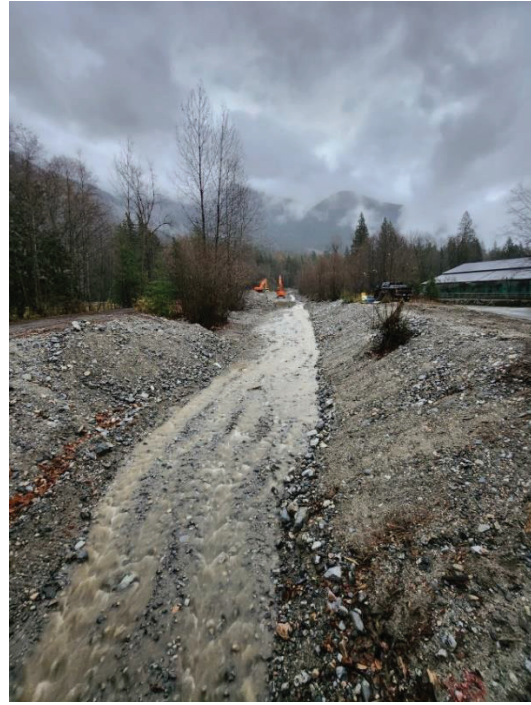


PHOTO #3 – Spill trays and Spill kit onsite



PHOTO #4 – Inside spill kit





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Natural Resource Department: Daily Environmental Monitoring Report

Report Number: 003		Location (Or Closest Address):			
Date: 2022-11-28	Time: 8am – 5pm	Carrott creek, Carrott cr. Rd.			
Monitor Name: Tina Pederson		Signature:			
Meetings:					
Safety Meeting					
Meeting Participants:					
Jakes Construction crew & Richco Contracting crew					
Contractor(s) On Site: Richco contracting & Jakes construction		Name of Construction Representative Present: Brett (Jakes) & Mark (Richco)			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): -1 / +2 degrees, Sunny w/clear sky.					
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐					
Completed Construction Activities (Since Last Visit): Across Bridge set up & base prep for haul truck access to upper reach. Sediment removal lower reach area & Base prep for haul truck access to upper reach area					
Construction Activities: Sediment removal lower reach area (Richco). Prep for haul truck access for upper reach area (Jakes). Fish screen set up at lower portion of Carratt Creek/ Cascade Creek (preventative) (Jen - Aqua Silva environmental). Base prep upper & lower reach.			Photos:		
			#1		
			#2		
Construction Equipment Being Used: (Richco Equipment - Hitachi 350, Hitachi 345, Hitachi 245, Kubota SSV 375) (Jakes Equipment - Hitachi 350, Deere 345G) Across bridge, 3 x Dump trucks			Photos:		
Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)					
Boundary Flagging	OK	NC	NA	Comments & Mitigation	Photos:
General Construction	OK			Street sweeper to keep paved road free of debris.	
Riparian Zone(s)	Ok				

Env. Sensitive Features	Ok				
Other					
Water Quality	OK	NC	NA	Comments & Mitigation	Photos:
Turbidity	Ok				
Temperature	Ok				
DO					
pH					
Conductivity					
Other					

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing			Na		
Bank Stabilization	Ok				
Soil Stockpiles	Ok				
Drainage & Diversions	Ok				
Detention Facilities			Na		
Other					
Fuel & Oil Management	OK	NC	NA	Comments & Mitigation	Photos:
Spill Kits/SPER Plan	Ok				#5
Fuel Storage	Ok				
Other					
Equipment	OK	NC	NA	Comments & Mitigation	Photos:
Condition (leaks, etc.)		NC		Leak/spill spotted in upper reach (JAKES machines area). Operator & Hoyan (A&E) notified.	#4
Initial Cleaning (Mud, Seeds)	Ok				
Other (Drip trays)		NC		All machines parked for night without the use of a drip tray.	
Waste Management	OK	NC	NA	Comments & Mitigation	Photos:
Sanitary Facilities	Ok				#6
Solid Waste & Recycling				None visible on site.	
Special Waste & Hazardous Materials				None visible on site.	
Other					
Atmosphere	OK	NC	NA	Comments & Mitigation	Photos:
Dust	Ok				
Air Quality	Ok				
Other					
Vegetation Management	OK	NC	NA	Comments & Mitigation	Photos:
Invasive Plants				Nonvisible. Japanese Knotweed nearby	
Other					
General Observations & Comments (Wildlife, New Sensitive Features, etc.):					Photos:
Rainbow trout found in lower reach and safely relocated to Cascade creek by Jen from Aqua Silva, no other fish have been seen so far. Jakes continues to clear an access for haul trucks into the upper reach in prep for fan diversion. Richco removing sediment and preparing access for haul tucks in lower reach.					

Other Comments: No visible cultural heritage or archaeological evidence during up stream walk of Carratt Creek. No visible signs amphibians.	Photos:
Upcoming Construction Events:	
Incident Report Required? Yes ☐ No ☒	

Natural Resource Department: Daily Environmental Monitoring Report



Photo #1



Photo #2



Photo #3



Photo #4



Photo #5



Photo #6



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Natural Resource Department: Daily Environmental Monitoring Report

Report Number: 004		Location (Or Closest Address):			
Date: 2022-11-29	Time: 8 - 5	Carrott Creek, Carrott Cr. Rd. - Hatzic Prairie			
Monitor Name: Tina Pederson		Signature:			
Meetings: Safety Meeting					
Meeting Participants: Richco Crew & Jakes Crew					
Contractor(s) On Site: Richco Contracting & Jakes Construction		Name of Construction Representative Present: Brett (Jakes) Mark (Richco)			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): -2 degrees, overcast with snow flurries towards end of the day.					
Ground Conditions: Dry ☒ Wet ☒ Saturated ☐					
Completed Construction Activities (Since Last Visit): Haul truck access completed for upper reach, actively loading out rock/sediment from upper reach area. (Jakes) Sediment removal continued on lower reach area. Loading dump trucks with material from the upper reach area. (Richco)					
Construction Activities: Across bridge moved to lower reach access point. Haul truck loading, upper reach material to lower reach exchange point (Jakes). Sediment removal, loading dump trucks and creek repair lower reach (Richco).			Photos: #1 #2		
Construction Equipment Being Used: Richco - Hitachi 345, Hitachi 350, Hitachi 245, Kubota ssv 75 Jakes - Hitach 350, Deere 345			Photos:		
Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)					
Boundary Flagging	OK	NC	NA	Comments & Mitigation	Photos:
General Construction	Ok				
Riparian Zone(s)	Ok				
Env. Sensitive Features	Ok				
Other					
Water Quality	OK	NC	NA	Comments & Mitigation	Photos:
Turbidity	Ok				
Temperature	OK				
DO					
pH					
Conductivity					
Other					

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing			Na		
Bank Stabilization	OK				
Soil Stockpiles	Ok				
Drainage & Diversions	Ok				
Detention Facilities			Na		
Other					
Fuel & Oil Management	OK	NC	NA	Comments & Mitigation	Photos:
Spill Kits/SPER Plan	Ok				
Fuel Storage	Ok				
Other					
Equipment	OK	NC	NA	Comments & Mitigation	Photos:
Condition (leaks, etc.)					
Initial Cleaning (Mud, Seeds)	Ok				
Other					
Waste Management	OK	NC	NA	Comments & Mitigation	Photos:
Sanitary Facilities	Ok				
Solid Waste & Recycling				No waste or recycling visible.	
Special Waste & Hazardous Materials				No special waste & hazardous materials visible.	
Other					
Atmosphere	OK	NC	NA	Comments & Mitigation	Photos:
Dust	Ok				
Air Quality	Ok				
Other					
Vegetation Management	OK	NC	NA	Comments & Mitigation	Photos:
Invasive Plants	Ok			None visible. Japanes knotweed nearby.	
Other					
General Observations & Comments (Wildlife, New Sensitive Features, etc.): Jakes continues to prep for upper reach fan diversion. Trevor (assotiated engineering) prepares a plan with Jakes for location of Hesco baskets location. Travis (Richco) oporating machine for recieved materials at Eng Rd. pit. Turbidity reading 1.47 down steam, 1.02 NTU up stream end of day. Jen (Aqua Silva)					Photos:
					#3
					#4
Other Comments: No Visible cultural heritage or archaeological evidence found today at Carrott Creek. No visible signs of fish or amphibians. Jakes adressed the in stream leak/spill from 2022-11-28, during morning safety meeting.. Richco used drip trays for all of thier machines at end of day.					Photos:
					#5
					#6
Upcoming Construction Events: Installation of Hesco baskets later this week or possibly next week. Jakes considering swapping smaller 245 Hitachi from the pit for the 345 Hitachi currently working in the lower reach, for ground preperation for baskets.					
Incident Report Required? Yes ☐ No ☒					

Natural Resource Department: Daily Environmental Monitoring Report



Photo #1



Photo #2



Photo #3



Photo #4



Photo #5



Photo #6



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Natural Resource Department:
Daily Environmental Monitoring Report

Report Number:003		Location (Or Closest Address):	
Date:2022-12-01	Time: 730AM-1130AM	Carratt Creek, Carratt RD – Hatzic Prairie	
Monitor Name: Jason Thompson		Signature:	
Meetings:			
Meeting Participants:			
Contractor(s) On Site: Jake's Construction; Richco; Associated Engineering; Aqua Silva Resource Management Ltd		Name of Construction Representative Present:	
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): -3°/-9°; Wind chill = -12°; No rain, blue/cloudy skies; approximately 16cm of snow; icy conditions			
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐			
Completed Construction Activities (Since Last Visit): Prepping access for lower reach(Richco Contracting); and upper reach (Jake's Contracting)			
Construction Activities: Access route moved to in-stream after insertion of diversion channel in order to better access upper reach; Skid Steer removing snow & sweeping Carratt Rd & parking areas; Excavators snow clearing of upper reach access road, bedload loaded for transport to Davies gravel pit			Photos:
Construction Equipment Being Used: 350 LC Hitachi(x2); 345 LC Hitachi(x1); 245 LC Hitachi(x1); Davies dump trucks(x4); Jake's Rock Trucks(x3)			Photos:
Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)			
Boundary Flagging	OK	NC	NA
General Construction	X		
Riparian Zone(s)			
Env. Sensitive Features			
Other			
Water Quality	OK	NC	NA
Turbidity	X		
Temperature			
DO			
pH			
Conductivity			
Other			

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing			X	No silt fencing require at this point, onsite if needed	
Bank Stabilization			X		
Soil Stockpiles			X		
Drainage & Diversions	X				
Detention Facilities			X		
Other				Fish fence installed at confluence to main channel	
Fuel & Oil Management	OK	NC	NA	Comments & Mitigation	Photos:
Spill Kits/SPER Plan	X			Spill kits/trays onsite & in-use during time of site visit	
Fuel Storage	X				
Other					
Equipment	OK	NC	NA	Comments & Mitigation	Photos:
Condition (leaks, etc.)	X			Equipment appeared leak free before work start	
Initial Cleaning (Mud, Seeds)	X			Equipment appeared leak free before work start	
Other					
Waste Management	OK	NC	NA	Comments & Mitigation	Photos:
Sanitary Facilities	X			Port-Potty onsite in two locations	
Solid Waste & Recycling			X	None visible on-site at the time of site visit	
Special Waste & Hazardous Materials			X	None visible on-site at the time of site visit	
Other					
Atmosphere	OK	NC	NA	Comments & Mitigation	Photos:
Dust	X				
Air Quality	X				
Other					
Vegetation Management	OK	NC	NA	Comments & Mitigation	Photos:
Invasive Plants	X			No visible Japanese Knotweed nearby	
Other					
General Observations & Comments (Wildlife, New Sensitive Features, etc.): Const. Activity: Jake's moved access route into creekbed after diversion channel was opened up in previous week; Bedload removed from upper reach and transported into lower reach, loaded into Davies trucks and transported to gravel pit Creek Conditions: Water is wetted to approximately 1m wide x 6-12cm deep in some spots; no turbidity; no signs of fish in creek, although some signs of Rainbow Trout at confluence of main channel; fish fence installed Fuel/Waste: No visible spills or equipment leaks; Spill trays(kiddie pools) and spill kits on-site at multiple locations in upper/lower reaches;					Photos:
Other Comments: Cultural Monitoring: No visible cultural heritage or archeological evidence during downstream walk of Carratt Creek to main channel; no visible signs of fish, amphibians; or terrestrial wildlife					Photos:
Upcoming Construction Events:					
Incident Report Required? Yes ☐ No ☐					

Natural Resource Department:
Daily Environmental Monitoring Report

PHOTO LOG – 2022/12/01

PHOTO #1 – Street sweeper for Skid Steer



PHOTO #2 - Bottom of wetted reach, approx. 100m upstream of Carratt Rd Bridge

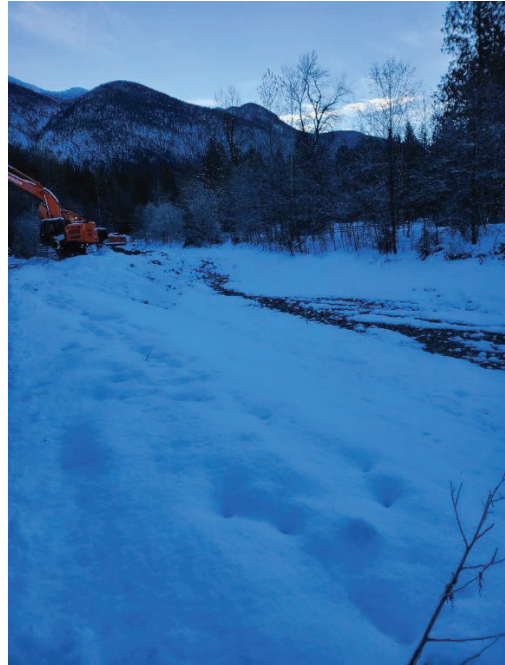


PHOTO #3 – Fish fence at bottom of Carratt Creek, approx.. 20m upstream of main channel



PHOTO #4 – Porto-potty and spill tray(kiddie pool)



**Natural Resource Department:
Daily Environmental Monitoring Report**

PHOTO LOG – 2022/12/01

PHOTO #5 – Temporary crossing to access upper reach



PHOTO #6 - Porto-potty and spill kit located in upper reach, adjacent to temporary crossing



PHOTO #7 – 1 of 2 excavators operating in upper reach



PHOTO #8 – 2 of 2 excavator operating in upper reach





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Natural Resource Department:
Daily Environmental Monitoring Report

Report Number:004		Location (Or Closest Address): Carratt Creek, Carratt RD – Hatzic Prairie			
Date:2022-12-02	Time: 10:30 30AM-1PM	Signature:			
Monitor Name: Jason Thompson					
Meetings:					
Meeting Participants:					
Contractor(s) On Site: Jake's Construction; Richco; Associated Engineering; Aqua Silva Resource Management Ltd		Name of Construction Representative Present:			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 1°/-3°; Wind chill = -12°; No rain, overcast w/expected flurries; approximately 16cm of snow; icy conditions					
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐					
Completed Construction Activities (Since Last Visit): Prepping upper reach for berm placement at top of upper reach; Prepping access road in lower reach for Hesco Baskets					
Construction Activities: Large boulder placement along berm at top of upper reach; Tree clearing for access road in top of lower reach in preparation of Hesco Basket arrival and placement; Continued load and transport of bedload to gravel pit			Photos:		
Construction Equipment Being Used: 350 LC Hitachi(x2); 345 LC Hitachi(x1); 245 LC Hitachi(x1); Davies dump trucks(x4); Jake's Rock Trucks(x3)			Photos:		
Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)					
Boundary Flagging	OK	NC	NA	Comments & Mitigation	Photos:
General Construction	X				
Riparian Zone(s)					
Env. Sensitive Features					
Other					
Water Quality	OK	NC	NA	Comments & Mitigation	Photos:
Turbidity	X			Creek visibly clear of turbidity	
Temperature					
DO					
pH					
Conductivity					
Other				Creek is frozen in lower reach; slushy in upper reach	

Natural Resource Department: Daily Environmental Monitoring Report

[illegible]

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Daily Environmental Monitoring Report

PHOTO LOG – 2022/12/02

PHOTO #1 – Boulder placement for berm at top of upper reach



PHOTO #2 - Tree and access road clearing in lower reach in preparation for Hesco Baskets



PHOTO #3 – Creek frozen in lower reach, unwetted approx. 100m upstream of Carratt Rd Bridge



PHOTO #4 – Cigarette butt discarded aside the access road into upper reach





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Natural Resource Department:
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Report Number:005		Location (Or Closest Address): Carratt Creek, Carratt RD – Hatzic Prairie			
Date:2022-12-05	Time: 9AM-2PM				
Monitor Name: Jason Thompson		Signature:			
Meetings:					
Meeting Participants:					
Contractor(s) On Site: Jake's Construction; Richco; Associated Engineering; Aqua Silva Resource Management Ltd		Name of Construction Representative Present:			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): -6°/2°; Cloudy/Fog; 3-7cm snow expected next 48 hours; approximately 6+cm snow onsite, icy/slushy access road conditions. Creek Conditions: <i>frozen/unwetted in lower reach, frozen/slushy in upper reach above temporary bridge crossing.</i>					
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐					
Completed Construction Activities (Since Last Visit): Boulder/berm placement along banks of upper reach; Access road work in prep for Hesco Baskets at top of lower reach.					
Construction Activities: Cont'd work on berm/boulder placement along banks of upper reach; cont'd work on access road in prep for Hesco baskets in lower reach; cont'd load/transport of bedload to gravel pit			Photos:		
Construction Equipment Being Used: 350 LC Hitachi(x2); 345 LC Hitachi(x1); 245 LC Hitachi(x1); Davies dump trucks(x4); Jake's Rock Trucks(x3)			Photos:		
Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)					
Boundary Flagging	OK	NC	NA	Comments & Mitigation	Photos:
General Construction	X				
Riparian Zone(s)					
Env. Sensitive Features					
Other					
Water Quality	OK	NC	NA	Comments & Mitigation	Photos:
Turbidity	X			Creek visibly clear of turbidity	
Temperature					
DO					
pH					
Conductivity					
Other				Creek is frozen in lower reach; slushy in upper reach	

Natural Resource Department: Daily Environmental Monitoring Report

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Natural Resource Department:
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PHOTO LOG – 2022/12/02

PHOTO #1 – Downstream-facing: Boulder material placement along bank-left

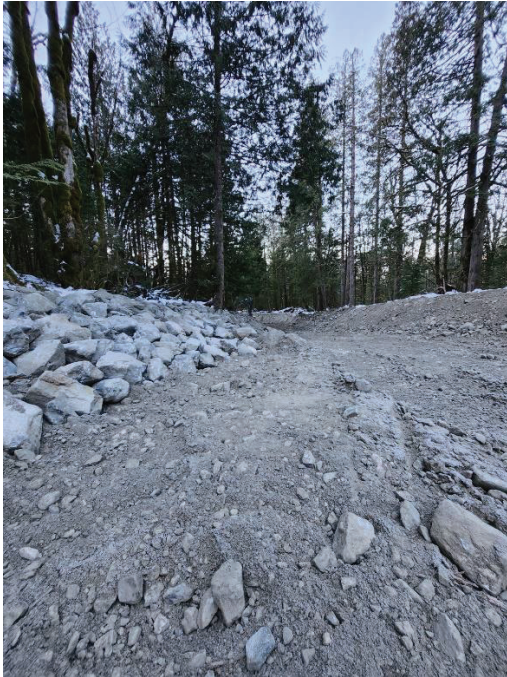


PHOTO #2 - Downstream-facing: Excavator pulling out large boulders before loading into rock truck

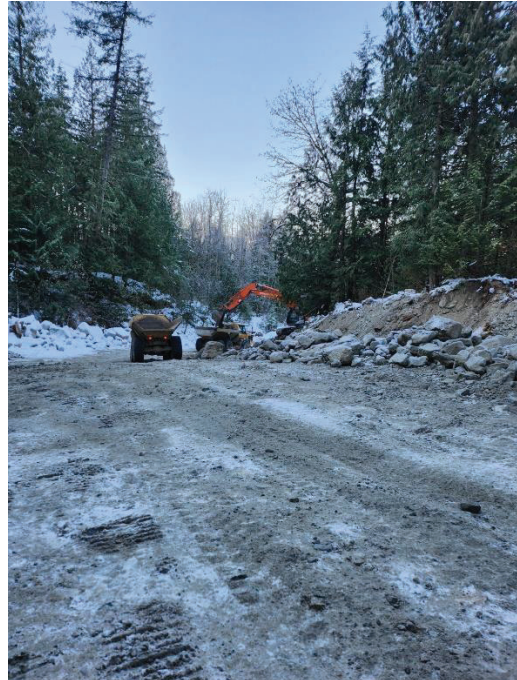


PHOTO #3 – Secondary access road work preparation for Hesco Baskets

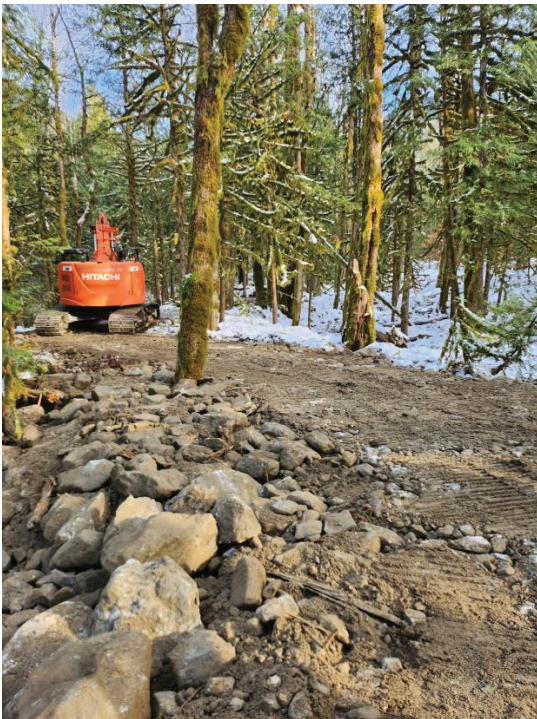


PHOTO #4 – Spill tray at beginning of worksite, adjacent to street sweeper





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Natural Resource Department:
Daily Environmental Monitoring Report

Report Number:006		Location (Or Closest Address):	
Date:2022-12-06	Time: 8AM-1:45PM	Carratt Creek, Carratt RD – Hatzic Prairie	
Monitor Name: Jason Thompson		Signature:	
Meetings:			
Meeting Participants:			
Contractor(s) On Site: Jake's Construction; Richco; Associated Engineering; Aqua Silva Resource Management Ltd		Name of Construction Representative Present:	
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 2°/-2°; Cloudy/Fog; approximately 6+cm snow onsite, icy/slushy access road conditions. Creek Conditions: <i>frozen/unwetted in lower reach, frozen/slushy in upper reach above temporary bridge crossing.</i>			
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐			
Completed Construction Activities (Since Last Visit): Berm/boulder placement along banks of upper reach; Access road in prep for Hesco baskets in lower reach; cont'd load/transport of bedload to gravel pit			
Construction Activities: Cont'd work on berm/boulder placement along banks of upper reach; cont'd work on access road in prep for Hesco baskets in lower reach; cont'd load/transport of bedload to gravel pit			Photos:
Construction Equipment Being Used: 350 LC Hitachi(x2); 345 LC Hitachi(x1); 245 LC Hitachi(x1); Davies dump trucks(x4); Jake's Rock Trucks(x3)			Photos:
Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)			
Boundary Flagging	OK	NC	NA
General Construction	X		
Riparian Zone(s)			
Env. Sensitive Features			
Other			
Water Quality	OK	NC	NA
Turbidity	X		
Temperature			
DO			
pH			
Conductivity			
Other			

Natural Resource Department: Daily Environmental Monitoring Report

[illegible]

Natural Resource Department:
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PHOTO LOG – 2022/12/06

PHOTO #1 – *Upstream facing* – loosely armored banks along upper reach & a line of small boulders



PHOTO #2 - *Upstream facing* – Bedload removal along lower radius in upper reach, SUV-sized boulder visible

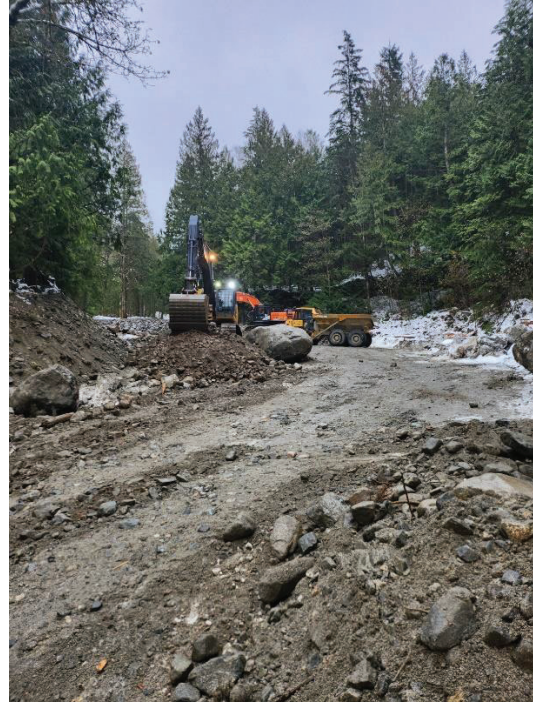


PHOTO #3 – Spill-tray under skid steer



PHOTO #4 – Fuel sheen visible on Carratt Rd & dyke access road





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Natural Resource Department:
Daily Environmental Monitoring Report

Report Number:007		Location (Or Closest Address):	
Date:2022-12-08	Time: 8AM-2:30pm	Carratt Creek, Carratt RD – Hatzic Prairie	
Monitor Name: Jason Thompson		Signature:	
Meetings:			
Meeting Participants:			
Contractor(s) On Site: Jake's Construction; Richco; Associated Engineering; Aqua Silva Resource Management Ltd		Name of Construction Representative Present:	
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 3°/0°; Cloudy/Fog; Slushy along access roads. Creek Conditions: <i>wetted/slushy in lower reach, wetted/slushy in upper reach above temporary bridge crossing.</i>			
Ground Conditions: Dry ☐ Wet ☒ Saturated ☐			
Completed Construction Activities (Since Last Visit): Cont'd boulder placement in upper reach; Hesco Baskets arrived onsite for assembly, fill and placement in lower reach along secondary access road			
Construction Activities: Cont'd work on berm/boulder placement along banks of upper reach; cont'd assembly, fill and placement of Hesco Baskets in lower reach; cont'd load/transport of bedload to gravel pit			Photos:
Construction Equipment Being Used: 350 LC Hitachi(x2); 345 LC Hitachi(x1); 245 LC Hitachi(x1); Davies dump trucks(x4); Jake's Rock Trucks(x3)			Photos:
Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)			
Boundary Flagging	OK	NC	NA
General Construction	X		
Riparian Zone(s)			
Env. Sensitive Features			
Other			
Water Quality	OK	NC	NA
Turbidity	X		
Temperature			
DO			
pH			
Conductivity			
Other			
			Ground water exposed in upper reach above bottom radius

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing			X	No silt fencing require at this point, onsite if needed	
Bank Stabilization		X		Boulders appear not keyed/pounded in along banks	
Soil Stockpiles			X		
Drainage & Diversions	X			Creek diversion continues to function, no concern	
Detention Facilities			X		
Other				Fish fence installed at confluence to main channel	
Fuel & Oil Management	OK	NC	NA	Comments & Mitigation	Photos:
Spill Kits/SPER Plan	X	X		Spill trays/kits in lower each; none in upper reach	
Fuel Storage					
Other		X		Cont'd fuel/oil sheen along main access road	
Equipment	OK	NC	NA	Comments & Mitigation	Photos:
Condition (leaks, etc.)		X		Foreman & truck drivers informed of leaks	
Initial Cleaning (Mud, Seeds)			X		
Other					
Waste Management	OK	NC	NA	Comments & Mitigation	Photos:
Sanitary Facilities	X			Port-Potty onsite in two locations	
Solid Waste & Recycling		X		Food/recycle waste bins still absent from site	
Special Waste & Hazardous Materials			X	None visible on-site at the time of site visit	
Other		X		Visible signs of litter and cigarette butts	
Atmosphere	OK	NC	NA	Comments & Mitigation	Photos:
Dust	X				
Air Quality	X				
Other					
Vegetation Management	OK	NC	NA	Comments & Mitigation	Photos:
Invasive Plants	X			No visible Japanese Knotweed nearby	
Other				Knotweed present at Eng Rd gravel pit dump site	
General Observations & Comments (Wildlife, New Sensitive Features, etc.): Const. Activity: Skid Steer/Street Sweep occurring along Carratt Rd entrance; Hesco Baskets being assembled, filled and placed at top of lower reach; Boulder placement along berm continues in upper reach – <i>AE site inspector stated hammering/securing boulders to banks was not allowed under this work</i> Fuel/Waste: Cont'd visible fuel sheen along Carratt Rd & access road frequented by dump trucks – Foremen informed. No visible leaks from any heavy equipment; no visible leaks/spills along access road into upper reach. <i>Cigarette butts & litter visible along access road into upper reach</i>					Photos:
Other Comments: Cultural Monitoring: No visible signs of archeological or cultural heritage evidence; no signs of fish in wetted areas; no signs of terrestrial wildlife frequenting areas; no visible bird nesting areas in nearby riparian areas					Photos:
Upcoming Construction Events:					
Incident Report Required? Yes ☐ No ☐					

**Natural Resource Department:
Daily Environmental Monitoring Report**

PHOTO LOG – 2022/12/06

PHOTO #1 – North facing – loose boulder placement along upper reach; ground water exposed

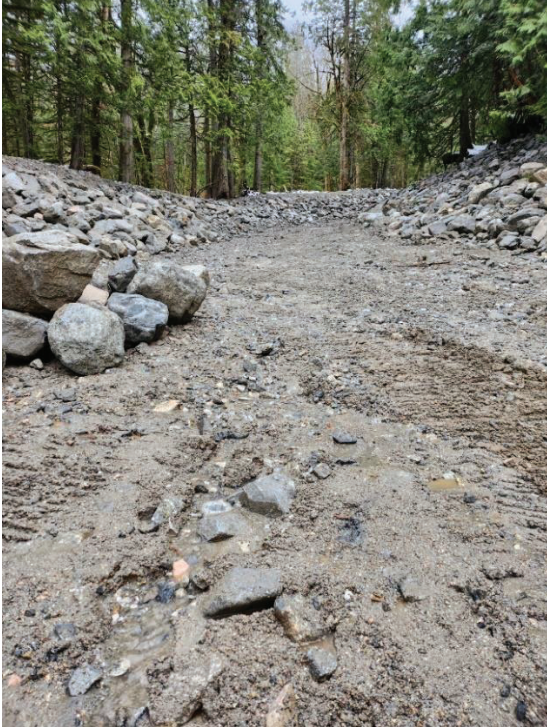


PHOTO #2 - South facing – Boulder placement along NE bank in upper reach



PHOTO #3 – Hesco Baskets assembled, filled, placed along wetted area in lower reach



PHOTO #4 – Fuel sheen visible on Carratt Rd & dyke access road





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Natural Resource Department:
Daily Environmental Monitoring Report

Report Number:008		Location (Or Closest Address):	
Date:2022-12-09	Time: 8AM-2:30pm	Carratt Creek, Carratt RD – Hatzic Prairie	
Monitor Name: Jason Thompson		Signature:	
Meetings:			
Meeting Participants:			
Contractor(s) On Site: Jake's Construction; Richco; Associated Engineering; Aqua Silva Resource Management Ltd		Name of Construction Representative Present:	
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 3°/2°; Cloudy/Fog; Slushy along access roads. Creek Conditions: <i>wetted/slushy in lower reach, wetted/slushy in upper reach above temporary bridge crossing.</i>			
Ground Conditions: Dry ☐ Wet ☒ Saturated ☐			
Completed Construction Activities (Since Last Visit): Cont'd boulder placement in upper reach; Hesco Baskets arrived onsite for assembly, fill and placement in lower reach along secondary access road			
Construction Activities: Cont'd work on berm/boulder placement along banks of upper reach; cont'd assembly, fill and placement of Hesco Baskets in lower reach; cont'd load/transport of bedload to gravel pit			Photos:
Construction Equipment Being Used: 350 LC Hitachi(x2); 345 LC Hitachi(x1); 245 LC Hitachi(x1); Davies dump trucks(x4); Jake's Rock Trucks(x3)			Photos:
Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)			
Boundary Flagging	OK	NC	NA
General Construction	X		
Riparian Zone(s)			
Env. Sensitive Features			
Other			
Water Quality	OK	NC	NA
Turbidity	X		
Temperature			
DO			
pH			
Conductivity			
Other			
			Ground water exposed in upper reach above bottom radius

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing			X	No silt fencing require at this point, onsite if needed	
Bank Stabilization		X		Boulders appear not keyed/pounded in along banks	
Soil Stockpiles			X		
Drainage & Diversions	X			Creek diversion continues to function, no concern	
Detention Facilities			X		
Other				Fish fence installed at confluence to main channel	
Fuel & Oil Management	OK	NC	NA	Comments & Mitigation	Photos:
Spill Kits/SPER Plan	X	X		Spill trays/kits in lower each; none in upper reach	
Fuel Storage					
Other		X		Cont'd fuel/oil sheen along main access road	
Equipment	OK	NC	NA	Comments & Mitigation	Photos:
Condition (leaks, etc.)		X		Foreman & truck drivers informed of leaks	
Initial Cleaning (Mud, Seeds)			X		
Other					
Waste Management	OK	NC	NA	Comments & Mitigation	Photos:
Sanitary Facilities	X			Port-Potty onsite in two locations	
Solid Waste & Recycling		X		Food/recycle waste bins still absent from site	
Special Waste & Hazardous Materials			X	None visible on-site at the time of site visit	
Other		X		Visible signs of litter and cigarette butts	
Atmosphere	OK	NC	NA	Comments & Mitigation	Photos:
Dust	X				
Air Quality	X				
Other					
Vegetation Management	OK	NC	NA	Comments & Mitigation	Photos:
Invasive Plants	X			No visible Japanese Knotweed nearby	
Other				Knotweed present at Eng Rd gravel pit dump site	
General Observations & Comments (Wildlife, New Sensitive Features, etc.): Const. Activity: Skid Steer/Street Sweep occurring along Carratt Rd entrance; Hesco Baskets being assembled, filled and placed at top of lower reach; Boulder placement along berm continues in upper reach – <i>AE site inspector stated hammering/securing boulders to banks was not allowed under this work</i> Fuel/Waste: Cont'd visible fuel sheen along Carratt Rd & access road frequented by dump trucks – Foremen informed. No visible leaks from any heavy equipment; no visible leaks/spills along access road into upper reach.					Photos:
Other Comments: Cultural Monitoring: No visible signs of archeological or cultural heritage evidence; no signs of fish in wetted areas; no signs of terrestrial wildlife frequenting areas; no visible bird nesting areas in nearby riparian areas					Photos:
Upcoming Construction Events:					
Incident Report Required? Yes ☐ No ☐					

Natural Resource Department:
Daily Environmental Monitoring Report

PHOTO LOG – 2022/12/09

PHOTO #1 – North facing – Boulder placement below headwall



PHOTO #2 - South facing – Headwall into main channel

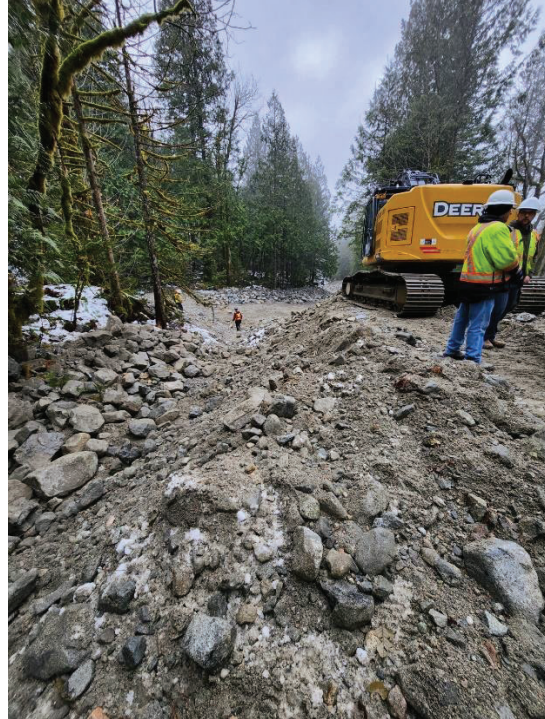


PHOTO #3 – Hesco Baskets assembled, filled, placed along wetted area in lower reach



PHOTO #4 – Fuel sheen visible on Carratt Rd & dyke access road





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Natural Resource Department: Daily Environmental Monitoring Report

Report Number: 007		Location (Or Closest Address):			
Date: 2022-12-12	Time: 2:30pm – 5pm	Eng RD, Pit. Carratt Creek, Carratt Cr RD. – Hatzic Prairie			
Monitor Name: Tina Pederson		Signature:			
Meetings: NA					
Meeting Participants: NA					
Contractor(s) On Site: - Jakes - Richco - Aqua Silva		Name of Construction Representative Present: - Brett (Jakes) - Mark (Richco)			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 3° Sunny w/ clear sky.					
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐					
Completed Construction Activities (Since Last Visit): - Removal of bedload from upper and lower reach.					
Construction Activities: - Removal of bedload from upper and lower reach. - Hesco basket install			Photos:		
Construction Equipment Being Used: - Hitach 350 - Deere 300D haul truck X 2 - Hitachi 350 - Dump truck x 2 - Hitachi 245			Photos:		
Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)					
Boundary Flagging	OK	NC	NA	Comments & Mitigation	Photos:
General Construction	X				
Riparian Zone(s)	X				
Env. Sensitive Features	X				
Other					
Water Quality	OK	NC	NA	Comments & Mitigation	Photos:
Turbidity	X				
Temperature	X				
DO			X		
pH			X		
Conductivity			X		
Other					

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing	X				
Bank Stabilization	X				
Soil Stockpiles	X				
Drainage & Diversions	X				
Detention Facilities			X		
Other					
Fuel & Oil Management	OK	NC	NA	Comments & Mitigation	Photos:
Spill Kits/SPER Plan	X				
Fuel Storage	X				
Other					
Equipment	OK	NC	NA	Comments & Mitigation	Photos:
Condition (leaks, etc.)	X				
Initial Cleaning (Mud, Seeds)	X				
Other					
Waste Management	OK	NC	NA	Comments & Mitigation	Photos:
Sanitary Facilities	X				
Solid Waste & Recycling		X		No visible waste or recycling area.	
Special Waste & Hazardous Materials			X		
Other					
Atmosphere	OK	NC	NA	Comments & Mitigation	Photos:
Dust	X				
Air Quality	X				
Other					
Vegetation Management	OK	NC	NA	Comments & Mitigation	Photos:
Invasive Plants	X				
Other					
General Observations & Comments (Wildlife, New Sensitive Features, etc.):					Photos:
- No visible signs of culturally sensitive finds in lower or upper reach areas. - No visible signs of Japanese knotweed or other invasive plant species in upper or lower reach areas of Carratt Cr.					
Other Comments:					Photos:
- Several visible Japanese knotweeds present along roadway, inside the Eng RD pit. - Several Japanese knotweeds present where/below the Carratt Creek material has been stockpiled. - Visible flowering rush along roadway of the Eng RD pit. - Contaminated soils containing flowering rush dumped along roadway inside pit, approximately 20 meters upslope from the Eng RD pit gate/entrance. - No visible mitigation plans in place to prevent the spread of these invasive plant species. - Large piles of anthropogenic material visible around and under Carratt Creek stockpiles, at the Eng Rd pit location. - .					Photo # 1
					Photo # 2
					Photo # 3
					Photo # 4
					Photo # 5
					Photo # 6

Natural Resource Department: Daily Environmental Monitoring Report

Upcoming Construction Events:

Incident Report Required?

Yes ☐

No ☒



Photo # 1



Photo # 2



Photo # 3



Photo # 4

Natural Resource Department: Daily Environmental Monitoring Report



Photo # 5



Photo # 6



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Natural Resource Department:
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Report Number:010		Location (Or Closest Address): Carratt Creek, Carratt RD – Hatzic Prairie			
Date:2022-12-13	Time: 8AM-1:30pm				
Monitor Name: Jason Thompson		Signature:			
Meetings:					
Meeting Participants:					
Contractor(s) On Site: Jake's Construction; Richco; Associated Engineering; Aqua Silva Resource Management Ltd		Name of Construction Representative Present:			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 3°/-3°; Cloudy/Fog; No rain. Creek Conditions: <i>dry in lower reach, wetted in upper reach above temporary bridge crossing.</i>					
Ground Conditions: Dry ☐ Wet ☐ Saturated ☐					
Completed Construction Activities (Since Last Visit): Cont'd boulder placement in upper reach; Hesco Baskets placement near completion					
Construction Activities: Boulder/riprap placement below headwall in upper reach; cont'd sediment removal into lower reach			Photos:		
Construction Equipment Being Used: 350 LC Hitachi(x2); 345 LC Hitachi(x1); 245 LC Hitachi(x1); Davies dump trucks(x4); Jake's Rock Trucks(x3)			Photos:		
Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)					
Boundary Flagging	OK	NC	NA	Comments & Mitigation	Photos:
General Construction	X				
Riparian Zone(s)					
Env. Sensitive Features					
Other					
Water Quality	OK	NC	NA	Comments & Mitigation	Photos:
Turbidity	X			Creek visibly clear of turbidity	
Temperature					
DO					
pH					
Conductivity					
Other				Ground water exposed in upper reach above bottom radius	

Natural Resource Department: Daily Environmental Monitoring Report

[illegible]

Natural Resource Department:
Daily Environmental Monitoring Report

PHOTO LOG – 2022/12/013

PHOTO #1 – South facing – Boulder placement below headwall



PHOTO #2 - North facing – Headwall into main channel

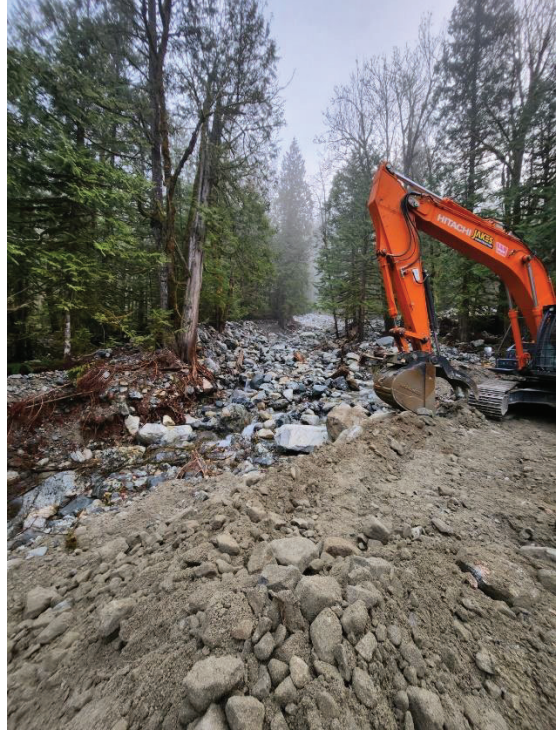


PHOTO #3 – Hesco Baskets assembled, filled, placed along wetted area in lower reach



PHOTO #4 – Clean spill tray along access road into Hesco Basket area



Natural Resource Department:
Daily Environmental Monitoring Report



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Natural Resource Department: Daily Environmental Monitoring Report

Report Number: 011				Location (Or Closest Address):	
Date: 2022-12-14		Time: 8am-4pm		Carratt Cr Rd. – Hatzic Prairie	
Monitor Name: Tina Pederson Rick Mckamey				Signature:	
Meetings: NA					
Meeting Participants: NA					
Contractor(s) On Site: Richco Contracting Jakes Construction Aguasilva Resource Managment				Name of Construction Representative Present: Mark (Richco) Brent (Jakes) Jenn (Aguasilva)	
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 1° - 4° Sunny and dry.					
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐					
Completed Construction Activities (Since Last Visit): - Jakes continues prepping upper reach to open head flow to main channel. - Richco continues to load out bedload transported from upper reach. - Richco Loading out bedload from lower reach. - Hesco baskets ready for completion, waiting on opening head flow to fill last few baskets.					
Construction Activities: - Jakes continues prepping upper reach to open head flow to main channel. - Jakes starting a center channel scour below head in upper reach. - Richco continues to load out bedload transported from upper reach. - Richco Loading out bedload from lower reach.					Photos: # 1 # 2
Construction Equipment Being Used: - Hitachi 350 (Jakes) 2X Deere 300D Haul Trucks (Jakes) - Deere 345 (Jakes) 3X Dump Trucks (Richco) - Hitachi 345 (Richco) 1X skid steer (Richco)					Photos: # 3 # 4
Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)					
Boundary Flagging	OK	NC	NA	Comments & Mitigation	Photos:
General Construction	X				
Riparian Zone(s)	X				
Env. Sensitive Features	X				
Other					
Water Quality	OK	NC	NA	Comments & Mitigation	Photos:
Turbidity	X			Low turbidity, water appears clear in stream.	
Temperature			X		
DO			X		

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pH			X		
Conductivity			X		
Other				Water surfaced approximately 30 meters downstream from head in main channel. Running above ground approx. 150 meters downstream before re-entering the ground.	
Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing			X	On Site if needed.	
Bank Stabilization					
Soil Stockpiles			X		
Drainage & Diversions			X		
Detention Facilities			X		
Other					
Fuel & Oil Management	OK	NC	NA	Comments & Mitigation	Photos:
Spill Kits/SPER Plan	X			Spill kits present in upper reach machines. Spill kit present in two locations lower reach.	
Fuel Storage	X				
Other					
Equipment	OK	NC	NA	Comments & Mitigation	Photos:
Condition (leaks, etc.)	X				
Initial Cleaning (Mud, Seeds)		X		No wash station set up for trucks nor any form of mitigation plan for invasive plant species present at Eng Pit. tipping location.	
Other					
Waste Management	OK	NC	NA	Comments & Mitigation	Photos:
Sanitary Facilities	X				
Solid Waste & Recycling	X			Garbage bag visible by sanitary facility.	
Special Waste & Hazardous Materials			X		
Other					
Atmosphere	OK	NC	NA	Comments & Mitigation	Photos:
Dust	X				
Air Quality	X				
Other					
Vegetation Management	OK	NC	NA	Comments & Mitigation	Photos:
Invasive Plants	X			No visible invasive plant in upper or lower reach of Carratt Creek.	
Other					
General Observations & Comments (Wildlife, New Sensitive Features, etc.):					Photos:
- No mitigation plan or wash station in place for the invasive plant species identified at Eng Rd pit, tipping location for Carratt materials. (Discussed options with Hoyeon A.E & Jenn A.S.M) - Large woody debris loosely place along lower west bank of upper reach, this debris is at risk of re-entering the main channel in high flow. (Discussed with Hoyeon A.E & Jenn A.S.M) - Jakes planning to open head flow to main channel 2022-12-16, lower reach not anticipated to be finished until 2022-12-17. LFN has concerns about higher than anticipated flow through the main channel once head is open, while bedload removal is still in progress in lower reach. Discussions are had with Rick McKamey LFN, Hoyeon A.E & Jenn A.S.M, regarding these concerns. - No visible culturally modified trees or signs of culturally sensitive areas in upper or lower reach. - No visible amphibians, no visible fish in upper or lower reach wetted areas.					# 5
					# 6
Other Comments:					Photos:

Natural Resource Department: Daily Environmental Monitoring Report

A discussion was broached by A.E (Hoyeon) regarding a discrepancy between Aquasilva's (Jenn) report and LFN (Tina) monitor report from 2022-12-10. Inside that discussion LFN monitor (Tina) was ask about changing a portion of the already submitted report. It was decided that changing the report was not an option as what was in the report was accurate information.

Upcoming Construction Events:

- Jakes planning to open head flow to main channel 2022-12-16, lower reach not anticipated to be finished until 2022-12-17. LFN has concerns about higher than anticipated flow through the main channel once head is open, while bedload removal is still in progress in lower reach. Discussions were had with Rick McKamey LFN, Hoyeon A.E & Jenn A.S.M, regarding these concerns without conclusion.

Incident Report Required?

Yes ☐

No ☒



Photo # 1



Photo # 2



Photo # 3



Photo # 4

Natural Resource Department: Daily Environmental Monitoring Report



Photo # 5



Photo # 6



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Natural Resource Department: Daily Environmental Monitoring Report

Report Number: 012		Location (Or Closest Address): Carratt Cr Rd. – Hatzic Prairie			
Date: 2022-12-15	Time: 10:30 – 2pm				
Monitor Name: Tina Pederson		Signature:			
Meetings: NA					
Meeting Participants: NA					
Contractor(s) On Site: Richco Contracting Jakes Construction Aquasilva Resource Management		Name of Construction Representative Present: Mark (Richco) Brent (Jakes) Jenn (Aquasilva)			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 1° - 4° Sunny w/ clouds and dry.					
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐					
Completed Construction Activities (Since Last Visit): - Jakes making a center channel scour below head in upper reach. - Richco continues to load out bedload from lower reach.					
Construction Activities: - Jakes preps exit for upper reach to be used once head flow is open to main channel. - Richco continues to load out bedload transported from upper reach. - Richco Loading out bedload from lower reach.			Photos: # 1 # 2 # 3		
Construction Equipment Being Used: - Hitachi 350 (Jakes) 2X Deere 300D Haul Trucks (Jakes) - Deere 345 (Jakes) 4X Dump Trucks (Richco) - Hitachi 345 (Richco) 1X skid steer (Richco)			Photos:		
Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)					
Boundary Flagging	OK	NC	NA	Comments & Mitigation	Photos:
General Construction	X				
Riparian Zone(s)	X				
Env. Sensitive Features	X				
Other					
Water Quality	OK	NC	NA	Comments & Mitigation	Photos:
Turbidity	X			Low turbidity, water appears clear in stream.	

Natural Resource Department: Daily Environmental Monitoring Report

Temperature	X		X		
DO			X		
pH			X		
Conductivity			X		
Other					
Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing			X	On Site if needed.	
Bank Stabilization	X			Rocks are loosely placed along banks upper and lower reach.	# 4
Soil Stockpiles			X		
Drainage & Diversions	X				
Detention Facilities			X		
Other					
Fuel & Oil Management	OK	NC	NA	Comments & Mitigation	Photos:
Spill Kits/SPER Plan	X			Spill kits in trucks in upper reach, Spill kits 2 locations lower reach.	
Fuel Storage	X				
Other					
Equipment	OK	NC	NA	Comments & Mitigation	Photos:
Condition (leaks, etc.)	X				
Initial Cleaning (Mud, Seeds)	X			Wash station has been placed at the Eng Rd. Pit location and is being used for the dump trucks.	# 5
Other					
Waste Management	OK	NC	NA	Comments & Mitigation	Photos:
Sanitary Facilities	X				
Solid Waste & Recycling	X				
Special Waste & Hazardous Materials			X		
Other					
Atmosphere	OK	NC	NA	Comments & Mitigation	Photos:
Dust	X				
Air Quality	X				
Other					
Vegetation Management	OK	NC	NA	Comments & Mitigation	Photos:
Invasive Plants	X			Nonvisible in upper or lower reach areas of Carratt creek.	
Other					
General Observations & Comments (Wildlife, New Sensitive Features, etc.):					Photos:
- There is some discrepancy between Jakes supervisor and A.E inspector around center channel scour below head in upper reach. A.E inspector has expressed this as not being part of the plan and it is decided to stop the scour approximately 100 meters downstream of the head. - Large woody debris on west bank of upper reach is planned to be moved to a safer location on the upper southwest bank. Communication with A.E. inspector on this concern. - Wash station has been set up by Richco at the end of Eng rd, approximately 20 meters below the pit gate entrance. Trucks are actively being cleaned as they exit the pit to mitigate any further transfer of contaminated soils. - Richco skid steer actively cleaning roadways between Carratt Creek and Eng rd pit, throughout the day. -					# 6
					# 7
Other Comments:					Photos:
- No visible culturally modified trees or signs of culturally sensitive areas in upper or lower reach. - No visible amphibians, no visible fish in upper or lower reach wetted areas.					

Natural Resource Department: Daily Environmental Monitoring Report

- Main channel, upper reach has flow coming out of ground approximately 20 meters downstream from head wall. Flow is running above ground for approximately 150 meters before re entering the ground. This flow is not reaching the main channel flow.	
Upcoming Construction Events: - Decision by Aquasilva environmental to have head wall opened Monday or Tuesday (week of 2022-12-19), after Richco has finished their work in the lower reach. - Jakes will help Richco with bedload removal in lower reach once they are done upper reach work. - Across bridge to be loaded out this week. - Plans to finish emergency work at Carratt creek early to mid-week 2022-12-19.	
Incident Report Required? Yes ☐ No ☒	



Photo #1



Photo #2



Photo #3



Photo #4

Natural Resource Department: Daily Environmental Monitoring Report



Photo #5



Photo #6



Photo #7



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Natural Resource Department: Daily Environmental Monitoring Report

Report Number: 013		Location (Or Closest Address): Carratt Creek, Carratt Cr Rd. Hatzic Prairie			
Date: 2022-12-16	Time: 12:30pm				
Monitor Name: Rick McKamey Tina Pederson		Signature:			
Meetings:NA					
Meeting Participants:NA					
Contractor(s) On Site: - Richco (Mark) - Jakes (Brent)		Name of Construction Representative Present: - AE – Hoyeon - Aquasilva- Jenn - LFN – Tina - LFN - Rick			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 1°- 3° Clear sky with fog					
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐					
Completed Construction Activities (Since Last Visit): - Continued lower reach extraction of bedload (Jakes & Richco)					
Construction Activities: - Continued lower reach extraction.			Photos: #1		
Construction Equipment Being Used: - Hitachi 250 (Jakes) - Hitachi 250 (Richco) - Haul Truck (Jakes) - 3 x Dump Truck (Richco)			Photos:		
Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)					
Boundary Flagging	OK	NC	NA	Comments & Mitigation	Photos:
General Construction	X				
Riparian Zone(s)	X				
Env. Sensitive Features	X				
Other					
Water Quality	OK	NC	NA	Comments & Mitigation	Photos:
Turbidity	X				
Temperature	X				
DO					
pH					
Conductivity					

Natural Resource Department: Daily Environmental Monitoring Report

Other						
Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation		Photos:
Silt Fencing	X			On site if needed.		
Bank Stabilization	X					
Soil Stockpiles	X					
Drainage & Diversions						
Detention Facilities						
Other						
Fuel & Oil Management	OK	NC	NA	Comments & Mitigation		Photos:
Spill Kits/SPER Plan	X			On site.		
Fuel Storage	X			Contained, located on work trucks.		
Other						
Equipment	OK	NC	NA	Comments & Mitigation		Photos:
Condition (leaks, etc.)	X					
Initial Cleaning (Mud, Seeds)	X			Tire wash in place at Eng. Rd Pit.		
Other						
Waste Management	OK	NC	NA	Comments & Mitigation		Photos:
Sanitary Facilities	X					
Solid Waste & Recycling	X					
Special Waste & Hazardous Materials						
Other						
Atmosphere	OK	NC	NA	Comments & Mitigation		Photos:
Dust	X					
Air Quality	X					
Other						
Vegetation Management	OK	NC	NA	Comments & Mitigation		Photos:
Invasive Plants	X					
Other						
General Observations & Comments (Wildlife, New Sensitive Features, etc.): - No visible culturally modified trees or signs of culturally sensitive areas in upper or lower reach. - No visible amphibians, no visible fish in upper or lower reach wetted areas.						Photos:
Other Comments: - Main channel, upper reach has flow coming out of ground approximately 20 meters downstream from head wall. Flow is running above ground for approximately 150 meters before re-entering the ground. This flow is not reaching the main channel flow.						Photos:
						#2
						#3
						#4
Upcoming Construction Events: - Plans to meet with AE rep Trevor, Aquasilva Rep Jenn, Jakes & Richco representatives for a preliminary walk through 2022-12-19 prior to opening headwall.						

Natural Resource Department: Daily Environmental Monitoring Report

Incident Report Required?

Yes ☐

No ☒

Photo #1



Photo #2



Photo #3



Photo #4





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Natural Resource Department: Daily Environmental Monitoring Report

Report Number: 014		Location (Or Closest Address): Carratt Creek, Carratt Cr Rd – Hatzic Prairie			
Date: 2022-12-17	Time: 8am – 2pm				
Monitor Name: Rick McKamey		Signature:			
Meetings:NA					
Meeting Participants:NA					
Contractor(s) On Site: Richco (Mark)		Name of Construction Representative Present: AE (Hoyeon) Aquasilva (Jenn) LFN (Rick)			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 1° with precipitation.					
Ground Conditions: Dry ☐ Wet ☒ Saturated ☐					
Completed Construction Activities (Since Last Visit): Further extraction of lower reach.					
Construction Activities: Sediment removal.			Photos:		
Construction Equipment Being Used: Hitachi 350 (Richco) 3 x Dump truck (Richco)			Photos:		
Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)					
Boundary Flagging	OK	NC	NA	Comments & Mitigation	Photos:
General Construction	X				
Riparian Zone(s)	X				
Env. Sensitive Features	X				
Other					
Water Quality	OK	NC	NA	Comments & Mitigation	Photos:
Turbidity	X				
Temperature	X				
DO					
pH					
Conductivity					
Other					

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing	X				
Bank Stabilization	X				
Soil Stockpiles	X			Eng Rd Pit.	
Drainage & Diversions					
Detention Facilities					
Other					
Fuel & Oil Management	OK	NC	NA	Comments & Mitigation	Photos:
Spill Kits/SPER Plan	X				
Fuel Storage	X				
Other					
Equipment	OK	NC	NA	Comments & Mitigation	Photos:
Condition (leaks, etc.)	X				
Initial Cleaning (Mud, Seeds)	X				
Other					
Waste Management	OK	NC	NA	Comments & Mitigation	Photos:
Sanitary Facilities	X				
Solid Waste & Recycling	X				
Special Waste & Hazardous Materials					
Other					
Atmosphere	OK	NC	NA	Comments & Mitigation	Photos:
Dust	X				
Air Quality	X				
Other					
Vegetation Management	OK	NC	NA	Comments & Mitigation	Photos:
Invasive Plants	X			Tire wash located Eng Rd Pit.	
Other					
General Observations & Comments (Wildlife, New Sensitive Features, etc.): Tire wash deployed Eng Rd Pit. Emil Anderson sand and salted Eng Rd upon request.					Photos:
Other Comments: No significant archaeological or culturally sensitive finds.					Photos:
Upcoming Construction Events: Plan to open headwall to main channel 2022-12-19.					
Incident Report Required? Yes ☐ No ☒					

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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:015		Location (Or Closest Address): Carratt Creek, Carratt Cr Rd – Hatzic Prairie			
Date: 2022-12-19	Time: 8:30-11:30 & 1pm				
Monitor Name: Tina Pederson Rick McKamey		Signature:			
Meetings: 10:30 Meeting for preliminary walk though of Carrat Creek in preparation of opening headwall to allow main flow into main channel.					
Meeting Participants: Jakes project manager Derrick, AE Engineer Trevor, LFN Rick, LFN Tina, AE inspector Hoyeon, Aquasilva enviromental Jenn, LFN Jason, Jakes supervisor Brent.					
Contractor(s) On Site: Jakes Richco Aquasilva AE		Name of Construction Representative Present: Brent Mark Jenn Hoyeon			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.) -10° Low hanging cloud, snow and icy conditions.					
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐					
Completed Construction Activities (Since Last Visit): Lower reach extraction nearly complete.					
Construction Activities: Lower reach extraction complete. Large woody debris on west bank of upper reach moved to safer locations. Opening headwall to allow flow into main channel. Completion of Hesco baskets.			Photos:		
			#1		
			#2		
			#3		
Construction Equipment Being Used: Jakes Deere 345 Richco Hitachi 350 Richco Skid steer 3x dump truck Richco			Photos:		
Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)					
Boundary Flagging	OK	NC	NA	Comments & Mitigation	Photos:
General Construction	X				
Riparian Zone(s)	X				
Env. Sensitive Features	X				
Other					
Water Quality	OK	NC	NA	Comments & Mitigation	Photos:
Turbidity	X			Turbidity present in main channel after headwall open.	
Temperature	X				
DO					

Natural Resource Department: Daily Environmental Monitoring Report

pH					
Conductivity					
Other					
Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing	X				
Bank Stabilization	X				
Soil Stockpiles	X			Eng Rd Pit	
Drainage & Diversions					
Detention Facilities					
Other					
Fuel & Oil Management	OK	NC	NA	Comments & Mitigation	Photos:
Spill Kits/SPER Plan	X				
Fuel Storage	X				
Other					
Equipment	OK	NC	NA	Comments & Mitigation	Photos:
Condition (leaks, etc.)	X				
Initial Cleaning (Mud, Seeds)	X				
Other					
Waste Management	OK	NC	NA	Comments & Mitigation	Photos:
Sanitary Facilities	X				
Solid Waste & Recycling	X				
Special Waste & Hazardous Materials					
Other					
Atmosphere	OK	NC	NA	Comments & Mitigation	Photos:
Dust	X				
Air Quality	X				
Other					
Vegetation Management	OK	NC	NA	Comments & Mitigation	Photos:
Invasive Plants	X			Tire wash at Eng rd, tipping location.	
Other					
General Observations & Comments (Wildlife, New Sensitive Features, etc.): No archaeological or culturally sensitive finds in upper or lower reach areas.					Photos:
Other Comments: Higher than expected flow through main channel once headwall opened, water freezing on its way downstream slowing flow at mid-point to lower reach.					Photos:
					#4

Natural Resource Department: Daily Environmental Monitoring Report

Upcoming Construction Events:

Wrapping up construction activities, outcrop removal immediate downflow of Carratt Cr MoTi bridge.

Incident Report Required?

Yes ☐

No ☒

Photo #1



Photo #2



Photo #3

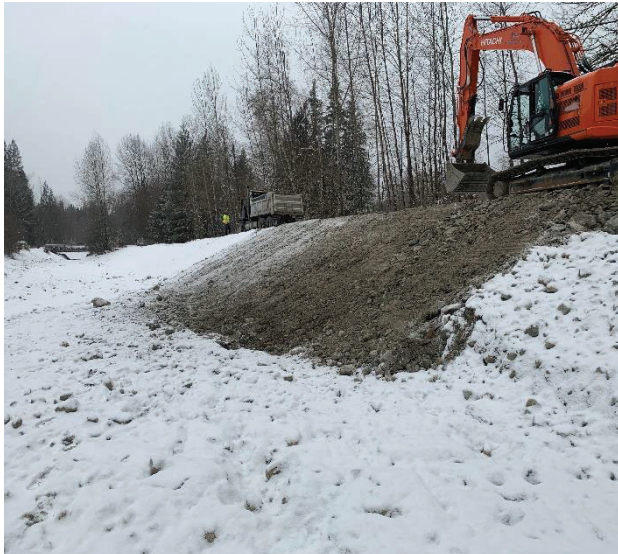


Photo #4





Leq'á:mel First Nation

43101 Leq'á:mel Way, Deroche BC V0M 1G0
(604) 826-7976 www.leqamel.ca

Natural Resource Department: Daily Environmental Monitoring Report

Report Number:016				Location (Or Closest Address): Carratt Creek, Hatzic Prairie	
Date: 2022-12-21		Time: 8:30-1:30			
Monitor Name: Rick McKamey				Signature:	
Meetings: NA					
Meeting Participants: NA					
Contractor(s) On Site: Richco – Mark Aquasilva – Jenn AE – Hoyeon LFN - Rick				Name of Construction Representative Present:	
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): -17° Clear sky					
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐					
Completed Construction Activities (Since Last Visit): Outcrop removal immediately downflow of Carratt Cr MoTi bridge, ~ 2.5 - 1 toe established & rounded bullnose to east bank culvert outlet through dyke.					
Construction Activities: Excavation & snow removal. Offsite haul of extracted granular.					Photos:
					#1
					#2
					#3
Construction Equipment Being Used: Hitachi 345 Kubota Skid steer 1 x dump truck					Photos:
Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)					
Boundary Flagging	OK	NC	NA	Comments & Mitigation	Photos:
General Construction	X				
Riparian Zone(s)	X				
Env. Sensitive Features	X				
Other					
Water Quality	OK	NC	NA	Comments & Mitigation	Photos:
Turbidity	X				
Temperature	X				
DO					
pH					
Conductivity					
Other					

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing	X				
Bank Stabilization	X				
Soil Stockpiles	X				
Drainage & Diversions					
Detention Facilities					
Other					
Fuel & Oil Management	OK	NC	NA	Comments & Mitigation	Photos:
Spill Kits/SPER Plan	X				
Fuel Storage	X				
Other					
Equipment	OK	NC	NA	Comments & Mitigation	Photos:
Condition (leaks, etc.)	X				
Initial Cleaning (Mud, Seeds)	X				
Other					
Waste Management	OK	NC	NA	Comments & Mitigation	Photos:
Sanitary Facilities	X				
Solid Waste & Recycling	X				
Special Waste & Hazardous Materials					
Other					
Atmosphere	OK	NC	NA	Comments & Mitigation	Photos:
Dust	X				
Air Quality	X				
Other					
Vegetation Management	OK	NC	NA	Comments & Mitigation	Photos:
Invasive Plants	X				
Other					
General Observations & Comments (Wildlife, New Sensitive Features, etc.): No archaeological or culturally significant finds.					Photos:
Other Comments:					Photos:
Upcoming Construction Events:					
Incident Report Required? Yes ☐ No ☒					

Natural Resource Department: Daily Environmental Monitoring Report

Photo #1



Photo #2



Photo #3



Appendix L

Appendix M

DRAWING INDEX			
SHEET	DRAWING NAME	REVISION	DRAWING TITLE
GENERAL			
1	2462-00-G-2001	3	COVER SHEET
CIVIL			
2	2462-00-G-2101	4	PLAN WITH AERIAL PHOTO
3	2462-00-G-2102	4	PLAN
4	2462-00-G-2001	3	DETAILS
EMERGENCY WORKS			
EMERGENCY WORKS			

WATERWAY SEDIMENT ASSESSMENT PROPOSED EMERGENCY WORK S-CR-28 CARRATT CREEK

PLOT DATE: 2023-03-07 4:17:41 PM
SAVE DATE: 2023-03-07 11:27:39 AM
SAVE BY: LEEH
DRAW PATH: I:\2023\2462-00_Sediment-cr-28\cr-28\2462-00-g-2001.dwg



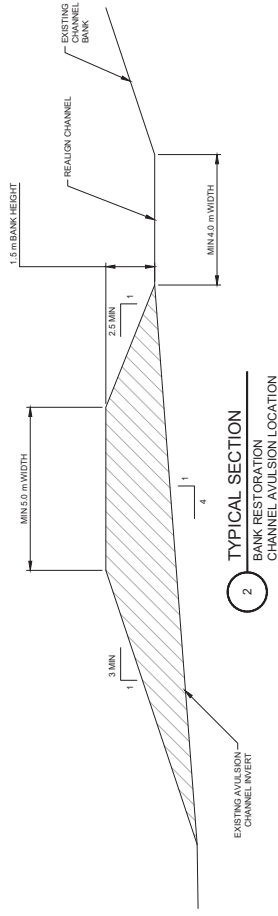
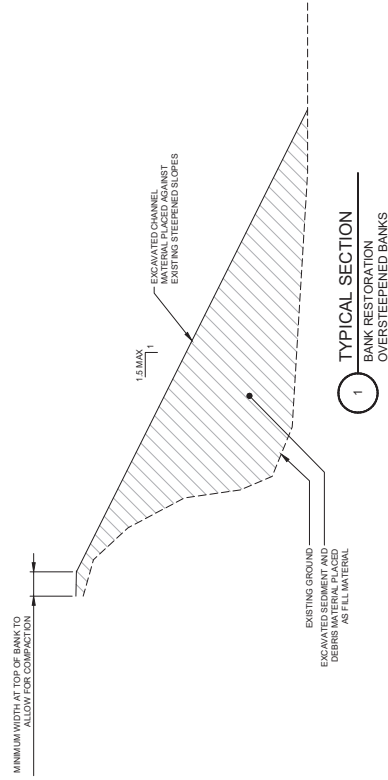
PRICEWATERHOUSE COOPERS
BC MINISTRY OF ENVIRONMENT
WATERWAY SEDIMENT ASSESSMENT
PROPOSED EMERGENCY WORK
S-CR-28 CARRATT CREEK
2022-2462-00

THE SEAL AND SIGNATURE OF THE UNDERSIGNED ON THIS DRAWING
CERTIFIES THAT THE DESIGN AND CONSTRUCTION OF THE
DRAWINGS ACCURATELY REFLECTS THE ORIGINAL DESIGN AND THE
DESIGNER'S INTENT. ANY CHANGES TO THE DESIGN OR
CONSTRUCTION SHALL BE MADE BY THE DESIGNER AND THE
DESIGNER'S INTENT SHALL BE MAINTAINED. ANY CHANGES TO THE
DESIGN OR CONSTRUCTION SHALL BE MADE BY THE DESIGNER AND
THE DESIGNER'S INTENT SHALL BE MAINTAINED. ANY CHANGES TO
THE DESIGN OR CONSTRUCTION SHALL BE MADE BY THE DESIGNER
AND THE DESIGNER'S INTENT SHALL BE MAINTAINED.

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ASSOCIATED ENGINEERING LTD.
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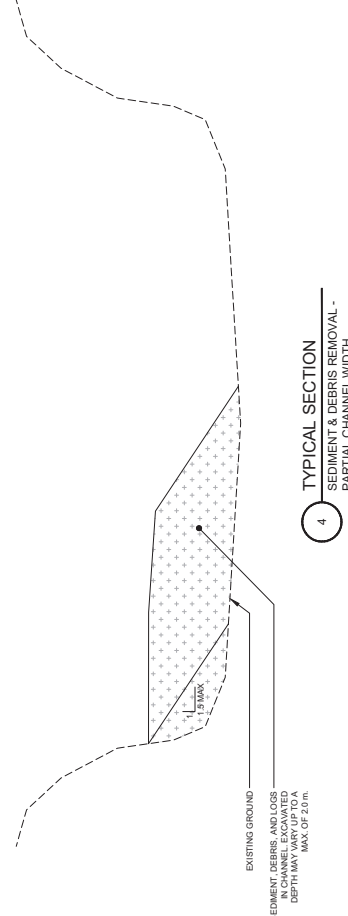
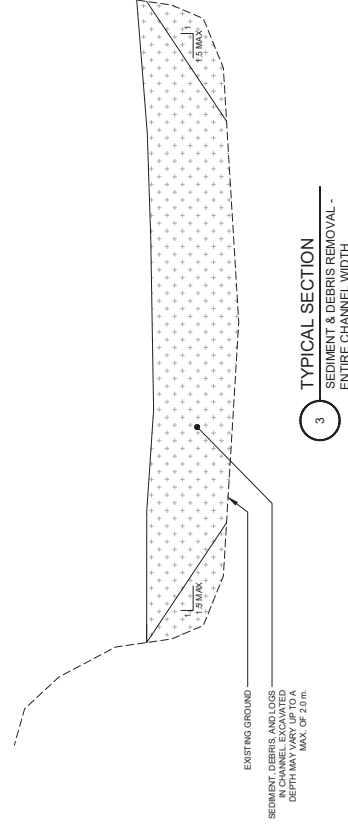
DRAWING			
REV	DATE	DESCRIPTION	SHEET
1	2022-11-08	AS-BUILT	1
2	2022-11-08	AS-BUILT	1
3	2022-11-08	AS-BUILT	1

SCALE(S) SHOWN ARE INTENDED FOR ANSI D (22X34) SIZE DRAWINGS. TABLOID (11X17) SIZE DRAWINGS ARE 1/2 OF SCALE(S) SHOWN UNLESS NOTED OTHERWISE



NOTES:

1. MAXIMUM OF 0.5 m DIAMETER MATERIALS USED IN CONSTRUCTION OF THE BANK REMEDIATION, TO PREVENT LARGE VOIDS FROM ENCOURAGING SEEPAGE THROUGH THE EMBANKMENT, WHILE ALSO ALLOWING FOR FAILURE OF THE BANK RESTORATION IN THE EVENT OF AN EXTREME DEBRIS FLOOD.



PERMIT TO PRACTICE
ASSOCIATED ENGINEERING (B.C.) LTD.
PERMIT NUMBER: 1000163
Engineers & Geoscientists BC

**13 BEST
MANAGED
COMPANIES**



Associated
Engineering



BRITISH
COLUMBIA

PRICEWATERHOUSE COOPERS
BC MINISTRY OF ENVIRONMENT
WATERWAY SEDIMENT ASSESS
PROPOSED EMERGENCY WORK
S-CR-28 CARRATT CREEK
2022-2462-00

DETAILS
EMERGENCY WORKS

DRAWING	REVISION	SHEET
2462-00-C-2501	3	4

THE SEAL AND SIGNATURE OF THE UNDERSIGNED ON THIS DRAWING CERTIFIES THAT THE DESIGN INFORMATION CONTAINED IN THESE DRAWINGS ACCURATELY REFLECTS THE ORIGINAL DESIGN AND THAT THE UNDERSIGNED HAS REVIEWED THE DRAWINGS AND BROUGHT TO THE UNDERSIGNED'S ATTENTION, THESE DRAWINGS ARE BEING PREPARED TO INCORPORATE ADDENDUM, CHANGE ORDERS, AND OTHER MATERIAL DESIGN CHANGES, BUT NOT NECESSARILY ALL TYPE INSTRUCTIONS.

THE UNDERSIGNED DOES NOT WARRANT OR GUARANTEE, NOR ACCEPT ANY RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE AS-CONSTRUCTED INFORMATION SUPPLIED BY OTHERS CONTAINED IN THESE DRAWINGS, BUT DOES, BY SEALING AND SIGNING, CERTIFY THAT THE AS-CONSTRUCTED INFORMATION, IF ACCURATE AND COMPLETE, PROVIDES THE AS-CONSTRUCTED SYSTEM WHICH SUBSTANTIALLY COMPLIES IN ALL

Appendix N

CARRATT CREEK FLOOD MITIGATION WORKS
CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

Prepared For:



25349 – 60th Avenue
Aldergrove, BC
V4W 1G9
Tel: 604-856-8866
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Prepared By:



PO Box 42
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December 2022

Table of Contents

1.0	Background and Project Context	4
1.1	Purpose of the Construction Environmental Management Plan	7
1.2	Provincial and Federal Regulatory Documents.....	7
1.3	Site Access and Staging Plan	8
1.4	Project Timing Restrictions	9
2.0	Responsibilities	9
3.0	Environmental Monitoring	10
3.1	Heavy Rainfall Shutdown Strategy.....	11
4.0	Water Quality Monitoring	11
5.0	Erosion and Sediment Control	12
6.0	Fish Salvage and Bypassing of Flows	14
7.0	Vegetation Management and Clearing	15
8.0	Invasive Plant Management.....	15
8.1	Carratt Creek Invasive Species Management.....	15
8.2	Eng Pit Invasive Species Management.....	16
9.0	Waste Management.....	17
10.0	Fuel Storage and Handling Plan	17
11.0	Emergency Spill Containment Response Plan	19
12.0	Conclusions	20
Figure 1. General location. Annotated Google Earth Image, 2022.....		4
Figure 2. Site location. Annotated Google Earth Image, 2022.		5
Figure 3. Anticipated channel avulsion activities. Annotated Google Earth Image, 2022.....		6
Figure 4. Anticipated sediment removal activities. Annotated Google Earth Image, 2022.		7
Figure 5. Site logistics plan. Annotated Fraser Valley Regional District Webmap, 2022.....		8
Figure 6. Monitoring locations (yellow pins). Annotated Google Earth Image, 2022.		12
Figure 7. Disposal site route (in orange) and truck wash station. Annotated Google Earth Image, 2022.....		13
Figure 8. Stockpile protection.		14
Figure 9. Fish exclusion fencing and relocation areas. Annotated Google Earth Image, 2022..		15
Figure 10. Refuelling locations. Annotated Fraser Valley Regional District Webmap, 2022.		19

APPENDIX I - Contractor Environmental Orientation Record

APPENDIX II - Spill Response Procedure

APPENDIX III - Environmental Incident Report Form

APPENDIX IV – Emergency Contacts

1.0 Background and Project Context

AquaSilva Resource Management Ltd. (AQS) has been retained to prepare a Construction Environmental Management Plan (CEMP) for use by both Richco Contracting Ltd (Richco) and Jakes Construction Ltd (Jakes) and their subcontractors when completing the flood mitigation works at Carratt Creek in Hatzic, B.C. (Figure 1). The 2021 Atmospheric Rainstorms caused significant flooding of Carratt Creek and resulted in widespread sediment deposition along the lower reaches of the watercourse as well a rock jam and channel avulsion approximately 800m upstream from the Carratt Creek bridge. The works will consist of temporary channel creation and bank repair works where channel avulsion occurred (~120m of channel length) and sediment removal works along a 260m reach downstream from the Carratt Road bridge and 900m upstream of the bridge. Applicable assessments were conducted, and regulatory permits were obtained by Associated Engineering.

It is required that the Contactor conform to:

- the contract between the Contractor and Ministry of Environment;
- the CEMP;
- District Bylaws; and,
- provincial and federal regulatory requirements.

Works will be completed along 1.2km of Carratt Creek from the channel avulsion to ~260m downstream of Carratt Road Bridge. See Figure 2.



Figure 1. General location. Annotated Google Earth Image, 2022.



Figure 2. Site location. Annotated Google Earth Image, 2022.

The works at the channel avulsion will include:

- Upon completion of onsite meetings with the project team, it was observed that channel isolation, bypassing of flows, and fish salvaging will not be required at the onset of the works as surface flows cease to exist downstream from Carratt Road bridge (channel dry). Isolation measures and bypassing of flows by the contractor will be implemented.
- Completion of channel avulsion works as outlined in the Associated Environmental (AE) Environment Management Plan (November 2022) prepared for this project:
 - a) Excavation of sediment to create a channel within Carratt Creek that allows water to flow around the debris jam;
 - b) Placement of the excavated sediment at the location of the avulsion to repair the bank of the creek;
 - c) Installation of a temporary HESCO barrier on Crown Land to redirect surface flows into Carratt Creek.
- Upon completion of the works, disturbed riparian areas will be covered with topsoil, seeded with grass seed, and covered with straw mulch.



Figure 3. Anticipated channel avulsion activities. Annotated Google Earth Image, 2022.

The works for the instream sediment removal will include:

- Upon completion of onsite meetings with the project team, it was observed that channel isolation, bypassing of flows, and fish salvaging will not be required at the onset of the works as surface flows cease to exist downstream from Carratt Road bridge (channel dry). Isolation measures and bypassing of flows by the contractor will be implemented.
- Sediment removal works will occur along a 260m reach downstream from the Carratt Road bridge and 900m upstream of the bridge and are anticipated to remove 65,000m³ of material.
 - If bypassing of flows becomes required, the Contractor will isolate work site using suitable methods and continue excavating sediment along one half of the channel width while allowing flows to bypass along the other half of the channel width. Once the first half of the channel width is completely excavated, the Contractor will “flip” the flows to the excavated length of channel and begin excavating the second half (see Figure 4).
 - Fish exclusion fencing and fish salvages of the isolated area will occur if surface flows and fish are observed.
- Upon completion of the works, disturbed riparian areas will be covered with topsoil, seeded with grass seed, and covered with straw mulch.
- Any large woody debris (Cedar or Hemlock) that requires removal during the works will be re-installed below the high-water mark where feasible or within an area where it can be stockpiled to be used for future restoration work.

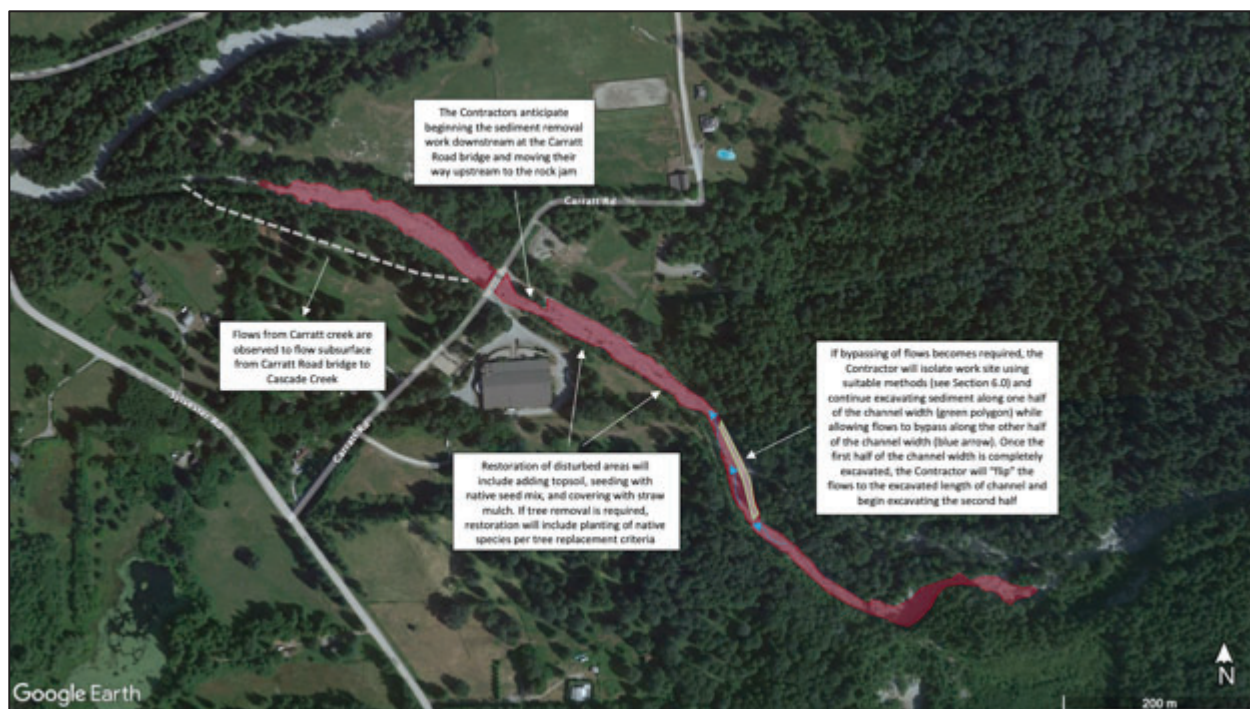


Figure 4. Anticipated sediment removal activities. Annotated Google Earth Image, 2022.

1.1 Purpose of the Construction Environmental Management Plan

This CEMP:

- clarifies environmental roles and responsibilities;
- describes environmental monitoring and reporting requirements; and,
- provides site-specific mitigation measures and general best management practices (BMPs) to avoid or mitigate for the potential effects of the project on the environment.

The principal commitments outlined in this CEMP are to:

- Meet - regulatory requirements
- Exceed - Environmental Requirements where possible
- Avoid - negative impacts
- Minimize - and if necessary, offset negative impacts
- Work - cooperatively with the Environmental Monitor

Please note this CEMP is dynamic in nature and may require updating through project duration.

1.2 Provincial and Federal Regulatory Documents

Ministry Change Approval (Job # 2010103) under BC's Water Sustainability Act (WSA) and a Fisheries and Ocean's Canada (DFO) Authorization (DFO File # 22-HPAC-01308) were received prior to the start of work.

Where requirements differ between this CEMP, the Change Approval under the Water Sustainability Act (WSA) by the province, and Authorization from Fisheries and Oceans Canada (DFO), the Change Approval and Authorization shall take precedence.

1.3 Site Access and Staging Plan

Access to the site will be from Carratt Road which leads to the Carratt Road bridge and dike that borders the watercourse.

Primary staging will occur along Carratt Road bridge and the dike as it borders the lower 80% of the works area. Construction materials and day to day supplies will be kept along the dike, or above the top of bank when channel avulsion works are being completed, (See Figure 5). Stockpiling of sediment from Carratt Creek will occur at Eng Pit (see Figure 7).

Once onsite, vehicles are to avoid vegetated areas unless those vegetated areas have been specifically approved for lay down by the Environmental Monitor. Upon completion of the work, the Contractor is responsible for the complete clean-up of all work areas to ensure that all wastes from its operations are removed.

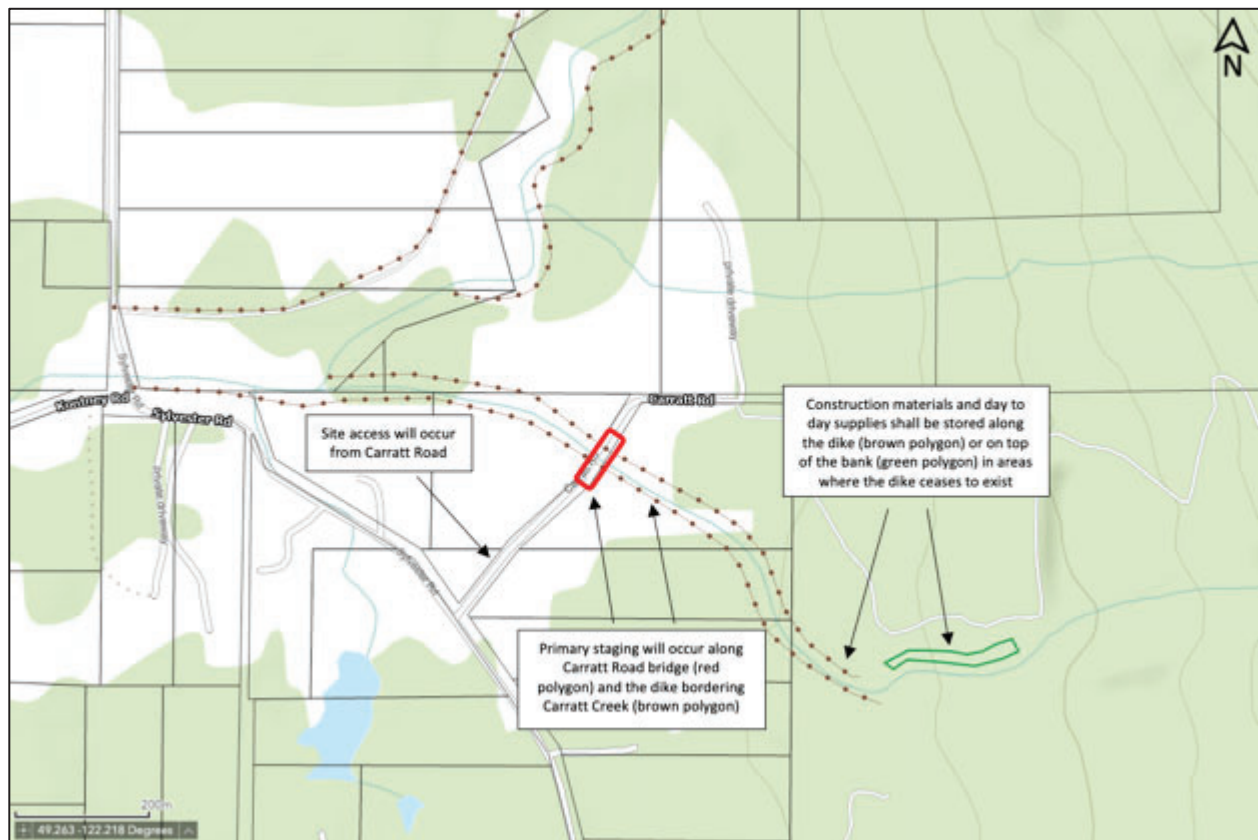


Figure 5. Site logistics plan. Annotated Fraser Valley Regional District Webmap, 2022.

1.4 Project Timing Restrictions

The works are anticipated to begin in mid-November 2022 and will continue until works are complete or weather conditions are no longer acceptable in which ESC measures can no longer be maintained and/or function effectively. AE anticipates the construction works to take approximately 45 days.

2.0 Responsibilities

All components of the work shall be carried out in accordance with requirements of the Contract.

Prior to the start of work, the project Team shall complete a review of site sensitivities with AQS. The Contractor will be instructed on site sensitivities and sign the Contractor Environmental Orientation Record (CEOR; Appendix I). By signing the CEOR the Contractor confirms acceptance and understanding of the specific environmental instructions and requirements for the project.

The table below outlines the environmental responsibilities of key personnel associated with the project.

Table 1. Roles and responsibilities.

Role	Name	Responsibilities
Associated Engineering Contractor Administrator	Eric Finney	• Responsible for overall contract management of the project. • Monitors Contractor(s) compliance with the Contract Documents. • Authorized to stop Work to ensure compliance with regulatory or Contract requirements.
Richco Contracting Ltd. / Jakes Construction Ltd Project Manager/Estimator	Rich Van Geel / Derrick Bisshop	• Ensures that the requirements of the Contract, CEMP and all notifications are implemented on a day-to-day basis. • Ensures that environmental incidents are reported and addressed, and items of environmental non-compliance are corrected. • Reviews all monitoring reports prepared by AQS.
Richco Contracting Ltd. Site Foreman	Mark Van Geel	• Participates in and signs off on Contractor's Environmental Orientation Record (CEOR). • Notifies Project Manager and AQS EM immediately in the event of an environmental incident. • Understands the expectations of their role in avoiding and mitigating environmental impact by implementing the regulatory and CEMP requirements per the Contract.

Role	Name	Responsibilities
Leq'á:mel First Nation Environmental and Cultural Monitor	Jason Thompson	• Provide regular environmental monitoring on behalf of Leq'á:mel First Nation. • Has ability to stop work to ensure compliance with indigenous and regulatory requirements. • Provide advice on key decisions including discovery of archaeological and/or historical materials, non-compliance or contravention of regulatory notifications, and/or potential for ecological damage.
AquaSilva Resource Management Ltd. Environmental Representative	Patrick Ehnes	• Has the ability to stop work to ensure compliance with regulatory requirements. • Provides advice on key decisions such as shut down job activities for non-compliance or contravention of regulatory notifications etc., and / or ecological damage is occurring, or is likely to occur.
AquaSilva Resource Management Ltd. Environmental Monitor (AQS EM)	Jennifer Heldt	• Communicates CEMP requirements to the Contractor. • Completes and records Contractor Environmental Orientation Record (CEOR) with the Contractor. • Conducts regular inspections to review and advise on the Contractor's compliance with the CEMP, Change Approval, and DFO Authorization and maintains records of inspections, and submits daily reports to the Contractor. • Has the authority to stop work to ensure compliance with regulatory or CEMP requirements.

3.0 Environmental Monitoring

AQS will provide an Environmental Monitor on behalf of the contractors for this project. The EM's duties are to ensure that environmental specifications within this CEMP and regulatory approvals are followed by the Contractor.

The EMs duties shall include the following:

- Brief the Contractor on environmental requirements specific to the site.
- Prepare daily environmental reports on instream construction activities.
- Conduct full time monitoring during sensitive instream works as specified within the regulatory approvals.
- Routine and random inspections of construction activities and practices during non-instream works (i.e., significant rain events).
- Monitoring the effects of construction activities on the environment.
- Preparing a post construction report that summarizes the information collected during monitoring, any actions taken on the part of the Contractor, and any potential future environmental impacts that could occur on site.

- Monitor the implementation of conditions within the DFO Emergency Authorization and MoF Change Approval including but not limited to the following:
 - Conducting full time observations for all fish species that may be present near or within the project footprint and modify or direct works to extent possible to avoid or minimize potential injury to fish;
 - Completing fish salvages of the isolated area as required, and relocating all salvaged fish species from the work area back into the same watercourse in a nearby area that has not been impacted by construction or removal works;
 - Conducting full time monitoring for deleterious substance released during the removal of sediment and direct avoidance and mitigation measures to reduce impacts to fish and fish habitat and avoid unauthorized death of fish by means other than fishing and harmful alteration, disruption, and destruction of fish habitat and to prevent their further movement into the watercourse;
 - Monitoring the watercourse for signs of sedimentation resulting from the works, undertakings, or activities and advise the Contractor to take corrective actions as required;
 - Implementing and ensuring applicable erosion and sediment control measures are constructed, installed, and maintained appropriately for the full duration of instream works;
 - If temporary diversion is required to isolate the worksite, the EM must monitor all diversion works daily to ensure pumps and flow bypasses are in proper working conditions.

3.1 Heavy Rainfall Shutdown Strategy

Heavy rainfall warnings must be monitored in advance by the EM and the Contractor. A significant rain event will be defined as 25mm of rain within the last 24 hours. If the works require shutdown due to significant rain events, the Contractor must focus all efforts on implementing measures to protect the site against erosion and sedimentation of Carratt Creek. This includes ensuring any isolation and any erosion and sediment control (ESC) measures that are installed are functioning as intended during the event.

4.0 Water Quality Monitoring

The EM is to collect daily turbidity samples upstream and downstream of the project site at designated monitoring sites, (Figure 6). The downstream monitoring location will be relocated depending on where the flows begin to move subsurface.



Figure 6. Monitoring locations (yellow pins). Annotated Google Earth Image, 2022.

If downstream turbidity exceeds the water quality parameters outlined below, the EM on site will notify the Contractor to implement site specific mitigation measures.

Table 2. Water quality parameters.

Parameter	Criteria
Turbidity - Nephelometric Turbidity Units (NTU)	• Change from background of 8 NTU at any one time for a duration of 24 h in all waters during clear flows or in clear waters • Change from background of 2 NTU at any one time for a duration of 30 d in all waters during clear flows or in clear waters • Change from background of 5 NTU at any time when background is 8 - 50 NTU during high flows or in turbid waters • Change from background of 10% when background is >50 NTU at any time during high flows or in turbid waters

Criteria taken from the B.C. Approved Water Quality Guidelines (2017) – Table 44 Summary of British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture.

5.0 Erosion and Sediment Control

The following Erosion and Sediment Control (E&SC) best management practices and mitigation measures shall be implemented:

- Ensure applicable erosion control measures are in place prior to starting any works.

- To avoid tracking sediment, vehicles travelling on exposed soils must have clean wheels or tracks prior to exiting the site. Equipment must be cleaned using brooms, brushes or mobile power washers when leaving exposed soils areas.
- Materials (i.e., rock) that are to be placed on the banks or within the active channel or floodplain of the watercourse must be inert and free of silt, overburden, debris, or other substances deleterious to aquatic life.
- Machinery must work from the top of the bank of the stream whenever possible to minimize impacts and to better enable mitigation of sedimentation.
- If applicable, the contractor must install silt fencing along top of bank of environmentally sensitive areas adjacent to Carratt Creek.
- Minimize the disturbance to existing vegetation on and adjacent to the stream banks and within the site.
- Protect material from erosion and re-introduction to any watercourse by applying topsoil, grass seed, and straw mulch to disturbed ground to ensure proper rehabilitation.
- When material is moved off-site to Eng Pit (see Figure 7), dispose of it in such a manner as to prevent its entry into any watercourse, floodplain, or ravine.
- Monitor, maintain, and repair E&SC items to ensure they are functioning as intended, particularly during and after large rainfall events.
- Protect existing vegetation where feasible.

5.1 Stockpiles

Excavated material from the project site is anticipated to be removed from the site within 48 hours and stockpiled at the ministry approved Eng Pit Disposal Site (Figure 7). The stability of these stockpiles must be confirmed by an engineer.



Figure 7. Disposal site route (in orange) and truck wash station. Annotated Google Earth Image, 2022.

Although not anticipated as sediment from removal activities at Carratt Creek is to be hauled off site to Eng Pit; if materials need to be stockpiled adjacent to the watercourses within the site

footprint at any time, they must be covered with polyethylene sheeting or tarps and secured at the base. These piles must be at least 15 m away from top of bank (Figure 8).



Figure 8. Stockpile protection.

6.0 Fish Salvage and Bypassing of Flows

No fish salvage or bypassing of flows is anticipated at the onset of the works as flows dewater prior to the creek's confluence with Cascade Creek. The sediment deposition currently limits fish access into the work site as well as prevents sediment laden water within the work site from travelling downstream into Cascade Creek. If surface flows are observed to reach Cascade Creek by the onsite EM, they will notify the Contractor to isolate the site using suitable methods (i.e., isolation using sandbags, dam sacs, steel plates or other methods deemed suitable by the Contractor) and implement a bypass plan that suits site conditions, (i.e., flip channel flows to far banks, bypass flows with suitable pumps and pipes, etc.).

AQS will install fish fencing at the confluence of Carratt Creek and Cascade Creek as a precautionary measure. AQS will also obtain a Fish Collection Permit (DFO) and a Scientific Fish Collection Permit (MOF). If fish are observed holding downstream of the work site, ongoing fish salvages will be completed and fish will be re-located downstream to Cascade creek where permanent flows are observed, (Figure 9).



Figure 9. Fish exclusion fencing and relocation areas. Annotated Google Earth Image, 2022.

7.0 Vegetation Management and Clearing

- The Contractor must complete a scan of areas to be disturbed to avoid disturbing any occurring protected plants in the work area. Observation of any provincially or federally listed protected plants are to be reported to the EM for reporting to the BC Conservation Data Centre.
- Access to sites will occur at existing designated access points or roads to minimize vegetation disturbance. Vegetation disturbance will be kept to a minimum and within the delineated construction footprint only.
- If tree removal is required, planting to replace lost vegetation will be recommended by the EM and detailed in a site-specific restoration plan.

8.0 Invasive Plant Management

It has recently come to AQS's attention that there are no known invasive plant occurrences within 150m of the project envelope at Carratt Creek however, the upstream polygons are within close proximity to the north end of Eng Pit, (Eric Finney email; December 9, 2022). Eng Pit has been confirmed by the Ministry of Forests as a disposal site for flowering rush (*Butomus umbellatus*) and knotweed spp. infested sediment.

8.1 Carratt Creek Invasive Species Management

The EM will survey the riparian area adjacent to Carratt Creek while they are monitoring the instream works to inspect whether knotweed is present within 30m of the project site. If the EM determines that knotweed is not present within 30m of the project area and machinery continues to be limited to the project area, then no further invasive plant management will be required, (Eric Finney email; December 9, 2022).

If knotweed is present within 30m of the project, the preferred management method would be to avoid the contaminated areas and notify the project manager of the contaminated area. The EM on site will flag a 20-meter buffer zone around the knotweed and inform the Contractors to avoid the “contaminated area”. If avoidance is not feasible, then the following best management practices for manual removal of knotweed which have been derived from the Invasive Species Council of BC (ISCBC) will be applied:

- **Smothering:** This method involves using light blocking materials that are thick and heavy such as recycled conveyor belts. Maintenance visits will be necessary to ensure the cover has not been breached and new shoots do not sprout along edges.
- **Pulling and Digging:** This method is used in areas where herbicide is not permitted. Extreme care must be taken at aquatic sites to prevent erosion and plant parts from entering the watercourse. The root mass volume is much larger than the above ground growth so digging will encompass a large area around infestation.
- **Excavation with Heavy Machinery:** If heavy machinery is used, the practitioner must ensure that all root materials are removed (requires digging 3 meters deep and up to 20 meters wide). This method requires great care as excavation has a high risk of spreading plant fragments. Equipment should be thoroughly washed onsite before transport to reduce the risk of spread. The area should be monitored after removal and treated with herbicide. If excavation occurs near a body of water and there is a risk of trapping amphibians, fish or other species in the contained area, then a QEP should be obtained to oversee and monitor the work.

8.2 Eng Pit Invasive Species Management

Sediment excavated from Carratt Creek will be stockpiled at Eng Pit which is accessed from Eng Road (see Figure 7 in section 5.1).

The following mitigation measures and best management practices provided by the Ministry of Forests (Becky Brown email; December 2, 2022) must be followed when hauling material to Eng Pit in order to prevent spread of invasive plants:

- Invasive species management must be performed under the direction of an invasive plant management plan or follow the Invasive Species Council of BC (ISCBC) plan.
- All equipment and vehicles must be inspected and cleaned with a power/high pressure washer (manually cleaned in freezing temperatures), before entering the project site and upon leaving Eng Pit at the truck wash station (see Figure 7 in section 5.1).
- Vehicles must stay on established roads and away from known occurrences of knotweed spp. and flowering rush when entering and exiting Eng Pit.
- Operate machinery away from known occurrences of knotweed spp. and flowering rush within Eng Pit.
- Material brought in from Carratt Creek sediment removal activities must be placed in locations away from known occurrences of knotweed spp. and flowering rush.
- Material brought in from Carratt Creek sediment removal activities must stay at Eng Pit to avoid potential spread of infested material to other locations.
- Any disturbed soils as a result of the works must be re-grade and seeded with Coastal Reclamation seed mixture.

9.0 Waste Management

Any solid wastes generated during this project that require disposal off site will need approval from the local landfill operator prior to disposal. Local landfills may have specific restrictions on waste items accepted. The Contractor must also adhere to the following mitigation measures when dealing with non-hazardous waste management on site:

- The Contractor must adhere to all applicable legislation with respect to the handling, transportation, and/or disposal of all materials related to this project. These regulations may include the B.C. Hazardous Waste Regulations, Spill Reporting Regulations, WorkSafe BC Regulations, Transportation of Dangerous Goods Regulations, and Hazardous Products Regulations, etc.
- The site is located within wildlife habitat. All non-hazardous waste will be removed from the site and disposed of in an appropriate manner. The Contractor shall separate and store all recyclable and waste material in appropriately labelled, covered, waterproof containers prior to transport to an authorized recycling and disposal facilities. Solid wastes generated by the Contractor shall be contained and removed on a weekly basis to maintain a clean and tidy environment and prevent the attraction of wildlife.
- The Contractor must follow the appropriate measures when dealing with the disposal or recycling of demolition, land clearing, and construction waste in accordance with the intent of the provincial Environmental Management Act, and with the applicable bylaw requirements of the City.
- Do not dump or burn garbage or any other waste. Should garbage or work-related waste be dumped, immediately act to clean up and remove the waste material to an approved location. The costs of the clean-up and removal of garbage and illegally dumped materials will be to the Contractor's account.

10.0 Fuel Storage and Handling Plan

The Contractor must adhere to the following mitigation measures regarding fuel storage and handling:

- The Contractor must always use biodiesel/ environmentally sensitive hydraulic fluids when working in the watercourse channel.
- The Contractor must store and safeguard the handling of fuels, oils, used fuel and oil filters, and other construction materials that may be environmentally harmful in a way to minimize leakage and spillage, and to allow containment and recovery in the event of a spill.
- Equipment must be checked daily to ensure that all systems are free of leaks and in good mechanical condition including fittings and hoses.
- All worn or leaking components will be replaced upon discovery.
- When equipment is working near watercourses, hose connections are to be wrapped with absorbent pads as a preventative measure.
- Procedures for all fluid transfers, sorbent pads must be immediately available (i.e., under area of transfer, in hand etc.) in case of drips, leaks, or spills.
- The Contractor must ensure that the onsite storage of spill kits on each piece of mobile equipment is appropriate to the type of liquids onboard (i.e., hydrocarbons, coolant, etc.) in the quantities required to absorb the liquids from the single largest tank of each liquid type (hydrocarbon or water soluble) on that piece of equipment, or for a minimum spill volume of 40 L.

- Vehicles and equipment (i.e., skid steers, generators, compressors, drills, etc.) left on the worksite overnight must have poly or sorbent pads placed under the equipment and secured in place to contain any drips or leaks.
- The Contractor must ensure fuel and oil containers of 23 litres or less are stored and handled appropriately. The Contractor must ensure fuel and oil containers will be stored in equipment boxes or storage areas capable of containing any leaks in the event of a spill.
- Fuel containers shall be CSA or ULC approved, no more than 5 years old if made of plastic, and properly identified using WHMIS labels. Fuel and oil containers greater than 23 litres will be double walled and will be stored in a vinyl lined containment area able to contain 110% of the volume of the container.
- The Contractor must follow the External Environmental Incident Reporting procedures that are required whenever an event on the project site contravenes federal, provincial, or local regulation. The contractor must work with the EM to immediately notify the appropriate regulatory agencies (i.e., Emergency Management BC) in the event of an externally reportable environmental incident.
- If an accidental spill occurs, the Contractor must comply with the spill response procedure outlined in Appendix II, as the spill may produce hazardous wastes (i.e., material with > 3% oil by weight) and contaminated soil. All waste disposals must comply with the provincial Environmental Management Act and its Regulations, and the federal Transportation of Dangerous Goods (TDG) Regulations.
- Materials used during clean-up (i.e., used sorbent, oil containment materials, etc.) must be disposed of in accordance with MoE requirements. Subject to prior approval from MoE, and minimum quantities, waste sorbent material may be disposed of in a landfill.
- Refueling of all equipment and filling of small portable containers must occur from the diked road (**Figure 10**).

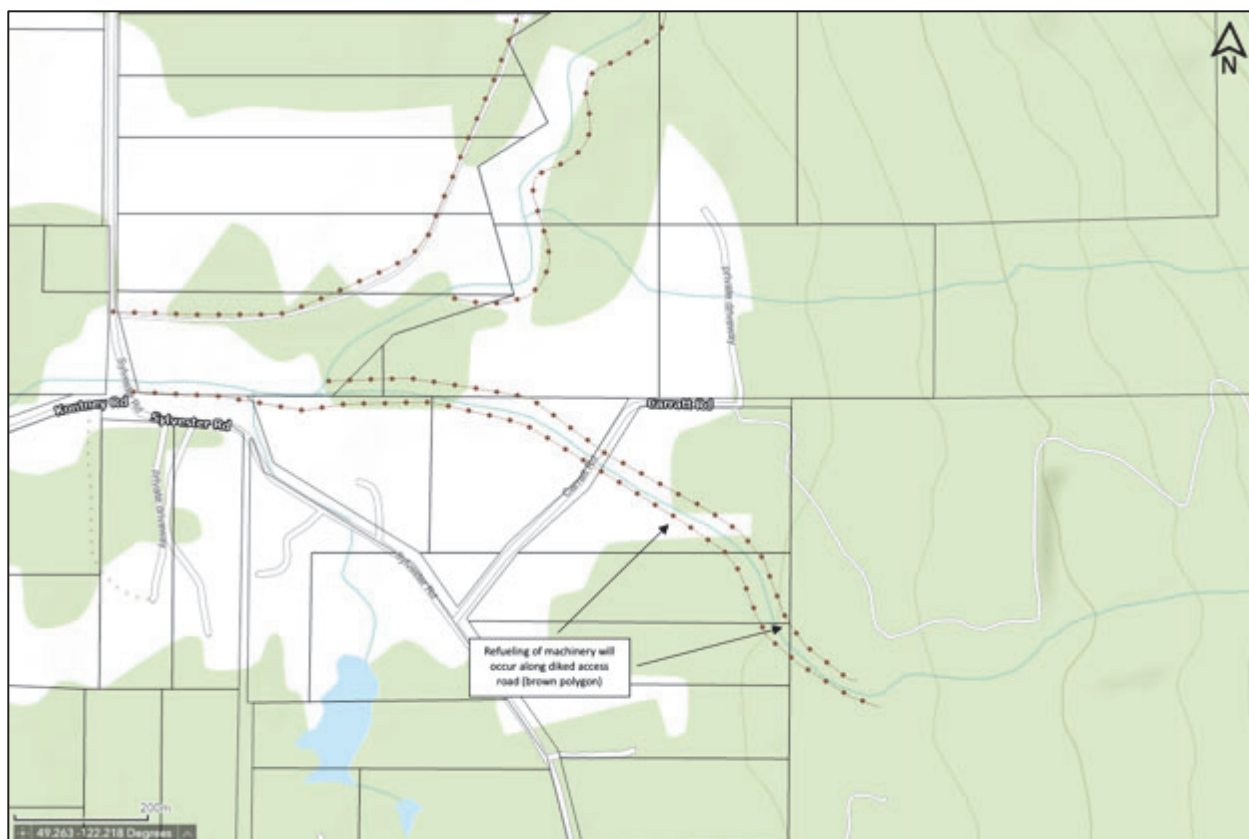


Figure 10. Refuelling locations. Annotated Fraser Valley Regional District Webmap, 2022.

11.0 Emergency Spill Containment Response Plan

The Contractor is responsible for ensuring its personnel and subcontractors are adequately trained (i.e., competent) in spill prevention and response. Personnel must be present and attentive to the equipment at all times during any fluid transfers (Appendix II).

- The Contractor will check equipment (including light trucks) before being brought to the project area, and daily to ensure that all systems are free of leaks and in good mechanical condition including fittings and hoses. All worn or leaking components will be replaced upon discovery. Records of inspection shall be provided to the CA or the AQS EM upon request.
- During all fluid transfers, sorbent pads must be immediately available (i.e. under area of transfer, in hand etc.) in case of drips, leaks, or spills.
- Refuel equipment and fill small portable containers a minimum of 30 m from all waterbodies (including dry ditches) and storm drains.
- Industry standard spill containment able to contain 110% of all fluids onboard must be in place under all parked equipment (e.g., generators, compressors, etc.) while in operation. The Contractors must have the following spill response materials onsite at all times:
 - 1 - 58 gal/220 L polyethylene container with lid and wheels

- 100 Absorbent pads (Oil, Gas & Diesel)
- 50 Universal Absorbent Pads (Antifreeze & Non-Haz)
- 6 – 3" x 4' Absorbent Socks (Oil, Gas & Diesel)

- 1 – 36" x 36" Neoprene Drain Cover
- 1 – 1lb Jar of Plug n Dike (Leak Stop)
- Nitrile Gloves

- HD Hazmat Disposal Bags
- Each machine utilized on-site for construction activities will be equipped with a small spill kit with a minimum sorbent capacity of 30 L and the following:
 - 20 Absorbent pads (Oil, Gas & Diesel)
 - Spill kits will be restocked within 48 hours of a spill.

- Fuel and oil containers of 23 litres (5 gallons) or less will be stored in equipment boxes or storage areas capable of containing any leaks in the event of a spill. Fuel containers shall be CSA or ULC approved, no more than 5 years old if made of plastic, and properly identified using WHMIS labels. Fuel and oil containers greater than 23 litres will be double walled and will be stored in a containment area able to contain 110% of the volume of the container.
- Spill Response Procedure are included in Appendix II and includes externally reportable spill quantities for common products. This plan must be posted at key locations on site e.g. wherever re-fueling occurs, site office, etc.
- Where Contractor's performance of Work causes an environmental incident (e.g. impact to the environment) on the project site, the Contractor's representative shall as soon as practicable, notify the CA of the incident, and the Contractor will file an environmental incident report (Appendix III).

12.0 Conclusions

AquaSilva Resource Management Ltd. (AQS) has been retained to prepare a Construction Environmental Management Plan (CEMP) for use by both Richco Contracting Ltd (Richco) and Jakes Construction Ltd (Jakes) and their subcontractors when completing the flood mitigation works at Carratt Creek in Hatzic, B.C.

We trust the information provided in this CEMP is satisfactory for your purposes at this time. If there are any questions regarding this document, please call the under-signed to discuss further.

Sincerely,

AQUASILVA RESOURCE MANAGEMENT LTD.

Authored By:

A blue ink signature of Sumeet Sidhu, featuring a stylized 'S' and 'S'.

Sumeet Sidhu, B.Sc.
Environmental Scientist/ Monitor

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Sabrina Hansen, *B.Env.*, BC-CESCL
Environmental Scientist/Monitor

Reviewed By:

A blue ink signature of Patrick Ehnes, featuring a stylized 'P' and 'E'.

Patrick Ehnes, R.B. Tech., ASCT., BC-CESCL
Principal, Senior Aquatic Specialist

APPENDIX I - Contractor Environmental Orientation Record

The Contractor Environmental Orientation Record (CEOR) should be completed for all contract work involving an environmental component. The Contractor is responsible for ensuring that the environmental requirements of the work are reviewed before work is started, and that a record of the discussion is documented on the CEOR. The form must be signed by the Environmental Monitor and the Contractor. By signing the CEOR, the Contractor indicates he/she has been advised of the environmental requirements of the contract. The CEOR should be distributed to all applicable parties.

	Date:	File No.	
1	Project Information		
	Project Title		
	Project Description		
	Project Location		
2	Contractor Information (if applicable)		
	Company Name		
	Company Address		
	Site Contact/Representative Name		
	Tel. #	Fax #	E-mail
3	Construction Environmental Management Plan / Environmental Practices Review the environmental issues and requirements of the work as specified in the Construction Environmental Protection (CEMP) or Environmental Practices (EP).		
	Environmental Issues	Environmental Protection Requirements	Discussed
	Is there an CEMP, or are there EP for the work?		Yes
	Have the environmental requirements been reviewed with the contractor and the contractor's staff? (Use the checklist below to guide discussion)		Yes
	Soil erosion / compaction		Yes
	Vegetation disturbance or removal		Yes
	Invasive species control and management		Yes
	Generation and disposal of hazardous substances		Yes
	Generation and disposal of waste		Yes
	Contaminated soil management		Yes
	Spill of hazardous substances		Yes

	Fuel and flammable storage		Yes	NA
	Dust generation / other air emissions		Yes	NA
	Water quality – erosion and siltation		Yes	NA
	Fish and Aquatic - Habitat alteration, disturbance or loss		Yes	NA
	Wildlife and Bird – Habitat Alteration, Disturbance or Loss		Yes	NA
	Disturbance to Heritage Resources / Archaeological Sites		Yes	NA
	Visual Impacts / Noise Concerns		Yes	NA
	Property Considerations		Yes	NA
	Disruption of Recreation Use		Yes	NA
	Public Safety Concerns		Yes	NA
	Do the tools and equipment meet the requirements?		Yes	NA
5	Permits and Approvals Information: Ensure the necessary environmental permits and approvals relating to the work have been obtained prior to starting work.			
	Are environmental notification, permits, licenses or approvals required?		Yes	NA
	List applicable regulatory requirements and permit reference numbers.			
	Have the permits, licenses and approvals obtained and / or checked?		Yes.	NA
6	Emergency Response Plan / Oil and Chemical Spill Response Plan			
	Has the Emergency Response Plan discussed?		Yes	NA
	Has the Oil and Chemical Spill Response Plan discussed?		Yes	NA
	Are there spill kits available on location?		Yes	NA
	Where are the spill kits located?			
7	Environmental Incident Reporting	Ensure Contractor is aware of Environmental Incident Reporting (EIR) system.		
	Environmental Incident Reporting Procedures discussed?		Yes	NA

The undersigned has been briefed on the environmental requirements of the work as detailed above.

Signed: _____ The Contractor Date: _____

Counter-signed: _____ AQS Representative Date: _____

RETURN COPY OF SIGNED FORM TO ENVIRONMENTAL MONITOR

APPENDIX II - Spill Response Procedure

OIL AND CHEMICAL SPILL EMERGENCY RESPONSE PLAN

If a spill of fuel, oils, unmixed cement, lubricants or other harmful substances occurs, the following procedures will be implemented.

Response Steps

1. **Ensure Safety**
2. **Stop the Flow (when possible)**
3. **Secure the Area**
4. **Contain the Spill**
5. **Notify/Report** (PEP 1-800-663-3456)
6. **Clean-up**

(Circumstances may dictate another sequence of events)

1. ENSURE SAFETY

- Ensure personal/public, electrical and environmental safety
- Wear appropriate Personal Protective Equipment (PPE)
- Never rush in, always determine the product spilled before taking action
- Warn people in immediate vicinity
- Ensure **no ignition sources** if spill is of a flammable material

2. STOP THE FLOW (WHEN POSSIBLE)

- Act quickly to reduce the risk of environmental impacts
- Close valves, shut off pumps or plug holes/leaks, set containers upright
- Stop the flow of the spill at its source

3. SECURE THE AREA

- Limit access to spill area
- Prevent unauthorized entry onto site

4. CONTAIN THE SPILL

- Block off and protect drains and culverts
- Prevent spilled material from entering drainage structures (ditches, culverts, drains)
- Use spill-sorbent material to contain spill
- If necessary, use a dike or any other method to prevent any discharge off site
- Make every effort to minimize contamination
- Contain as close to the source as possible

5. NOTIFY/REPORT

- Notify appropriate Site Supervisor or alternate of incident (provide spill details)

- When necessary, the first external call should be made to (see spill reporting requirements):

Provincial Emergency Program (PEP) 1-800-663-3456 (24 hours) (SPILL REPORTING SHALL BE INITIATED BY THE PROJECT MANAGER AND PROJECT ENVIRONMENTAL MANAGER OR A DELEGATE);

- Provide necessary spill details to other external agencies (see spill reporting requirements); and,
- Complete an Environmental Incident Report (EIR) available from the Environmental Monitor.

Spill Reporting Notification Chart

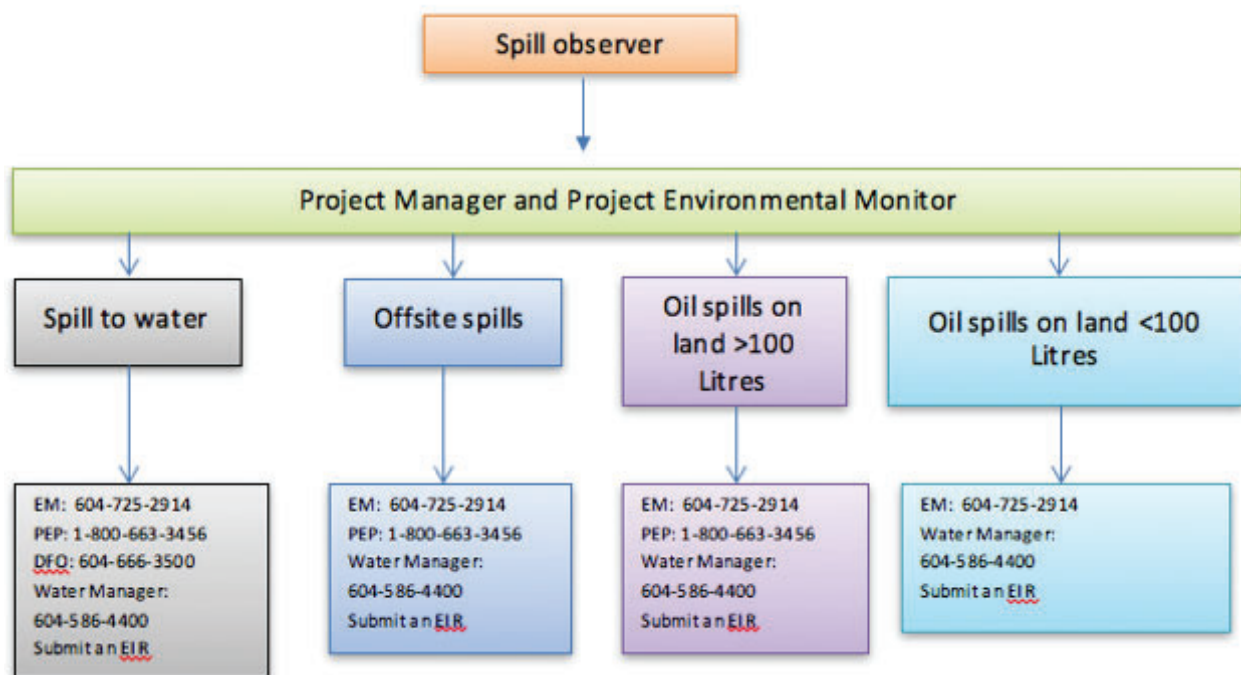


Table 1: List of externally reportable quantities for commonly used substances

Product	Quantity
Class 2.1 – flammable gas (e.g., propane)	10 kg or 10 min.
Class 2.2 - non-flammable gas (e.g., SF6, CO2)	10 kg or 10 min.
Class 3 - flammable liquids	100 litres
Class 8 - corrosive liquid acids and caustics (e.g., battery acid)	5 kg or litres
Class 9 – environmentally hazardous (e.g., PCB's, used ethylene glycol)	1 kg or litre

Product	Quantity
Oil & Waste Oil	100 litres
Other Substances (e.g., new antifreeze, power-wash water)	200 kg or litres
Pesticides & Herbicides	1 kg or litre

Note: All spills to water are reportable. If in doubt as to whether or not to report a spill, err on the side of caution and report the spill immediately to the Environmental Representative. Agency notification will be initiated by the Environmental Representative or the Environmental Monitor.

Emergency Contacts

Provincial Emergency Program (PEP) **1-800-663-3456**

Other Contacts

Department of Fisheries and Oceans **604-666-8266**

Ministry of Forests (Water Manager) **604-586-4400**

6. CLEAN-UP

- All equipment and/or material used in clean-up (e.g. used sorbents, oil containment materials etc.) must be disposed of in accordance with BC Ministry of Environment (MOE) requirements.
- Accidental spills may produce special wastes (e.g., material with > 3% oil) and contaminated soil. All waste disposals must comply with the *BC Hazardous Waste Regulations* (BC Reg. 63/88) and the *BC Environmental Management Act* ([SBC 2003] CHAPTER 53).
- Waste-contaminated sorbent material may not be disposed of in a landfill without prior approval from MOE and the landfill operator.
- Contaminated soil must be treated and dealt with as required on a site-specific basis and must comply with the requirements of the *BC Contaminated Sites Regulations* (B.C. Reg. 375/96).

APPENDIX III - Environmental Incident Report Form

Contractor: Where Contractor's performance of Work causes an environmental incident (e.g. impact to the environment) on the project site, the Contractor's representative shall as soon as practicable, notify the AE CA, AQS EM, and Leq'á:mel First Nation of the incident, and submit an environmental incident report. Complete this incident report form and forward the completed incident report to the AQS ER and EM in electronic or paper copy.

Incident Date:	Incident Time: AM ☐ PM ☐
Incident Location (Address/City):	
Incident Description (include sufficient detail):	
Immediate Corrective Actions Taken (i.e. steps taken in response to incident):	
Weather Conditions & Temperature:	
Equipment Type: Serial Number (if available):	Material Released (if Spill/Pollution) and Amount:
Area of Impact (Check all that apply): • Air • Asphalt or Concrete • Drainage System • Surface Water or Ditch • Watercourse • Soil Inside Building or Engineered Containment	Did you report this incident to any external agency? YES ☐ NO ☐ If YES, to whom:

Contractor Information

Contractor Company Name:		
Name of Contractor's Representative:		
Address:		
Telephone#:		
Project Owner's Representative Contract #:		Project #:
Are You Prime on Site?	Yes ☐ No ☐	
Project Owner's Representative Name:		
E-Mail:		
Address:		
Telephone#:		

APPENDIX IV: EMERGENCY CONTACTS

The purpose of this appendix is to provide a list of emergency contacts for the Contract Administrator, the Contractor, regulatory agencies, and key stakeholders.

The majority of the list of contacts are responsible for the implementation of the CEMP with the potential to be implicated by the project.

This table is dynamic in nature and may require updating through project duration.

Table 3. A list of emergency contacts is provided below

Contact	Name	Email	Office	Mobile
Associated Engineering				
Contract Administrator	Eric Finney	finneye@ae.ca		778-868-3742
Water Resources Engineer	Andrew Wiens	weinsa@ae.ca	403-262-4500	403-863-4009
Site Inspector	Oscar David			604-803-6091
Site Inspector	Trevor Friedmann			778-873-7353
Richco Contracting Ltd				
Construction Project Manager	Rich Van Geel	rich@richco.ca	604-856-8866	604-290-5587
Site Foreman	Mark Van Geel	mark@richco.ca	604-856-8866	778-990-7885
Jakes Construction Ltd				
Construction Project Manager	Derrick Bisshop	dbisshop@jakesconstruction.ca	604-701-3861	604-819-9947
Leq'á:mel First Nation				
Environmental and Cultural Monitor	Jason Thompson		604-826-7976	604-768-6987
AquaSilva Resource Management Ltd.				
Environmental Representative	Patrick Ehnes	pjehnes@aqsrme.com		604-725-2914
Environmental Monitor	Jennifer Heldt	jennifer@aqsrme.com		778-982-3180
EMBC	1-800-663-3456			
DFO Spill Reporting (Observe, Record, Report)			1-800-465-4336	
Environment Canada	Refers you to Emergency Management B.C			