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Engineering

GLOBAL PERSPECTIVE.
LOCAL FOCUS.

REPORT

Ministry of Environment and Climate Change Strategy

Hatzic Emergency Works Program Eng Creek and McNab Creek



Post Construction Report

APRIL 2024



Platinum
member

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1 INTRODUCTION

1.1 Purpose of Report

This report documents the completion of emergency sediment removal works on Eng Creek and McNab Creek. Both creeks feed into Allan Lake, which is located approximately 21 km northeast of Mission, 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 private land and Fraser Valley Regional District (FVRD) land.

1.2 Background

Bank erosion and sediment deposition occurred within both, Eng and McNab Creek, during the November 2021 regional flood event, resulting from multiple atmospheric rivers through southwest BC. Rainfall within the mountainous upper watershed mobilized large volumes of rock debris and sediment; deposition of the mobilized debris and sediment occurred within both creeks' channels, ranging from boulders no greater than 1 metre diameter to fine streambed materials, thereby reducing each channels capacity.

ENV/PwC commissioned QP assessments and tech memos **Appendix A** that outlined the need for emergency sediment removal and flood restoration 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

The Project location is in the Hatzic Valley, in the southern, lowland portion of the Fraser Valley Regional District, British Columbia.

Eng Creek inlet to Allan Lake is located at approximately 49°14'56.27"N and 122°13'4.20"W.

McNab Creek inlet to Allan Lake is located at approximately 49°14'43.64"N and 122°13'0.94"W.

Figure 1.2 and Figure 1-3 show the project location for both Eng Creek and McNab Creek.

1.4 Scope

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

- Sediment and debris removal,
- Bank restoration,
- Erosion protection,

Eng Creek sediment removal works were performed throughout 320 metres of channel starting at the Allen Lake inlet. Refer to **Figure 1-2** below for a site overview.

McNab Creek sediment removal works were performed throughout 370 metres of channel starting at the Sylvester Road culvert outlets, which lead into Allan Lake. Refer to **Figure 1-3** below for a site overview.

1.5 Project Team

The Associated project team included:

- Program Manager – Paul Hague, RPF
- Senior Technical Advisor – Andrew Weins, P.Eng.
- Engineer of Record – Lisbeth Medina M.Eng. P.Eng.
- Project Coordinator – Dianna Christopoulos
- Environmental Lead – Naomi Sands, R.P. Bio.
- Contract Administrator – Scott Crawford, E.I.T.
- Site Inspector / Ministry Rep. – Taylor Johnston

Subconsultant support was provided by Leq'á: mel First Nation, from Deroche, B.C with the following staff:

- Rick McKamey – Environmental Lead
- Jason Thompson – Environmental Monitor
- Tina Pederson - Environmental Monitor Coordinator

The general contractor for the work was Mission Contractors with the following key staff:

- Operations Manager / Project Foreman – Jon Murphy
- Project Manager – Adam Wodzianek
- Environmental Monitors – Nicole Chin (AquaTerra)

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

- ENV – BC Ministry of Environmental and Climate Change Strategy, Victoria – Thyren Jacobs

Figure 1-3: McNab Creek Overview

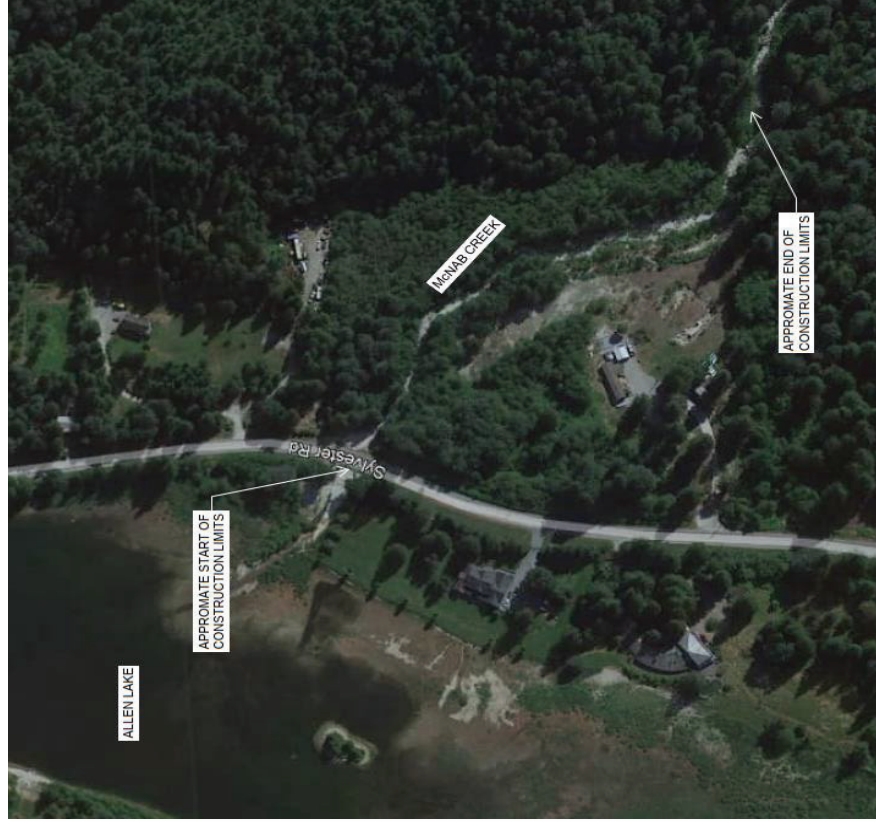


Figure 1-2: Eng Creek Overview



2 DESIGN

2.1 Site Condition

November 2021 ARE had a significant impact on the Hatzic Valley area. At McNab Creek, the event mobilized sediment and debris from the steep upstream portions of the catchment and transported it to the flatter lower portions. The high flows caused erosion of channel banks in several locations and accumulation of sediment and debris within the lower reaches of the channel, upstream of Allan Lake. The deposition reduced the capacity of both creek channels as well as the two existing Corrugated Steel Pipe (CSP) culverts at Sylvester Road and bridges crossing Sylvester Road and Hartley Road. Additionally, erosion was identified at several locations, both upstream and downstream of the Sylvester Road culverts and bridges. Much of the bank is heavily vegetated by shrubs and trees, which are being undercut by erosion.

The following are the key issues that needed to be addressed in the design.

- **Eng Creek:**
 - Bank erosion was evident at several locations throughout the creek reach. Much of the bank is heavily vegetated by shrubs and trees, which are being undercut by erosion. Heavy bank erosion was documented as far as 180 m upstream of the Sylvester Road bridge.
 - The Sylvester Road bridge has significant sediment accumulation within the bridge opening. The available freeboard at the bridge is approximately 0.6 m (measured from the top of the sediment to bottom of the deck).
 - The Hartley Road bridge also has some sediment accumulation within the bridge opening.
 - Sediment accumulation is visible within Allan Lake, where Eng Creek enters the lake.
- **McNab Creek:**
 - Sediment removal was necessary to restore the one in ten-year hydraulic capacity of the channel.
 - The hydraulic capacity of the two 1650 mm x 1150 mm elliptical CSP culverts across Sylvester Road is not adequate to convey the one in ten-year design flows, even after additional sediment removal. The tailwater for the one in ten-year condition from Allan Lake is equivalent to the Sylvester Road elevation. This reduces the available capacity in the culverts and results in upstream flow overtopping the road.

2.2 Design Objective

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

The key design objectives were:

- Restoration of pre-flood channel capacity (sediment and debris removal)
- Remediation and protection of the damaged channel bank
- Erosion protection measures at existing Sylvester Road, and Hartley Road infrastructures.

Refer to design documents and drawings located in Appendices.

3 PERMITTING AND APPROVALS

3.1 First Nations Consultation

The project is located within the traditional territory of the Leq'á: mel First Nation. Various First Nation Cultural Monitors (Led by Tina Pederson) alternated on site from October 10th, 2023, to final walk through on November 3rd, 2023.

Monitors were on site to observe and report the re-construction of the creeks as per Associated Engineering drawings and field fits as per design engineer.

The First Nations Cultural monitors found no archaeological finds due to the nature of the washed out/flooding of the creek.

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 both Eng and McNab Creeks, 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;).

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 the Ministry of Water, Lands and Resource Stewardship (WLRS). 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 Eng and McNab Creeks was granted by WLRS on September 28, 2023 (2010789).

All instream works were to be conducted under the oversight of a Qualified Professional and in accordance with regulatory authorizations and approvals, the McNab and Eng Creeks (SCR-35 and 36) Bank Protection and Sediment Removal Environmental Management Plan (Associated Environmental, 2023), 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).

The Construction Environmental Management Plan was prepared by AquaTerra Environmental Ltd. in October 2023 under *Fisheries Act* Emergency Authorization No. 22-HPAC-01308, and *Water Sustainability Act* Approval No. 2010789. Field work was done under best management practices and applicable environmental regulations.

3.3 Archeological

Leq'á: mel First Nation provided cultural, archeological and environmental monitors to review the work daily, keeping records and submitting daily reports.

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, a local contractor, Mission Contractors, was recommended to be awarded to complete the work. Mission Contractors had immediate availability and have previous experience in the expected type of work.

Contract awarded under WK24EPFLOOD0025 – Mission Contractors, Mission, BC

4.2 Approach to Construction

Eng Creek: A laydown was established on the east side of Sylvester Road north of Hartley Road, this laydown was used to stockpile and load sediment. Sediment removal started at station 0+320 working downstream. Due to the dry conditions the creek bed was used as the haul route back to the laydown.

McNab Creek: A laydown was established on the west side of Sylvester Road just north of McNab creek. Starting at station 0+370 working downstream. Due to the dry conditions the stream bed was used as a haul route. Minimal impact to the surrounding properties.

4.3 Quality Control

Associated Engineering

- Provided daily inspection 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.

Mission Contractors

- Prime Contractor responsible for site management, safety, coordination, overall delivery of the construction and subcontracted environmental monitoring to AquaTerra Environmental

AquaTerra Environmental

- Developed Construction Environmental Management Plan including spill response plan.
- Designed environmental measures for protecting aquatic life, including erosion and sediment control, and managing spills.
- Provided guidance on how to prevent the spread of Japanese Knotweed, which was present at Eng Creek, and in situ monitoring.
- Conducted routine environmental monitoring to verify success of mitigation measures.
- Kept periodic records of work completed and pertinent information, summarized in a daily monitoring report.

Leq'a: mel First Nation

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

Construction reports from Associated Engineering, AquaTerra, and Leq'a: mel are provided in the Appendices.

4.4 Changes During Construction

The following changes from design were implemented during construction:

- Eng Creek:
 - Additional riprap armouring along the south bank between stations 0+140 and 0+160.
 - Extending the riprap armouring from station 0+90 to station 0+60 along the north bank.
 - Removed the debris removal at the Sylvester Road culvert to Eng Creek.
 - Laydown left a layer of sediment due to potential Japanese Knotweed soil contamination. Approved by the Fraiser Valley Regional District.
 - Filled the voids within the Rip-Rap material with fine material to provide additional habitat areas.
- McNab Creek:
 - Additional riprap armouring and bank restoration between stations 0+355 and 0+340.

4.5 Construction Monitoring

Environmental

Full time environmental monitoring was conducted by AquaTerra during instream works and audited by Associated Environmental. As the environmental monitor (EM), AquaTerra was responsible for working with the Contractor 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 Management Plan (CEMP) (prepared by AquaTerra and reviewed by Associated), environmental permit conditions and any applicable regulations.

Environmental Inspection Reports (EIR) were prepared by AquaTerra and submitted to Associated every day and were augmented by Daily Environmental Monitoring Reports submitted by Leq'a: mel First Nation.

Refer to reports located in Appendices.

4.6 Project Completion

November 03, 2023, was the date agreed for substantial performance completion with Mission. Final walk-through inspection before completion was issued was November 02, 2023, attended by Lisbeth Medina and Taylor Johnston of Associated, and Jon Murphy of Mission Contractors.

Refer to completion documents and drawings located in Appendices.

CERTIFICATION PAGE

This report presents our findings regarding the Government of British Columbia
Hatzic Emergency Works Program Eng Creek and McNab Creek Post Construction Report.

Respectfully submitted,

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



Lisbeth Medina, M.Eng., P.Eng.
Water Resources Engineer

APPENDIX A - AIC SITE ASSESSMENT TECH DEMO

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, Associated, 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 Associated.

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 contractor's 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 23, 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-36 - ENG CREEK 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-36

Location: 49.249415°, -122.217877°

Site Description: Eng Creek, Hatzic, BC

Local Government Agency: Fraser Valley Regional District (FVRD)

Waterbody: Eng 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 letter 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.

Associated Engineering (AE) completed a site visit on May 30, 2022. Photos from our site visit are contained in **Enclosure B**. Subsequently, AE reviewed the 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 the Hatzic Lake watershed. In the case of Eng Creek, sediment from the steeper upstream areas was mobilized and transported west and south towards Allan Lake. Sediment accumulated at the Sylvester Road bridge, the Hartley Road Bridge Crossings, and within an alluvial fan in Allan Lake.

Based on previous assessments completed by Stirling Geoscience Ltd. (December 2021), deposition of sediment occurred over 150 m of the Eng Creek channel from the alluvial fan to upstream of the Sylvester Road bridge.

During our site assessment of Eng Creek at Sylvester Road, we noted the following:

1. The Sylvester Road bridge has a low hydraulic opening. The hydraulic capacity of the bridge appears to be insufficient due to the significant sediment accumulation within the bridge opening and along the west embankment;
2. Sediment deposition has been observed within the Hartley Road bridge; however, it is unclear if the hydraulic capacity of the bridge has been compromised;
3. There is sediment deposition along the Eng Creek channel between the two (2) bridges; however, it is unclear if the channel capacity has been compromised within this section of the creek;
4. There is an earthen berm on the right bank of Eng Creek between the two (2) bridges. This berm, which was estimated to be approximately 1 m high, separates the creek from private property;
5. Roadway shoulder erosion/scour was observed at the intersection of Hartley Road and Sylvester Road (west shoulder), and at Hartley Road north shoulder, approximately 100 m west of the Hartley Road bridge; and
6. There is an alluvial fan at the mouth of Eng Creek within Allan Lake. Based on the review of available historical imagery, it appears that there is a history of deposition and bank erosion along this creek.

We anticipate that another significant rainfall event could continue transferring further sediment and debris down Eng Creek and towards Allan Lake. This sediment could further reduce the hydraulic capacity of the Sylvester Road bridge. If the bridge opening were to become blocked, flows would backup, overtop Sylvester Road, and could flow through private property to the west. There is also potential for the earthen berm to be overtopped between the two (2) bridges. If this were to happen, runoff would spill into private property into a wetland north of Hartley Road.

3 PRELIMINARY RISK EVALUATION

The Preliminary Risk Evaluation for the site is shown in **Table 3-1**. The risk key is included in **Enclosure A** for ease of reference.

Table 3-1
Preliminary Risk Evaluation

Category	Preliminary Risk Evaluation	Anticipated Consequence
Public Health and Safety	Medium	We believe there is a risk of blockage at the Sylvester Road bridge due to the small hydraulic capacity and upstream sediment accumulation. This could impact the roadway and adjacent property.
River Capacity	Low	The channel is well defined. Accumulation of sediment is not anticipated to have a significant effect on channel capacity. However, the capacity of the Sylvester Road bridge is low and has been comprised due to sediment.
Environmental	Medium	We anticipate habitat degradation within Allan Lake due to the development of the alluvial fan.
Infrastructure	Medium	We anticipate low risks to the Hartley Road bridge due to the large hydraulic capacity. We anticipate medium risks to the Sylvester Road bridge due to the low hydraulic capacity.

Based on the preliminary risk evaluation noted above, we assess the risk to be **Medium**. On this basis, we confirm that the site rating should be revised to an Area of Concern.

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

1. Background Reports:
 - a. Associated Engineering. (1992, August). *Hatzic Prairie Drainage Study Volume 1*.
 - b. Stirling Geoscience Ltd. (2021, December 16). *Hatzic Prairie Creek Assessment and Preliminary High-Level Mitigation Cost Estimate, Hatzic Prairie, BC - Draft*.
2. Site Assessment completed on May 30, 2022; and
3. Google Satellite Imagery.

4 SITE OPINION AND ADVICE

Based on the hazard and risk assessment, it is our opinion that Site S-CR-36 is an Area of Concern (AC), by definition one not requiring sediment removal prior to the 2022 spring freshet but requiring further assessment, emergency work, and potential mitigation measures prior to the 2022 fall / winter storm season as follows:

Emergency Works (ASAP)

1. Repair the shoulders of Hartley Road approximately 100 m west of the Hartley Road bridge. Determine presence of a culvert at this location. If culvert is found, restore the culvert; and
2. Repair the west shoulder of Sylvester Road at the intersection of Sylvester Road and Hartley Road.

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

1. Complete a hydraulic capacity assessment of Eng Creek in order to evaluate options for restoring the capacity of the bridges and channel;
2. Restore the channel's capacity by:
 - a. Coordinating with MoTI, FVRD, and environmental regulators;
 - b. Sediment and vegetation removal upstream and downstream of Sylvester Road. Extents to be determined as part of the hydraulic assessment; and
 - c. Installation of riprap on channel banks. Locations and extents to be determined as part of the hydraulic assessment.

5 CLOSURE

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

Yours truly,

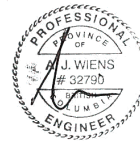
Prepared by:



Andrew Rushworth, P.Eng. (Alberta)
Project Engineer

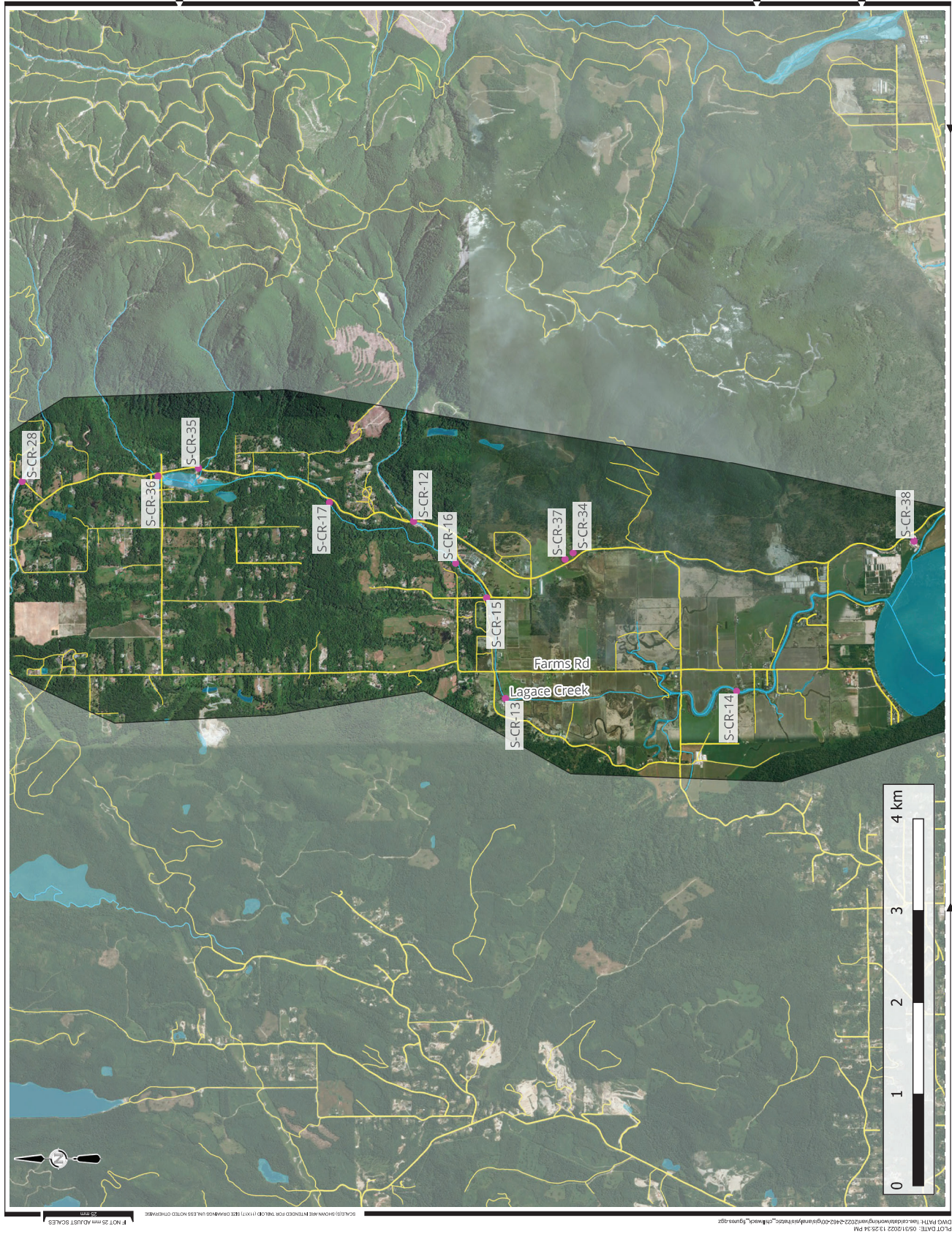
AR/AW/fd/jg

Reviewed by:



Jun. 24 2022

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



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 – AE Site Photos (May 30, 2022)



Eng Creek
Upstream of Sylvester Road Bridge – Looking Downstream



Eng Creek
Downstream of Sylvester Road Bridge – Looking Upstream



Eng Creek
Between Sylvester Road Bridge and Hartley Road Bridge –
Looking Downstream towards Hartley Road Bridge



Eng Creek
On Hartley Road Bridge – Looking Downstream



Erosion at Sylvester Road and Hartley Road intersection (west
shoulder)
Looking Northeast



Damage to north Shoulder of Hartley Road 100 m west of Hartley
Road Bridge
Looking Southwest

June 23, 2022
AE File: 2022-2462-00

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

**Re: PRELIMINARY SITE ASSESSMENT OF POTENTIAL AREAS OF IMMEDIATE CONCERN
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1 SITE INFORMATION

Site ID: S-CR-35

Location: 49.245478°, -122.216991°

Site Description: McNab Creek, Hatzic, BC

Local Government Agency: Fraser Valley Regional District (FVRD)

Waterbody: McNab 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 letter 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.

Associated Engineering (AE) completed a site visit on May 30, 2022. Photos from our site visit are contained in [Enclosure B](#). Subsequently, AE reviewed the 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 the Hatzic Lake watershed. In the case of MacNab Creek, sediment and debris from the steeper upstream areas was mobilized and transported west towards Allan Lake across Sylvester Road. The existing two (2) culverts at Sylvester Road and the creek channel were impacted by the high flows, high velocities, and sediment accumulation from the November 2021 rainfall event. On-site evidence suggests that the roadway was overtopped due to insufficient capacity of the two (2) culverts as well as sediment and debris blockages.

According to previous assessments completed by Stirling Geoscience Ltd. (December 2021), deposition of sediment occurred along the MacNab Creek channel approximately 70 m upstream and 40 m downstream of the culverts during the November 2021 storm event. According to the report, deposited material has already been removed at the culvert inlet; however, additional sediment removal is required.

During our site assessment of MacNab Creek at the Sylvester Road culverts, we noted the following:

1. Hydraulic capacity of the two (2) culverts appears to be insufficient;
2. Creek bank erosion was observed upstream and downstream of the MacNab Creek culverts. Bank erosion is likely due to high flows, velocities, and sediment deposition;
3. Upstream and downstream of the culverts, the channel has been filled with sediment;
4. Deposited material has likely impacted to the hydraulic capacity of the existing culverts. The upstream end of the north culvert is approximately 40% filled with sediment and blocked with debris;
5. Scour and erosion along the Sylvester Road east and west shoulders and side slopes were observed. It appears that some material has been placed along the east roadway shoulder; however, this emergency repair is not sufficient for the long term; and
6. The culverts (in particular the north culvert) appear to have structural deformations across the culverts' roofs. Based on a visual assessment, it appears that the culverts may have less than minimum cover.

We anticipate that runoff will continue to overtop Sylvester Road and additional sediment will be transported towards Allan Lake during significant rainfall events. An overtopping event could further scour the roadway shoulders and result in further downstream erosion. Due to the culverts' insufficient hydraulic capacity, there is the potential for them to be washed out during a significant rainfall event.

Debris from an overtopping/washout event would be deposited on the west side of Sylvester Road and could increase the downstream alluvial fan in Allan Lake.

3 PRELIMINARY RISK EVALUATION

The Preliminary Risk Evaluation for the site is shown in **Table 3-1**. The risk key is included in **Enclosure A** for ease of reference.

Table 3-1
Preliminary Risk Evaluation

Category	Preliminary Risk Evaluation	Anticipated Consequence
Public Health and Safety	Medium	There is the potential for a road washout event to impact the surrounding community. Sylvester Road is the main access road for the community.
River Capacity	Low	The channel is steep and well defined. Accumulation of sediment is not anticipated to have a significant effect on channel capacity. However, the capacity of the culverts is comprised due to upstream sediment.
Environmental	Medium	We anticipate habitat degradation within Allan Lake due to the development of the alluvial fan.
Infrastructure	Medium	We anticipate additional damage to the shoulders of Sylvester Road during significant rainfall events due to inadequate capacity of the existing culverts. There is a possibility that a significant rainfall event could wash out the roadway.

Based on the preliminary risk evaluation noted above, we assess the risk to be **Medium**. On this basis, we confirm that the site rating should be revised to an Area of Concern.

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

- Background Reports:
 - Associated Engineering. (1992, August). *Hatzic Prairie Drainage Study Volume 1*.
 - Stirling Geoscience Ltd. (2021, December 16). *Hatzic Prairie Creek Assessment and Preliminary High-Level Mitigation Cost Estimate, Hatzic Prairie, BC - Draft*
- Site Assessment completed on May 30, 2022; and
- Google Satellite Imagery.

4 SITE OPINION AND ADVICE

Based on the hazard and risk assessment, it is our opinion that Site S-CR-35 is an Area of Concern (AC), by definition one not requiring sediment removal prior to the 2022 spring freshet but requiring further assessment, emergency work and potential mitigation measures prior to the 2022 fall / winter storm season as follows:

Emergency Works (ASAP)

1. Remove sediment and debris on McNab Creek at the inlets of the Sylvester Road culverts.

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

1. Complete a hydraulic capacity assessment for McNab Creek in order to evaluate options for restoring the capacity of the culverts and channel;
2. Restore the channel's capacity by:
 - a. Coordinating with MoTI, FVRD, and environmental regulators;
 - b. Sediment and vegetation removal upstream and downstream of Sylvester Road. Extents to be determined as part of the hydraulic assessment;
 - c. Installation of riprap on channel banks. Locations and extents to be determined as part of the hydraulic assessment; and
 - d. Replacement and expansion of the existing culverts on McNab Creek.

5 CLOSURE

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

Yours truly,

Prepared by:

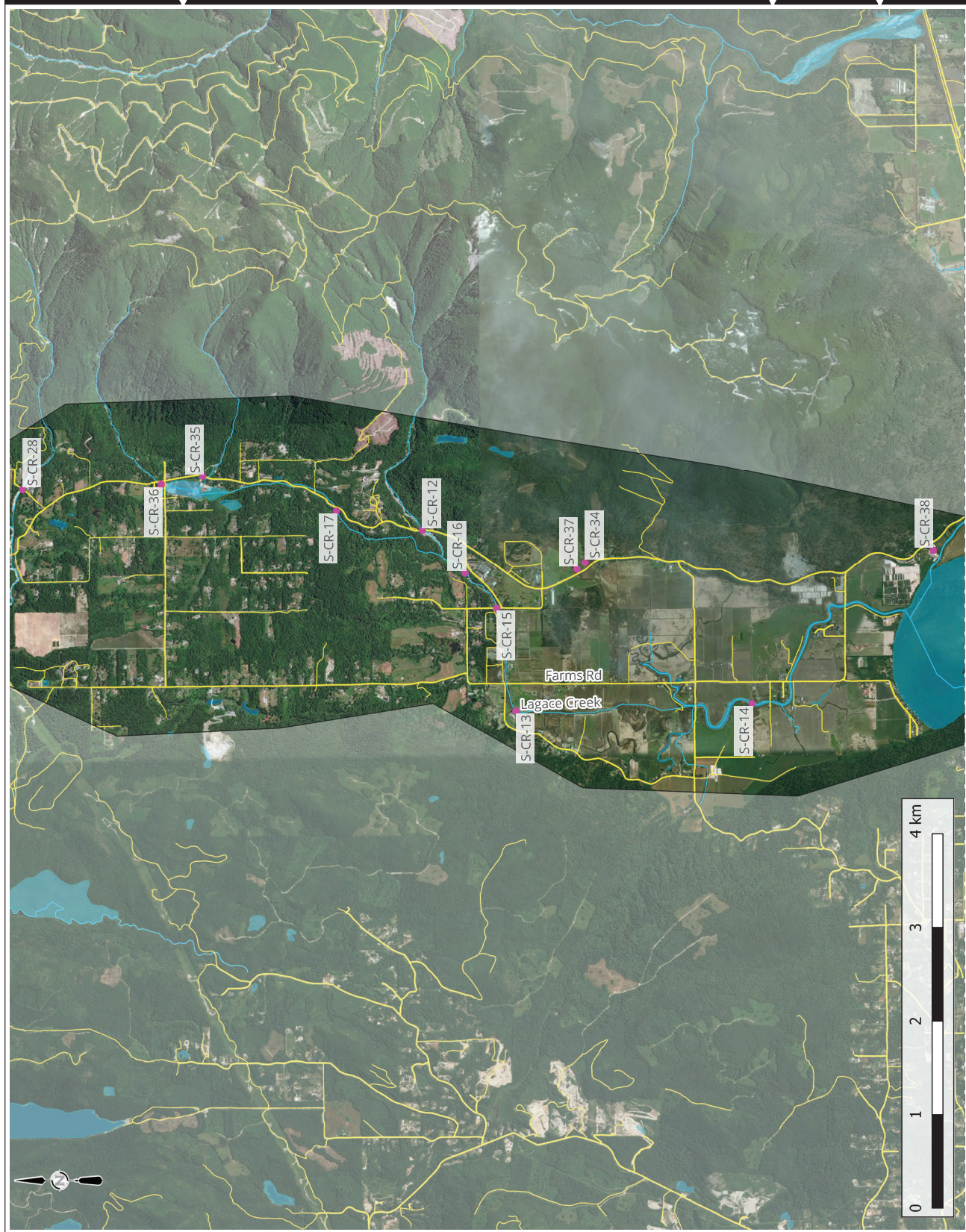


Andrew Rushworth, P.Eng. (Alberta)
Project Engineer
AR/AW/fd/kc

Reviewed by:



Jun. 24 2022
Andrew Wiens, P.Eng. (BC)
Senior Water Resources Engineer



Legend

Roads

— Watercourse

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 1

PRICEWATERHOUSE COOPERS
BC MINISTRY OF ENVIRONMENT

WATERWAY SEDIMENT ASSESSMENT
PWC HATZIC PRARIE SITE OVERVIEW

SCALE	DATE	REV	DESCRIPTION
1:100	10/10/2023	1	Initial Design
1:100	10/10/2023	2	Revised Design
1:100	10/10/2023	3	Final Design

- Legend
- Problem Location (Site)
 - Roads
 - Waterbodies
 - Observed Watercourse Path
 - Existing Culvert
 - Sediment Deposition

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

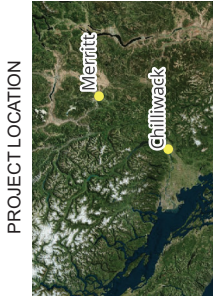
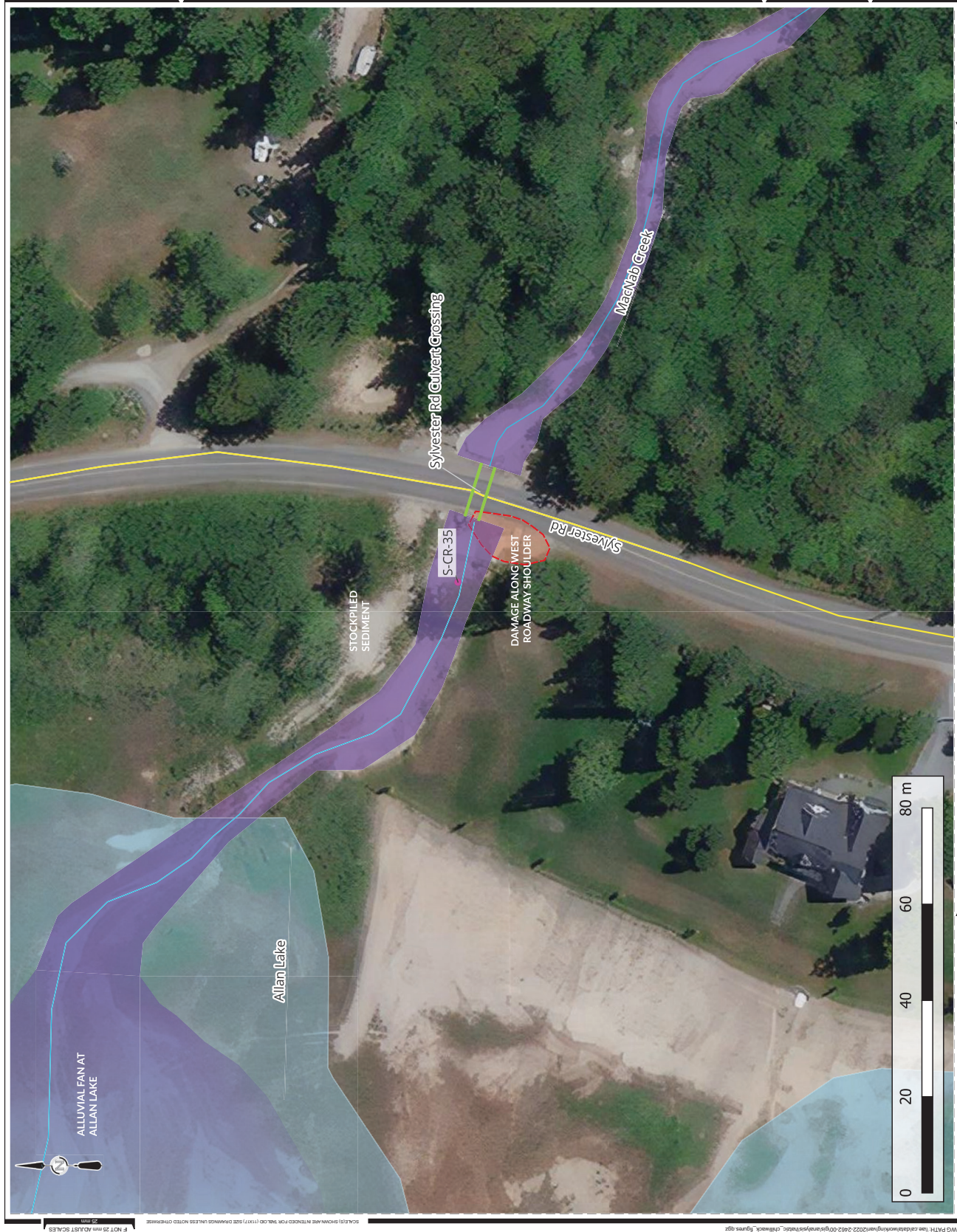


FIGURE 2

PRICewaterhouse COOPERS	20222462-00
BC MINISTRY OF ENVIRONMENT	AS SHOWN
WATERWAY SEDIMENT ASSESSMENT	A. WIENS
PW/C SITE S-CR-35	20220623
MAC/VAB CREEK AT SYLVESTER RD	A
AE PROJECT No.	ISSUED FOR FINAL
SCALE	
APPROVED	
DATE	
REV	
DESCRIPTION	



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 – AE Site Photos (May 30, 2022)



MacNab Creek downstream of Sylvester Road (looking east)



MacNab Creek upstream of Sylvester Road (looking west)



Excavated Materials downstream of Sylvester Road culverts



Deposition in MacNab Creek downstream of Sylvester Road culverts



Upstream blockage of northern MacNab Creek culvert at Sylvester Road



Pavement cracking on Sylvester Road aligned with both culverts.

Appendix B

SHEET LIST TABLE

SHEET	DRAWING NAME	REVISION	DRAWING TITLE	DRAWING DESCRIPTION
GENERAL				
1	2632-10-G-001	0	COVER	
2	2632-10-G-002	0	LEGEND	
3	2632-10-G-003	0	LOCATION PLAN	SCR35 MCNAB CREEK AND SCR36 ENG CREEK
4	2632-10-G-004	0	SCR36 PLAN	ACCESS AND LAYOUT AREA
5	2632-10-G-005	0	SCR36 PLAN	ACCESS AND LAYOUT AREA
CIVIL				
6	2632-10-C-001	0	SCR36 PLAN	SITE 35 WORKS
7	2632-10-C-002	0	SCR36 PLAN / PROFILE	STA 0+00 TO STA 0+300
8	2632-10-C-010	0	SCR36 PLAN / PROFILE	SITE 36 WORKS
9	2632-10-C-011	0	SCR36 PLAN / PROFILE	STATION STA 0+320
10	2632-10-C-001	0	SECTION	SCR35 AND SCR36
11	2632-10-C-001	0	DETAILS	

BC MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY HATZIC EMERGENCY WORKS PROGRAM SCR35 MCNAB CREEK AND SCR36 ENG CREEK

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SAVE DATE: 2023-08-04 10:49:44 AM
SAVE BY: LECTON
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CHECKED BY: LECTON
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SHEET: 10 of 11



BC MINISTRY OF ENVIRONMENT
AND CLIMATE CHANGE STRATEGY
HATZIC EMERGENCY
WORKS PROGRAM
SITES SCR35 AND SCR36
20222632-09 AND 10

REV	DATE	DESIGN	DRAWN	DESCRIPTION
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DRAWING				
2632-10-G-001				REVISION
				0
				1

IF NOT DIMENSIONAL SCALES

SCALES SHOWN ARE INTENDED FOR AMB LAYOUT/USE DRAWINGS. VARIOUS (1:10) SIZE DRAWING SCALE 1/2 OF SCALE SHOWN VALUES NOTED OTHERWISE

EXISTING DESIGN	ROAD CONTROL LINE GRAVEL ROAD EDGE OF PAVEMENT CURB (ACTUAL WIDTH) SIDEWALK (ACTUAL WIDTH) CURB DEPRESSION GUIDE RAIL	EXISTING DESIGN	WATER WATER MAIN FIRE SUPPRESSION IRRIGATION RAW WATER POTABLE WATER VAULT BOX FIRE HYDRANT MANHOLE METER CHAMBER CROSS FLANGE TEE FLANGE END CAP / PLUG GATE VALVE THRUST BLOCK 45 DEGREE ELBOW 90 DEGREE ELBOW WYE ENCASEMENT WATER LEVEL COUPLING REDUCER WELL CURB STOP / CURB BOX	EXISTING DESIGN	STORM DRAINAGE CULVERT (Ø AND TYPE) STORM SEWER CATCH BASIN DOUBLE CATCH BASIN DITCH INLET CATCH BASIN CATCH BASIN / MANHOLE LAWN BASIN MANHOLE STORMCEPTOR OIL INTERCEPTOR VALVE BOX CULVERT INLET CULVERT OUTLET HEADWALL DITCH FLOW	EXISTING DESIGN	ELECTRICAL / POWER POWER / COMM / CONDUIT OVERHEAD POWER UNDERGROUND POWER VAULT / HYDRO BOX PULL BOX JUNCTION BOX TRANSFORMER VAULT / MANHOLE TRANSFORMER PAD METER MANHOLE LIGHT / LAMP STANDARD HYDRO / UTILITY POLE GUY WIRE SIGNAL SIGNAL WITH OVERHEAD ARM	EXISTING DESIGN	SANITARY SEWER SANITARY SEWER SANITARY FORCEMAIN SANITARY COMBINED SEWER MANHOLE COMBINED MANHOLE VALVE CHAMBER CLEANOUT VALVE BOX FLOW DIRECTION LIFT / PUMP STATION	EXISTING DESIGN	COMMUNICATIONS / TELEPHONE CABLE FIBRE OPTIC CABLE TELEPHONE / LINE UNDERGROUND TELEPHONE COMMUNICATIONS VAULT BOX TELEPHONE MANHOLE TELEPHONE VAULT BOX COMMUNICATIONS MANHOLE TELEPHONE PEDESTAL	EXISTING DESIGN	GAS / OIL GAS OIL VAULT BOX VALVE BOX MANHOLE METER	EXISTING DESIGN	CONTOUR MAJOR MINOR	PROPERTY PARCEL / LOT LINE EASEMENT STATUTORY ROW ROAD ROW	EXISTING DESIGN	PROFILE VIEW GROUND WATER MAIN SANITARY SEWER STORM SEWER	EXISTING DESIGN	SURVEY SURVEY HUB MONUMENT IRON PIN IRON PIN (FOUND) LEAD PLUG UNIDENTIFIED MANHOLE MONITORING WELL PEZOMETER OBSERVATION WELL	EXISTING DESIGN	MISCELLANEOUS CREEK (OVER 3m WIDE) (WIDTH OF CREEK SHOWN TO SCALE) TEST PIT BORER HOLE FLAG POLE PARKING METER MALBOX BOULDER RAILWAY SIGNAL LIGHT PARTITION FENCE (ANNOTATE AS REQUIRED) NO POST BARRIER / JERSEY BARRIER (SCALE AS REQUIRED) SIGN GATE BUSH TREE (RED CIRCLE) (SCALE AS REQUIRED) TREE (OVERHANGING) (SCALE AS REQUIRED) SPOT ELEVATION SLOPE GRID COORDINATE REGISTRATION	EXISTING DESIGN	HATCH PATTERNS SEMENT REMOVAL BANK EROSION REPAIR DEBRIS REMOVAL BENT/REPAIR UPPER EXTENT OF SEDIMENT REMOVAL EROSION PROTECTION CONSTRUCTION AREA	EXISTING DESIGN	MISCELLANEOUS FENCE SILT FENCE ABANDONED PPE RAILWAY BOTTOM OF BANK TOP OF BANK EDGE OF WATER HEDGE DITCH BUILDING 200 YEAR FLOOD EXTENTS ACCESS AND LAYDOWN AREA PROJECT EXTENTS PROJECT FOOTPRINT	EXISTING DESIGN	PERMIT TO PRACTICE ASSOCIATED ENGINEERING B.C. LTD. Engineers & Geoscientists BC	BC MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY AND CLIMATE CHANGE STRATEGY HATZIC EMERGENCY WORKS PROGRAM SITES SCR35 AND SCR36 2022/2632-09 AND 10 SCALE: NTS	BRITISH COLUMBIA GENERAL LEGEND	REVISION 0 2
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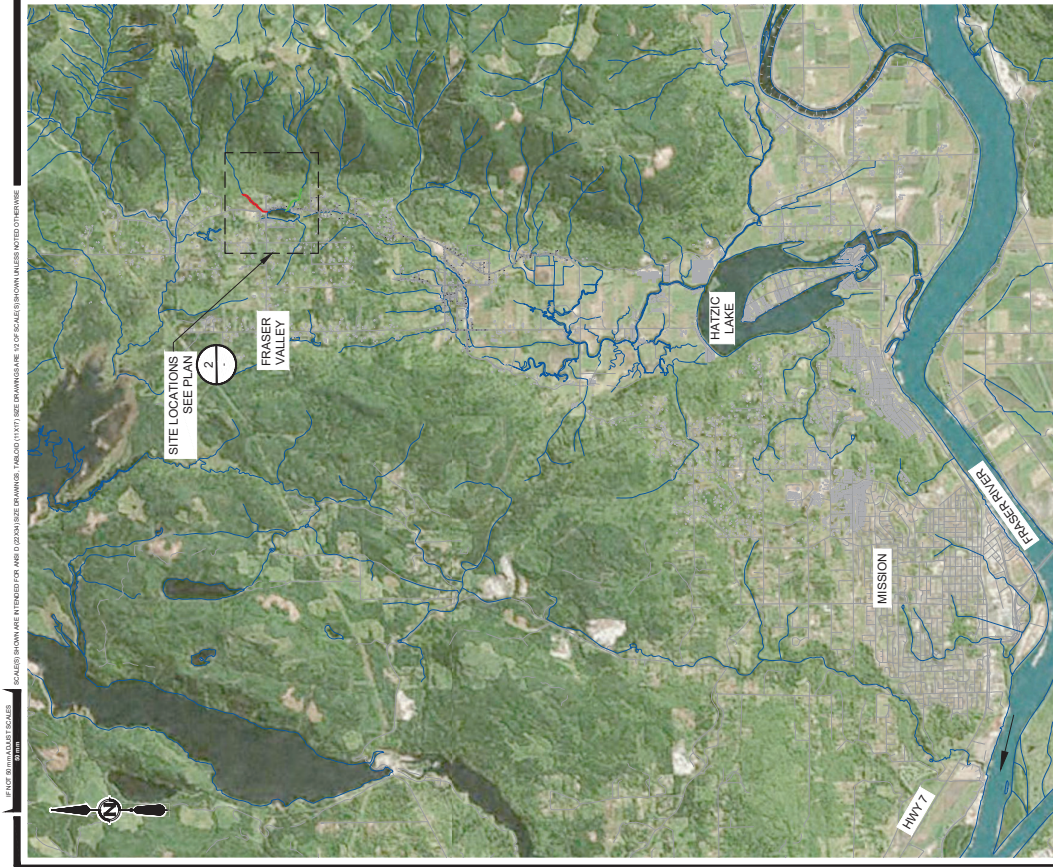
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AND CLIMATE CHANGE STRATEGY
AND CLIMATE CHANGE STRATEGY
HATZIC EMERGENCY
WORKS PROGRAM
SITES SCR35 AND SCR36
2022/2632-09 AND 10
SCALE: NTS



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2 PLAN

1 PLAN



BRITISH COLUMBIA

GENERAL LOCATION PLAN
SITES SCR35 AND SCR36

BC MINISTRY OF ENVIRONMENT
AND CLIMATE CHANGE STRATEGY

HATZIC EMERGENCY
WORKS PROGRAM

SITES SCR35 AND SCR36

20222632-09 AND 10

SCALE: AS SHOWN

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DRAWING	REVISION	SHEET
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Associated Engineering



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1 PLAN

1:500



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HATZIC EMERGENCY
WORKS PROGRAM
SITES SCR35 AND SCR36

20222632-09 AND 10

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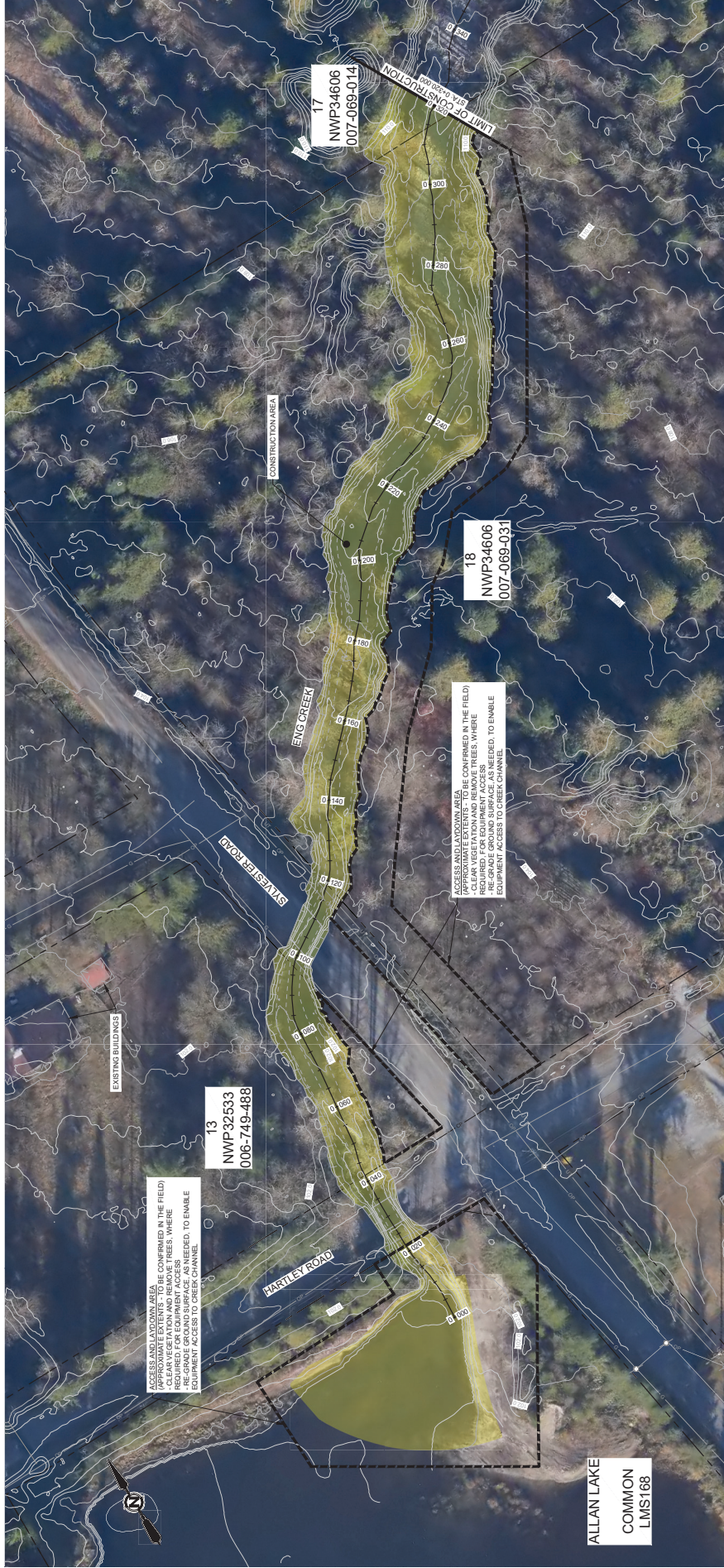


GENERAL
ACCESS AND LAYDOWN AREA

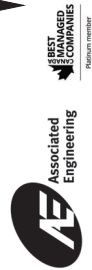
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1 PLAN 1:500



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WORKS PROGRAM
SITES SCR35 AND SCR36
2022/2632-09 AND 10

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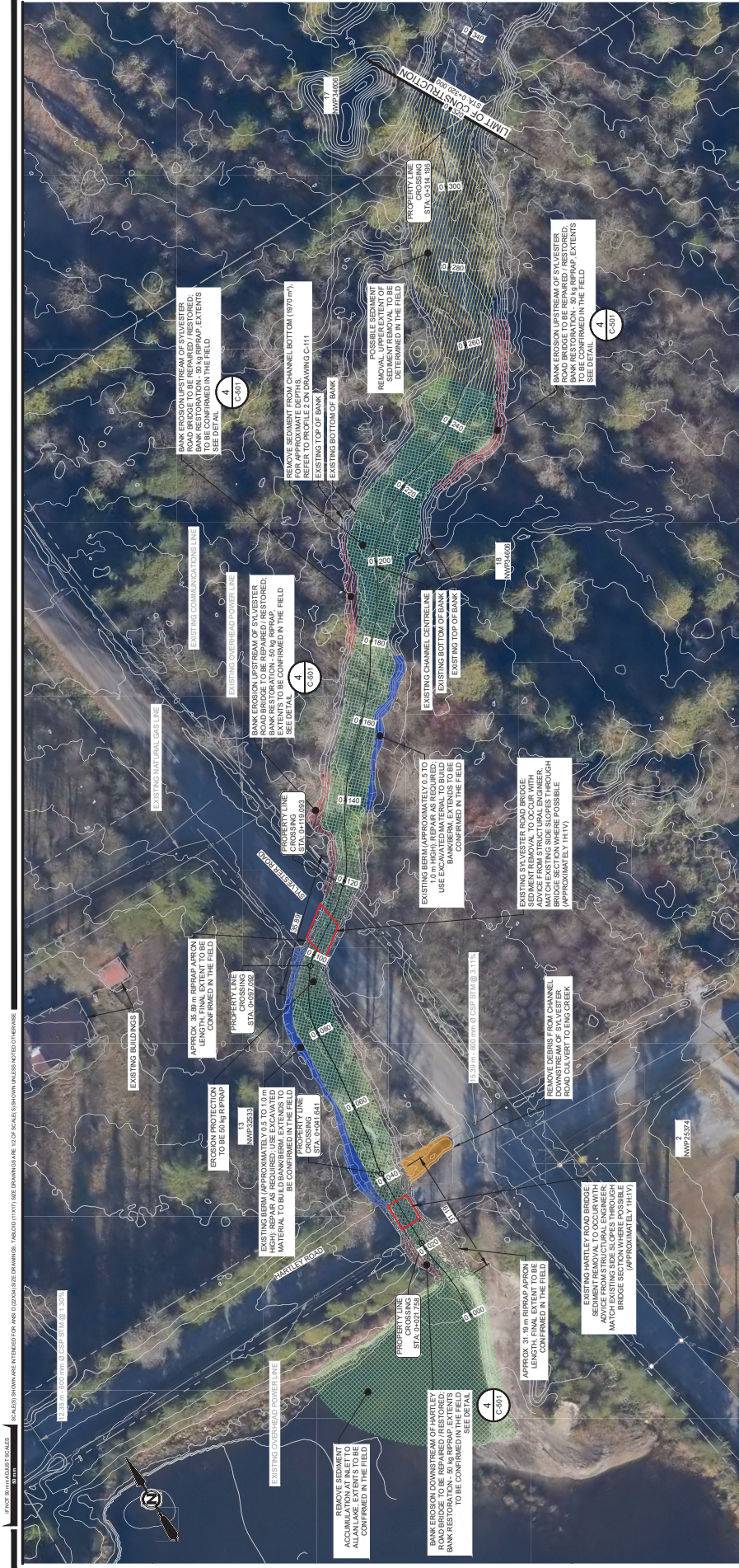
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0 2024/04/04 A. WHEAT M. LEON REVISIONS

GENERAL
SCHEMATIC
ACCESS AND LAYDOWN AREA



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PLAN 1:500

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- DESIGN EXTENTS ARE APPROXIMATE AND MAY REQUIRE ADJUSTMENT IN THE FIELD.
- EXISTING DEEP DRINKING WATER MAINS TO 1.5m TO BE REMOVED FROM CREEKS AS NOTED ON THE PLAN.
- DESIGN EXTENTS ARE APPROXIMATE AND MAY REQUIRE FIELD FITTING TO MAXIMIZE SEDIMENT REMOVAL.
- EXISTING DEEP DRINKING WATER MAINS TO 1.5m TO BE REMOVED FROM CREEKS AS NOTED ON THE PLAN.
- THE LOCATION OF ALL UTILITIES SHOWN ARE IN ACCORD WITH 10.
- COMPLETE AND MUST BE CERTIFIED WITH THE UTILITY PRIOR TO PROCEEDING WITH CONSTRUCTION.
- EXISTING SURFACE INFRASTRUCTURE AND UNDERGROUND UTILITIES, INCLUDING ALL EXISTING SURFACE INFRASTRUCTURE AND UNDERGROUND UTILITIES, SHALL BE PROTECTED AND MAINTAINED THROUGHOUT THE PROJECT.
- REMOVE EXISTING VEGETATION AS REQUIRED TO FACILITATE CONSTRUCTION.
- CONTRACTOR TO MAINTAIN NATURAL FLOW OF THE CREEK FOR THE DURATION OF THE PROJECT.

AE Associated Engineering

**BEST
MANAGED
COMPANIES**

Platinum member

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SITES SCR35 AND SCR36
20222632-09 AND 10

SCALE: AS SHOWN



BRITISH
COLUMBIA

CIVIL
SCR36 PLAN
SITE 36 WORKS

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20222632-09 AND 10

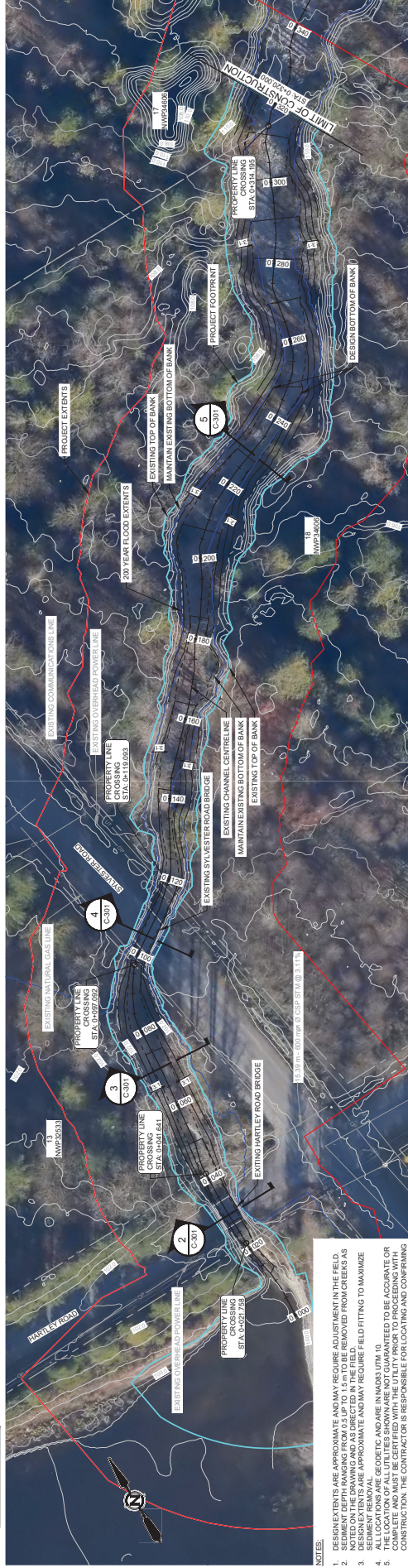
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SITE 36 WORKS

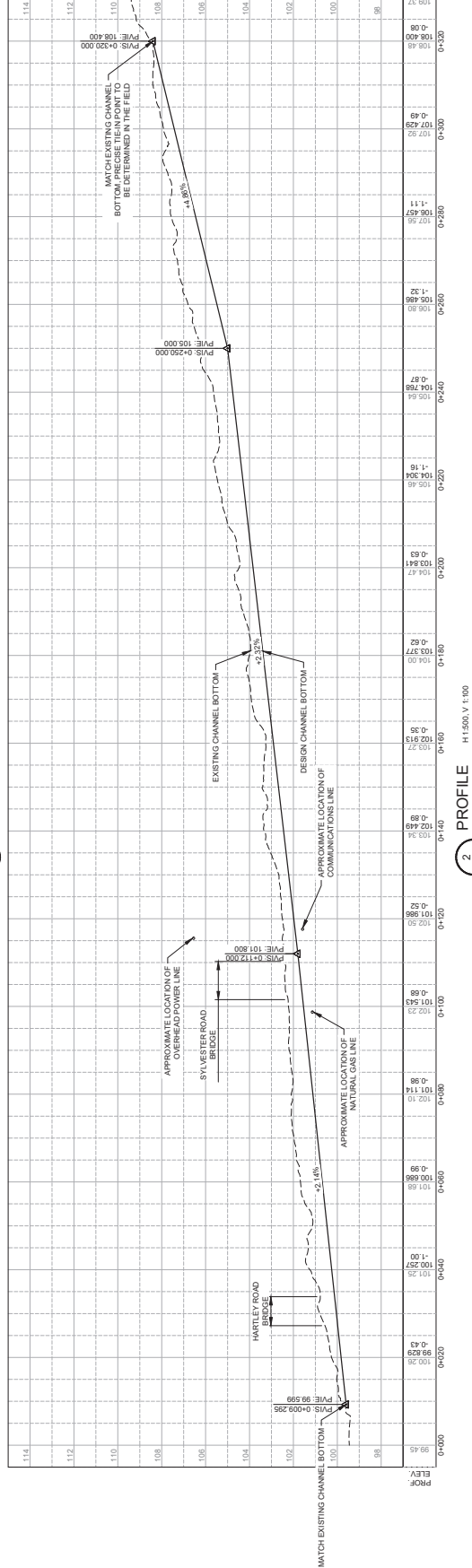
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SCALES SHOWN ARE INTENDED FOR INFO AND DO NOT SCALE DRAWINGS. VARIOUS (1:100) SIZE DRAWINGS ARE 12 OF SCALE SHOWN. ALL OTHERS NOTED OTHERWISE.



1 PLAN



2 PROFILE

- NOTES:
- DESIGN EXTENTS ARE APPROXIMATE AND MAY REQUIRE ADJUSTMENT IN THE FIELD.
 - SEDIMENT DEPTH RANGING FROM 0.5 UP TO 1.5m TO BE REMOVED FROM CREEKS AS SHOWN.
 - DESIGN EXTENTS ARE APPROXIMATE AND MAY REQUIRE FIELD FITTING TO MAXIMIZE.
 - SEDIMENT REMOVAL, GEOTECHNICAL AND ARE IN ACCORD WITH I.O.
 - THE LOCATION OF ALL UTILITIES SHOWN ARE NOT GUARANTEED TO BE ACCURATE OR COMPLETE AND MUST BE CERTIFIED WITH THE UTILITY PRIOR TO PROCEEDING WITH ANY CONSTRUCTION.
 - ALL EXISTING SURFACE INFRASTRUCTURE AND UNDERGROUND UTILITIES.
 - REMOVE EXISTING VEGETATION AS REQUIRED TO FACILITATE CONSTRUCTION OF CONSTRUCTION VIA TEMPORARY DIVERSION OR VIA OTHER APPROVED METHODS.



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REV	DATE	DESIGN	DRAWN	DESCRIPTION
0	2024-08-08	A. WILSON	M. LEON	REVISIONS

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HATZIS EMERGENCY
WORKS PROGRAM
SITES SCR35 AND SCR36
20222632-09 AND 10
SCALE: AS SHOWN

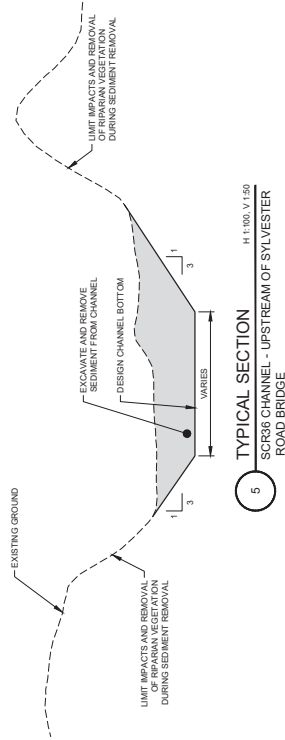
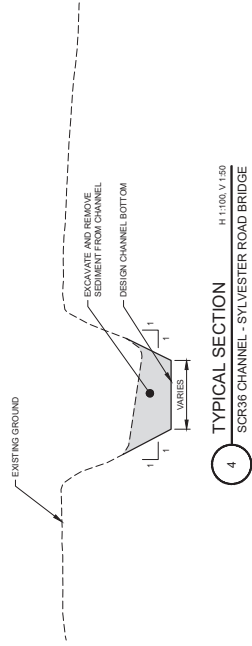
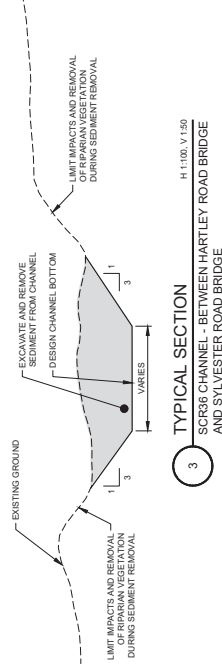
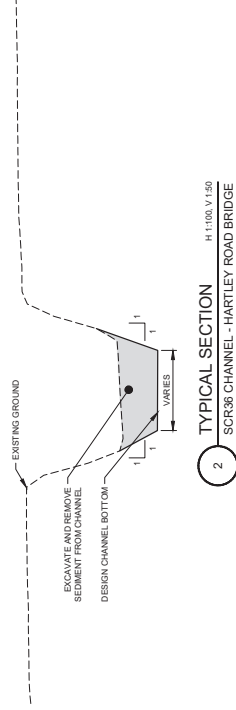
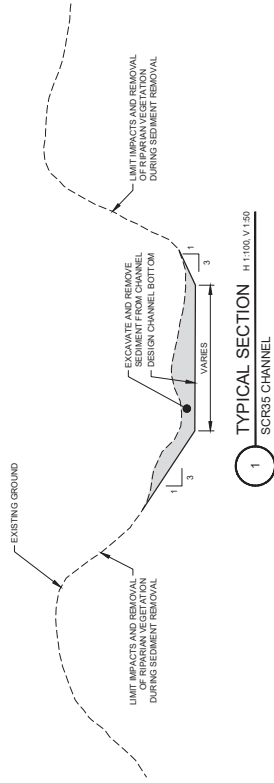


CIVIL
CH36 PLAN / PROFILE
STA 0+000 TO STA 0+320

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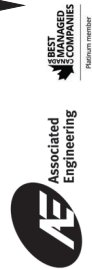
IF NOT DIMENSIONAL SCALES

SCALES SHOWN ARE INTENDED FOR AND USED AS GUIDE ONLY. ALL DIMENSIONS ARE TO BE SHOWN UNLESS NOTED OTHERWISE.



NOTES:

1. SEDIMENT REMOVAL AND CHANNEL ALTERATIONS TO BE COMPLETED BY A QUALIFIED ENVIRONMENTAL PROFESSIONAL AND QUALIFIED ENVIRONMENTAL PROFESSIONAL.
2. SEDIMENT DEPTH RANGING FROM 0.5 UP TO 1.5 m TO BE REMOVED FROM THE CHANNEL BOTTOM AS SHOWN ON THE DRAWING AND AS DIRECTED IN THE FIELD.



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AND CLIMATE CHANGE STRATEGY

HATZIC EMERGENCY
WORKS PROGRAM
SITES SCR35 AND SCR36
20222632-09 AND 10

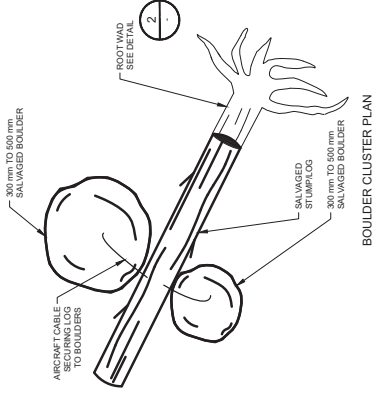
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CIVIL
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SCR35 AND SCR36

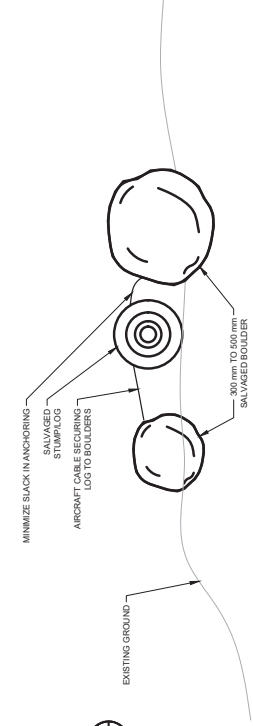


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0	2024/08/08	A. WILSON	M. LEON	SEALING FOR PERMIT

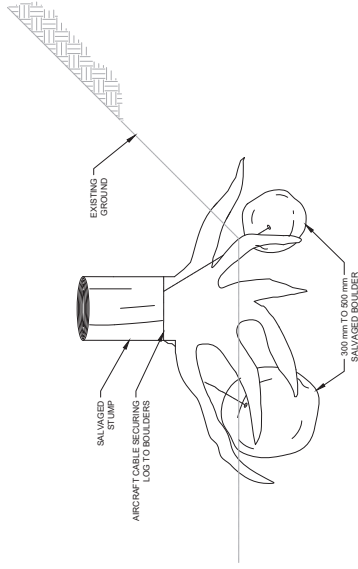
DRAWING	REVISION	SHEET
2632-10-C-301	0	10



BOULDER CLUSTER PLAN



BOULDER CLUSTER PROFILE



2

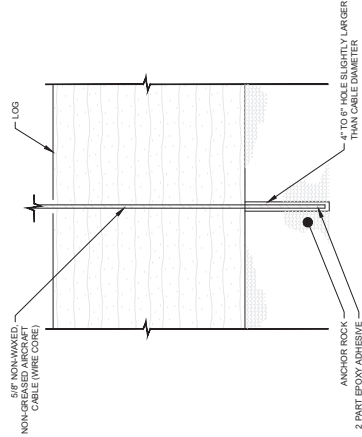
TYPICAL DETAIL

ROOT WAD

NTS

1

TYPICAL DETAIL	NTS
BOULDER CLUSTER	

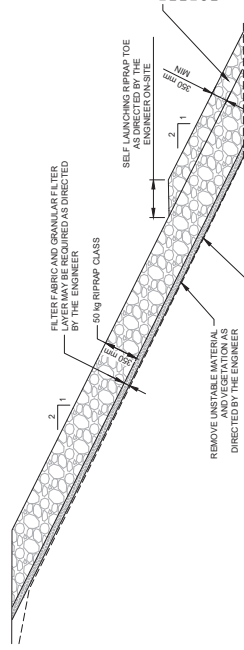


3

TYPICAL DETAIL

ANCHOR

NTS



4

TYPICAL SECTION

NTS

EROSION PROTECTION

NOTES FOR TYPICAL DETAILS:

1. PLACEMENT OF MATERIAL FEATURES:
 - 1.1. BOLLER CLUSTER OR ROOT WAS SHOULD BE PLACED ADJACENT TO OR PARTIALLY WITHIN, THE THAWING LOGGERS' CLUSTER OF ROOT OR BOLLER CLUSTER TO BE COMPLETED IN THE FIELD.
 2. LARGE WOODY DEBRIS SHALL BE COMPOSED OF MINIMUM 40% INCH AND ROOT WOOD ATTACHED.
 - 2.1. LARGE WOODY DEBRIS SHALL BE COMPOSED OF MINIMUM 40% INCH AND ROOT WOOD ATTACHED.
 - 2.2. LOGS SHALL BE 2.0m TO 4.0m IN LENGTH, ONE END TO CHANNEL BED AND THE OTHER TO CHANNEL BANK.
 - 2.3. LOGS SHALL BE 10 CM TO 15 CM IN DIAMETER.
 - 2.4. LOGS SHALL NOT EXCEED MAXIMUM OF 1/3 OF THE CHANNEL WIDTH.
 3. ROOT WAS PLACED UP AND DOWN BOTH SIDES OF CHANNEL.
 - 3.1. ROOT WAS SHALL PREFERABLY CONSIST OF DOUGLASS FIR OR SPRUCE.
 - 3.2. ROOT WAS SHALL HAVE MINIMUM ROOT WAS DIAMETER OF 2.0 m.
 - 3.3. 20% OF THE ROOT WAS SHALL BE BURIED IN THE CHANNEL.
 - 3.4. ANCHOR ROOT WAS USING MINIMUM 1/4" STAINLESS STEEL ANCHOR TIED TO CHANNEL BANK AND OTHER END TO STREAM BOTTOM, ACCORDING TO SHORE AND OTHER END TO STREAM BOTTOM, ACCORDING TO SHORE AND OTHER END TO STREAM BOTTOM, ACCORDING TO SHORE AND OTHER END TO STREAM BOTTOM.
 - 3.5. ANCHOR ROOT WAS SHALL NOT EXTEND GREATER THAN 1/3 THE WIDTH OF THE STREAM CHANNEL.
 4. ANCHORING NOTES:
 - 4.1. ANCHORING MINIMUM 1/4" NON-WALNUT, NON-GLUED.
 - 4.2. RAIL CABLE THOUGHS OF LOGS INTO TWO 30mm to 50 mm ANCHOR CABLE (WIRE CORE).
 - 4.3. LOGS IN HOLES MUST OF DEEP INTO BOLLERS AND SECURE SLIGHTLY LARGER THAN CABLE DIAMETERS HOLES TO BE CLEANED FOR ALL ANCHORS. CABLE LENGTH (SLACK) SHOULD BE MINIMIZED TO THE EXTENT PRACTICAL TO PREVENT MOVEMENT OF LOG AND ROOT

Appendix C



September 28, 2023

File Number: 2010789

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

Sent via E-mail: thyren.jacobs@gov.bc.ca

Re: Application for approval to make changes in Eng Creek and MacNab Creek flowing into Allan Lake Within Lot 4, Plan 29900 & Lot A, Plan BCP6138, Section 30; Lots 13, 17, 18, Plan 32533, Section 31 All Within Township 21, New Westminster District; Strata Lots 1 - 12, Strata Plan LMS168 Together With An Interest In The Common Property In Proportion To The Unit Entitlement Of The Strata Lot As Shown On Form 1 and along Road ROW Plan BCP6138 and unsurveyed crown crown land within bed and bank of Eng Creek and MacNab 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 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.

The holder of this Approval must have permits or other written consent from any affected property or right-of-way holders before commencing work that could affect utilities or other structures within the property and/or right-of-way.

The holder of this Approval shall take reasonable care to avoid damaging any land, works, trees, or other property and shall make full compensation to the owners for any damage or loss resulting from the exercise of rights granted hereunder.

This Approval requires the oversight of an appropriately Qualified Professional. For the purposes of this authorization, that professional must be registered with one of the five professional regulatory bodies named under the *Professional Governance Act* of British Columbia. They must be in good standing and acting under that professional regulatory body's code of ethics and subject to disciplinary action by that professional regulatory body.

Please ensure that machinery is free of invasive plant material that could potentially be transported throughout or between sites. In addition, ensure that invasive species removed from a site are disposed of appropriately.

For the protection of wildlife species, the Qualified Professional is responsible for planning and implementing fish and wildlife salvages prior to any instream and riparian works. *Wildlife Act* permits must be obtained from the Ministry of Forests (<https://portal.nrs.gov.bc.ca/web/client/home>).

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 website 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 contact the South Coast Office at WaterActReferrals.LowerMainland@gov.bc.ca.

Sincerely,



Kevin Gustafson
Assistant Water Manager

pc: Naomi Sands, Associated Environmental, Email: sandsn@ae.com
Pradeep Poudel, MoF, Email: Pradeep.1.Poudel@gov.bc.ca
Kwantlen First Nation
Leq'á:mel First Nation
Matsqui First Nation
Peters First Nation
Semiahmoo First Nation
People of the River Referrals Office (PRRO)

Enclosures

Approval 2010789 – Water Sustainability Act – Section 11 (Changes in and about a stream)
Permit Over Crown Land #29692



September 28, 2023

File Number: 2010789

APPROVAL

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

MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY

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

- (a) The names of the streams are MacNab Creek and Eng Creek, herein referred to as “the stream”.
- (b) The changes to be made in and about the streams are:
General works (both sites)
 - 1. Diversion of flows (if necessary).
 - 2. Revegetation of disturbed banks following sediment removal
 - 3. Replacement of LWD following sediment removal.

Within Lot 4, Plan 29900 & Lot A, Plan BCP6138, Section 30; Lots 13, 17, 18, Plan 32533, Section 31 All Within Township 21, New Westminster District; Strata Lots 1 - 12, Strata Plan LMS168 Together With An Interest In The Common Property In Proportion To The Unit Entitlement Of The Strata Lot As Shown On Form 1 and along Road ROW Plan BCP6138 and unsurveyed crown land within bed and bank of Eng Creek and MacNab Creek and lands held under Permit over Crown Land #29692 authorizing the occupation of Crown land.

- (c) The changes to be made in MacNab Creek are:
 - 1. Clearing/grubbing riparian vegetation for site access.
 - 2. Remove Approximately 1240 cubic meters of sediment.
 - 3. Place approximately 55 square meters of riprap along the south banks of the stream.
 - 4. Place approximately 278 square meters of riprap at culvert inlet/outlet
 - 5. Restore the disturbed site with plantation.

Within Road Right of Way (Plan BCP6138), Lots 4 and “A”, Strata Lot 11, Section 30,

Township 21, New Westminster District, Plans 29900 and BCP6138, Strata Plan LMS168, Together with an Interest in the Common Property in Proportion to the Unit Entitlement of the Strata Lot as Shown on Form 1 and Unsurveyed Crown Land with in bed and bank of MacNab Creek.

- (d) The location of the works at MacNab site (Site SCR 35) are at the following coordinates, as provided by the applicant: 49.2454371, -122.2167705
- (e) The changes to be made in Eng Creek are:
 - 1. Clearing/grubbing riparian vegetation for site access.
 - 2. Remove Approximately 3945 cubic meters of sediment.
 - 3. Place approximately 305 square meters of riprap at three sites along the north and south banks of the stream.
 - 4. Place approximately 620 m² of riprap under both bridge crossings.
 - 5. Restore the disturbed site with plantation.

Within Road Right of Way (Plan BCP6138), Lots 13, 17 and 18, Strata Lots 1-12, Section 30, Township 21, New Westminster District, Plans 32533 and 34606, Strata Plan LMS168, Together with an Interest in the Common Property in Proportion to the Unit Entitlement of the Strata Lot as Shown on Form 1 and Unsurveyed Crown Land within bed and bank of Eng Creek.

- (f) The location of the works at Eng Creek (Site SCR 36) are at the following coordinates, as provided by the applicant: 49.2490534, -122.2175497
- (g) The works authorized in this Approval shall be completed on or before December 31, 2024.
- (h) All works associated with the Effectiveness Monitoring Plan, as outlined in clause (y) below, shall be completed within three years after the works are completed, December 31, 2027, unless otherwise stated in writing by the Water Manager.
- (i) 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) shall occur 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);
- ii. The Qualified Professional shall also provide additional construction mitigation advice to prevent adverse environmental impacts, and daily or full-time supervision of all work in or near the stream;
 - iii. Work must be timed and planned appropriately, the stream must be completely dry or have marginal flows (naturally or achieved through appropriate isolation and diversion) 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.
- (j) All works shall comply with the following documents and any minor changes hereafter. Any major changes to the design must be submitted to the Water Manager for written authorization.
1. The report “MacNab and Eng Creeks (SCR-35 and 36) Bank Protection and Sediment Removal Environmental Management Plan”, prepared for Ministry of Environment and Climate Change Strategy by Associated Environmental dated August 2023.
 2. Memo “Preliminary Site Assessment of Potential Areas of Immediate Concern PWC Site ID: S-CR-35- McNab Creek Hatzic, BC”, prepared for Ministry of Environment and Climate Change Strategy by Associated Environmental dated June 23, 2022.
 3. Memo “Preliminary Site Assessment of Potential Areas of Immediate Concern PWC Site ID: S-CR-36- Eng Creek Hatzic, BC”, prepared for Ministry of Environment and Climate Change Strategy by Associated Environmental dated June 23, 2022.
 4. Stamped Drawings Issued for RFP and Permitting for Hatzic Emergency Works Program Sites SCR35 and SCR36 “2632-10-G-003 General Location Plan SCR35 McNAB and SCR 36 Eng Creek”; “2632-10-G-004 General SCR35 Plan Access and Laydown Area”; “2632-10-G-005 General SCR36 Plan Access and Laydown Area”; “2632-10-C-101 Civil SCR35 Plan Site 35 Works”; “2632-10-C-110 Civil SCR35 Plan/Profile STA 0+000 TO STA 0+380”; “2632-10-C-110 Civil SCR36 Plan Site 36 Works”; “2632-10-C-111 Civil SCR36 Plan/Profile STA 0+000 TO STA 0+320”; “2632-10-C-301 Civil Sections SCR35 and SCR 36”; 2632-09-C-501 Civil Details”; prepared for Ministry of Environment and Climate Change Strategy by Associated Environmental dated August 08, 2023.
- (k) All work shall be carried out in accordance with the Provincial "Requirements and Best Management Practices for Making Changes In and About a Stream in

B.C." (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>.

- (I) 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 and 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.
 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.

- (m) All proposed works shall be completed in isolation of the stream flows.
- (n) All equipment and machinery used in or near the stream channel must:
 - 1. Be in good operating condition and free of leaks, excess oil and grease;
 - 2. Have a spill containment kit readily accessible on-site with operators and/or staff on site trained in handling and applying a spill kit appropriately to any spills/incidents;
 - 3. Be refuelled a minimum of 30 metres away from all streams;
 - 4. Use environmentally sensitive hydraulic fluids which are non-toxic to aquatic life and which are readily or inherently bio-degradable;
 - 5. Any spill of a substance that is toxic, polluting, or deleterious to aquatic life of reportable quantities must be reported to the Dangerous Goods Incident Report 24-hour phone line at 1-800-663-3456.
- (o) 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. 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 Provincial "Requirements and Best Management Practices for Making Changes In and About a Stream in B.C." (2022) and the "Land Development Guidelines for the Protection of Aquatic Habitat" (Fisheries and Oceans Canada and the Province of British Columbia, 1993).
- (p) Sediment removal boundaries must be clearly delineated prior to commencement of work. All sediment excavation for removal purposes shall be completed in isolation of the stream flows.
- (q) Discharge and runoff water from the site into any watercourse(s) must comply with the BC Approved Water Quality Guidelines for the Protection of Aquatic Life (<https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines/approved-water-quality-guidelines>) and/or the applicable Local Government Bylaw(s).

Water quality monitoring must be conducted by an appropriately Qualified Professional or a designate (in writing) Environmental Monitor on every day in which instream works are being conducted. Measurements must be taken upstream of any works taking place and within the extent of the sedimentation downstream of where instream work is actively occurring. Measurements are to be taken immediately prior to works beginning, and then at regular intervals until the works are completed and may require additional frequency during wet

weather conditions. Wet weather conditions will be defined as being equal to or greater than 25 millimetres of rainfall within a 24-hour period.

- (r) 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.
- (s) The holder of this Approval shall ensure that instream works are designed and installed so as not to restrict fish passage and/or lead to fish stranding. The works shall not result in depressions that have the ability to trap fish and other aquatic life.
- (t) All temporary works (including a ford, stream crossing, flow bypass, and erosion and sediment control measures) shall be removed on completion of the project, and the stream channel restored to its natural condition.
- (u) Vegetation along the banks of the stream shall be disturbed as little as possible. All disturbed areas must be restored using native vegetation that is suitable for the site conditions.
- (v) Large woody debris and the stumps of large diameter trees must be left in place or retained on-site where it is safe to do so.
- (w) The holder of this Approval must provide a detailed post-construction report no later than December 1 of the year works were completed. The report must be submitted by email to SouthCoastWSAReporting@gov.bc.ca, 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;
 - 4. The volume of gravel or sediment removed (if applicable);
 - 5. The frequency of monitoring, including the name(s) of the designated monitor(s);
 - 6. The water quality reporting (e.g., turbidity, pH)
 - 7. Representative site photographs;
 - 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.
 - 10. As-Built Engineered Drawings.

- (x) The holders of water licensees near the work site, which are likely to be affected by the proposed works, are to be advised as soon as practicable prior to commencement of construction. If the proposed works cause or are expected to cause an adverse impact to quality or quantity of water available to the license holders, the license holders are to be provided with an alternate supply of fresh water during the periods when water quality or availability will be adversely impacted.
- (y) The holder of this Approval must retain an appropriately Qualified Professional to develop and implement a three-year Effectiveness Monitoring Plan that includes:
1. Maintenance and monitoring of plantings (including watering);
 2. Replacement of plantings, where necessary, to ensure 100% tree survival and minimum 80% shrub and other vegetation survival rate;
 3. Monitoring of vegetation within the side-cast areas to ensure tree survival.
 4. Monitoring of all channels and reaches within project area for flow and function with proposed adaptive management strategies to address shortfalls.

Annual reports must be submitted by December 31 of each calendar year following completion of construction to SouthCoastWSAReporting@gov.bc.ca. The reports and subject line of the email must be labelled with this Approval file number.

Sincerely,



Kevin Gustafson
Assistant Water Manager



Province of British Columbia

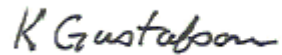
Water Sustainability Act

PERMIT AUTHORIZING THE OCCUPATION OF CROWN LAND

The holder of this permit, Ministry of Environment and Climate Change Strategy (14475), whose Change Approval authorizes changes in and about a stream (Eng Creek, MacNab Creek), is hereby authorized to occupy Crown Land by constructing, maintaining and operating the works as authorized in the Change Approval (2010789).

- (a) The Crown land which is authorized to be occupied under this permit is a portion of a SCR-35 MacNab Creek, Sylvester Rd, Fraser Valley (Area = 177.6 square meters)
- (b) b) SCR-36 Eng Creek, Hartley road and Sylvester Rd, Fraser Valley (Area = 497.1 square meters), the location of which is authorized in the Change Approval.
- (c) The approximate dimensions of the Crown Land authorized to be occupied under this permit, are for having an area of 0.06471 hectares.
- (d) 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.
- (e) This permit is appurtenant to the land, mine, or undertaking to which the aforesaid Change Approval is appurtenant.
- (f) 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.
- (g) 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.

- (h) 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.
- (i) 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.



Kevin Gustafson
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: 
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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.

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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 archsiteform@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.

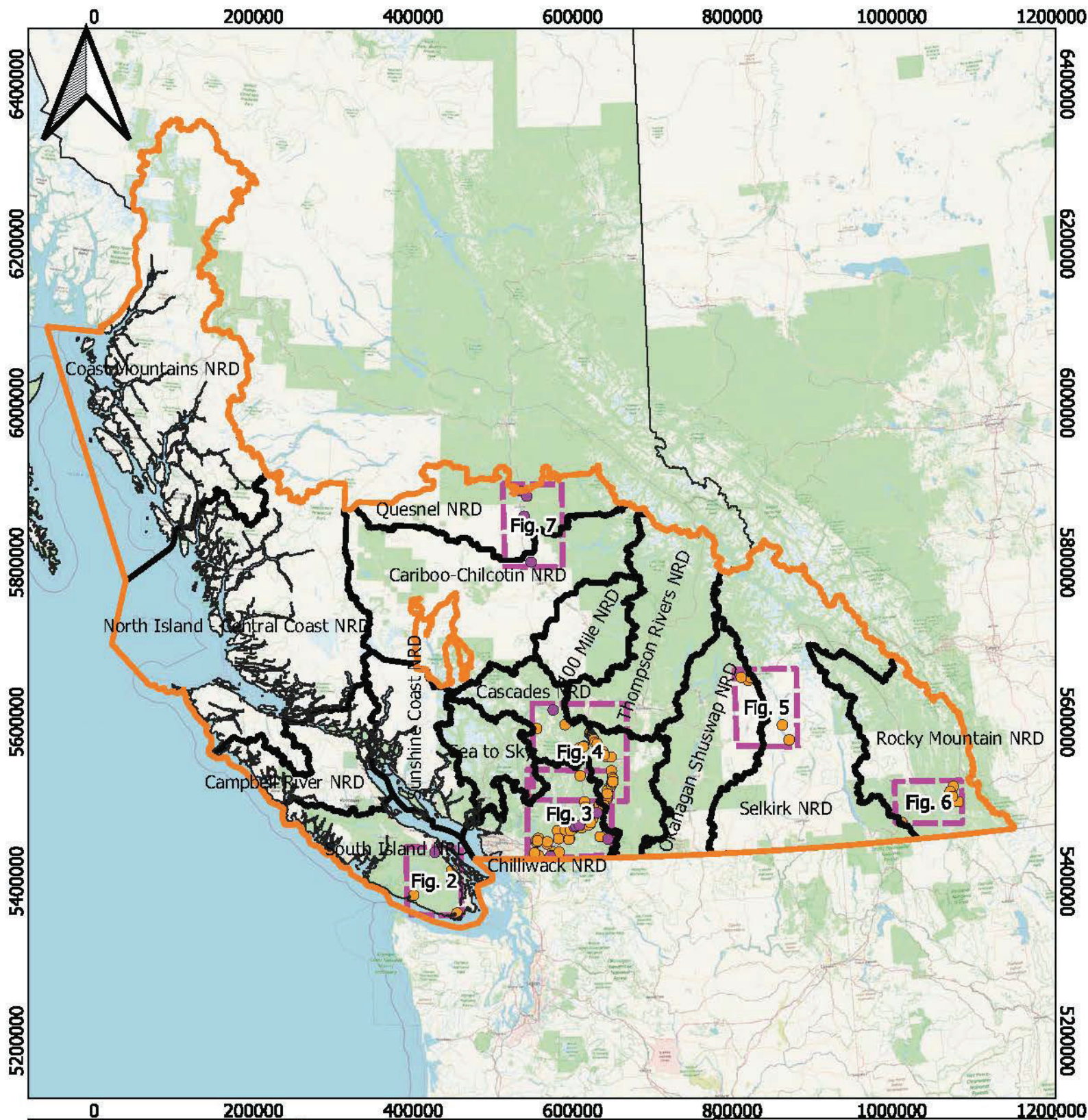


Fig. 1 - Permit Area Overview

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



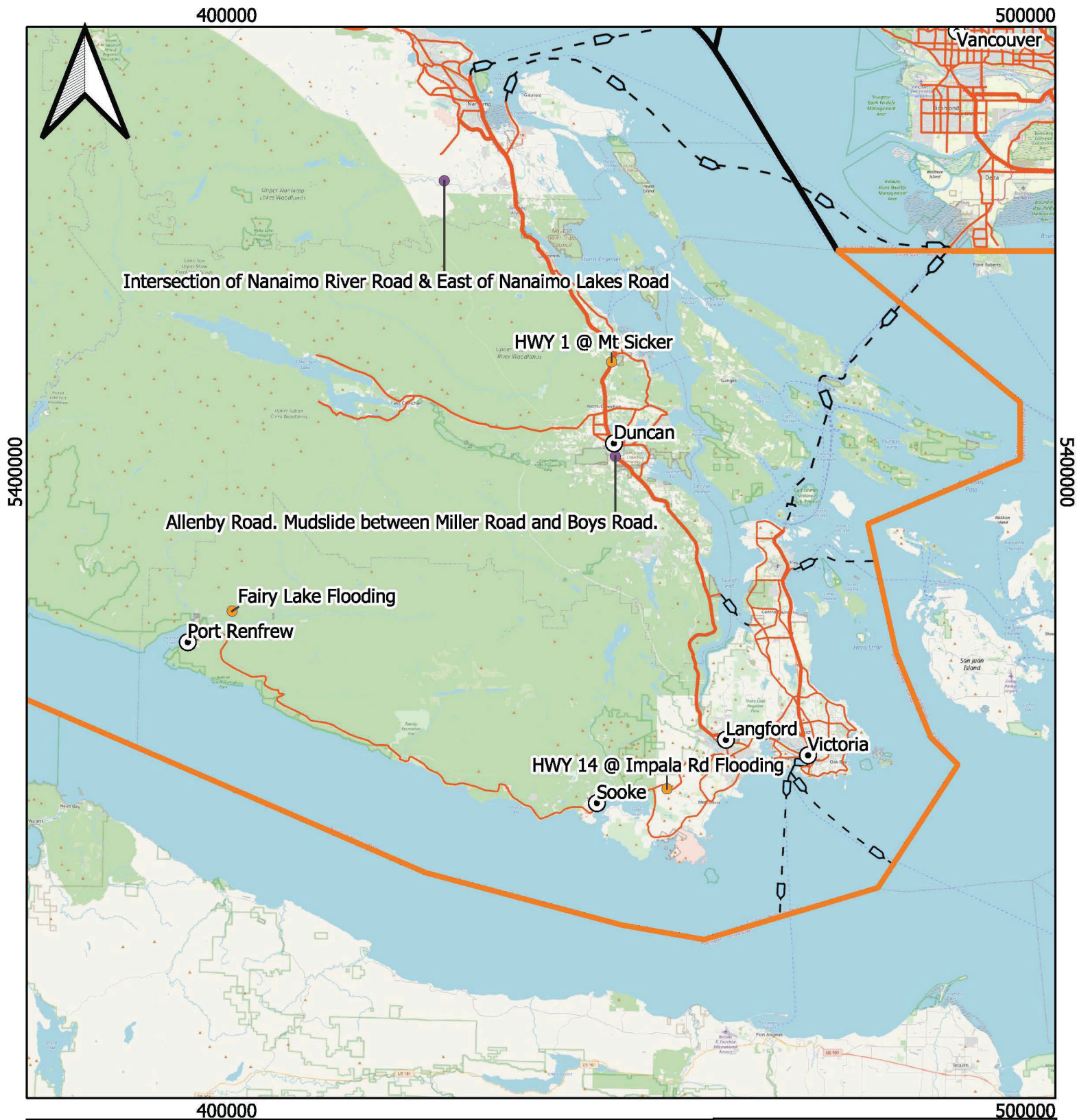


Fig. 2 Midrange - South Island

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

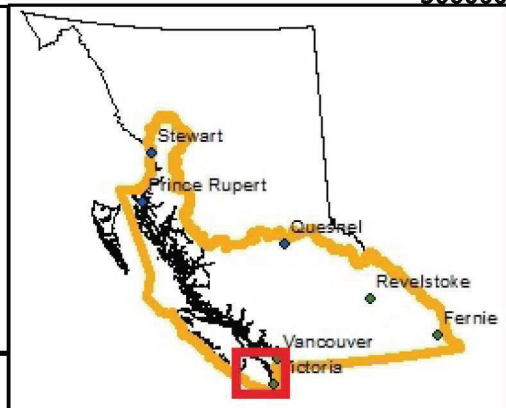
Cities

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



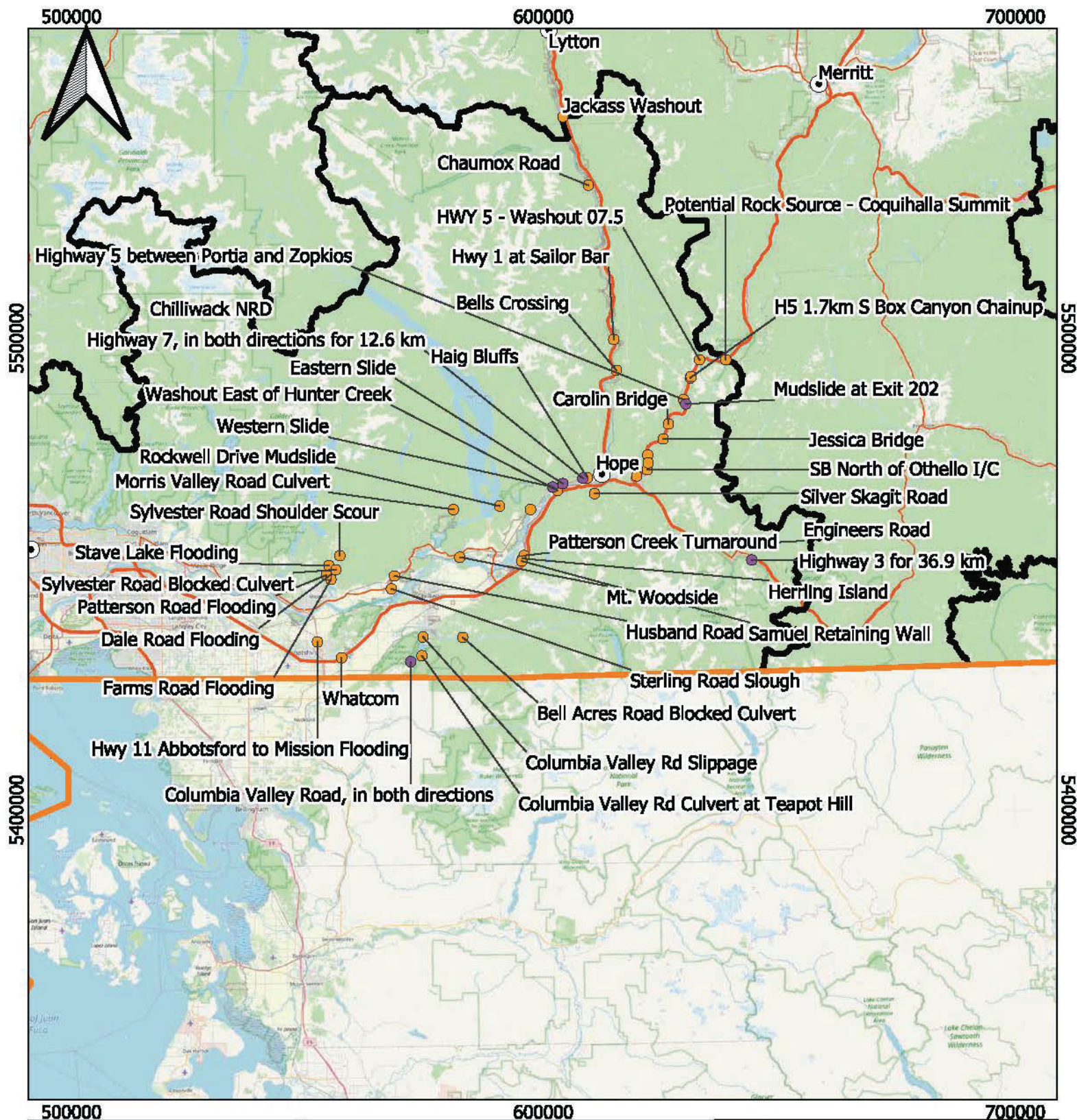


Fig. 3 Midrange - Chilliwack

0 10 20 km

HCA Application: 21A0694

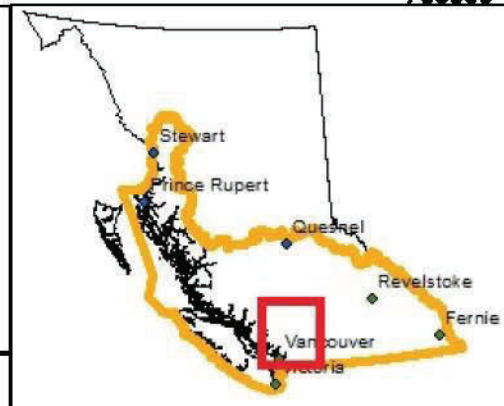
Scale: 1: 1,100,000

Datum: UTM 10 N

Date: 2021-11-26

Author:

Corey Cookson (Arch Branch)



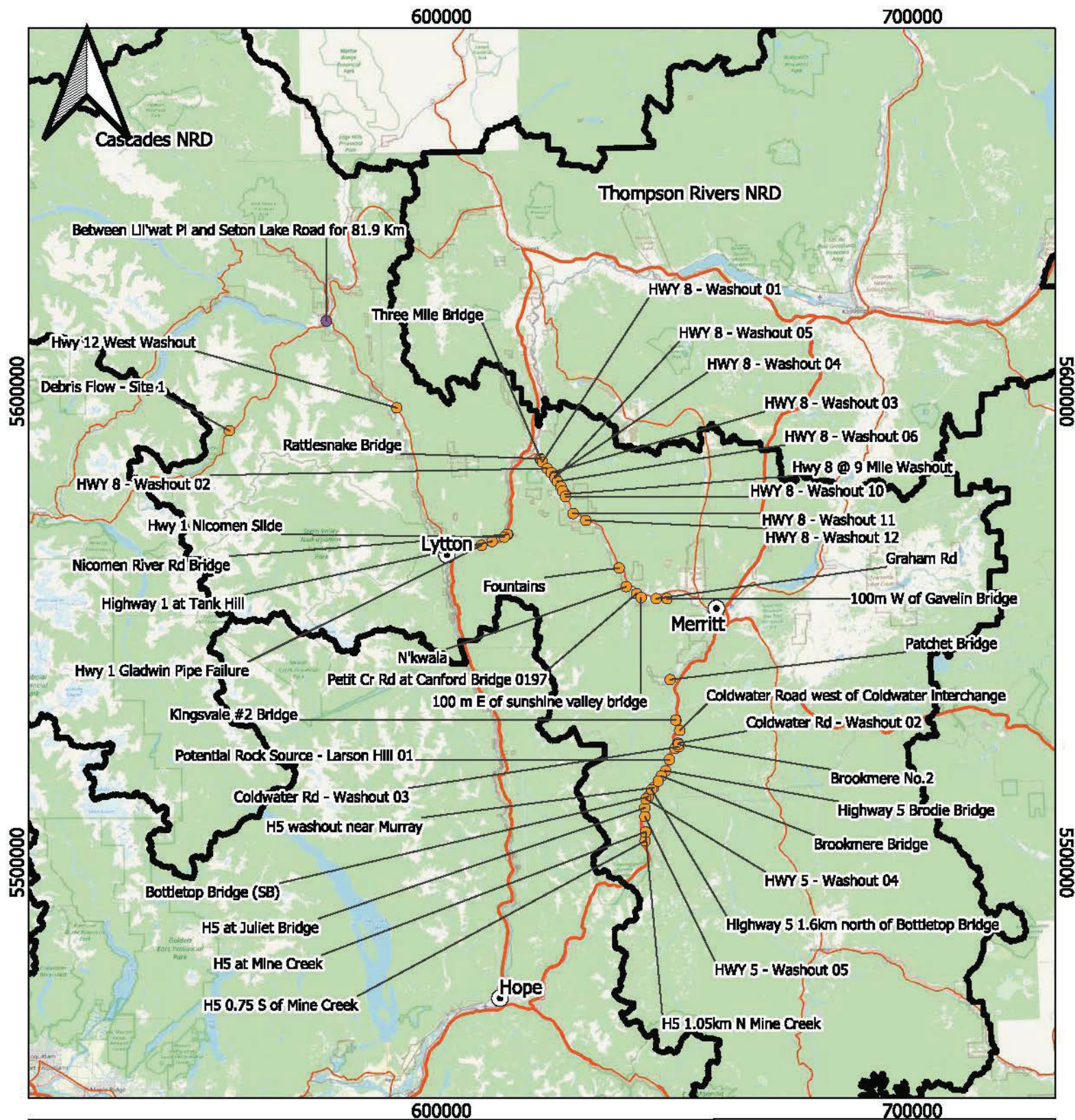


Fig. 4 Midrange - Cascades

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



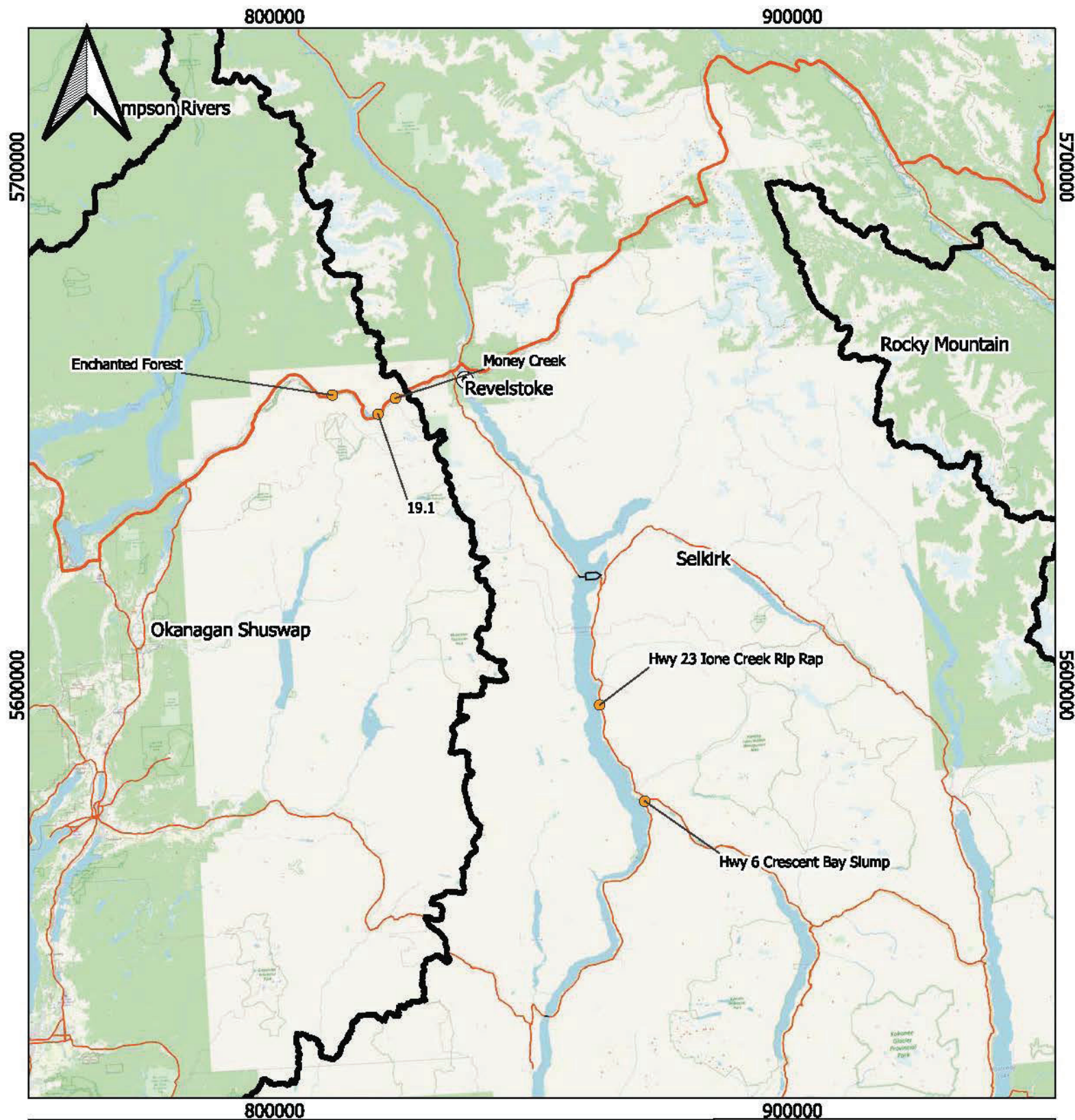


Fig. 5 Midrange - Okanagan Shuswap & Selkirk

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



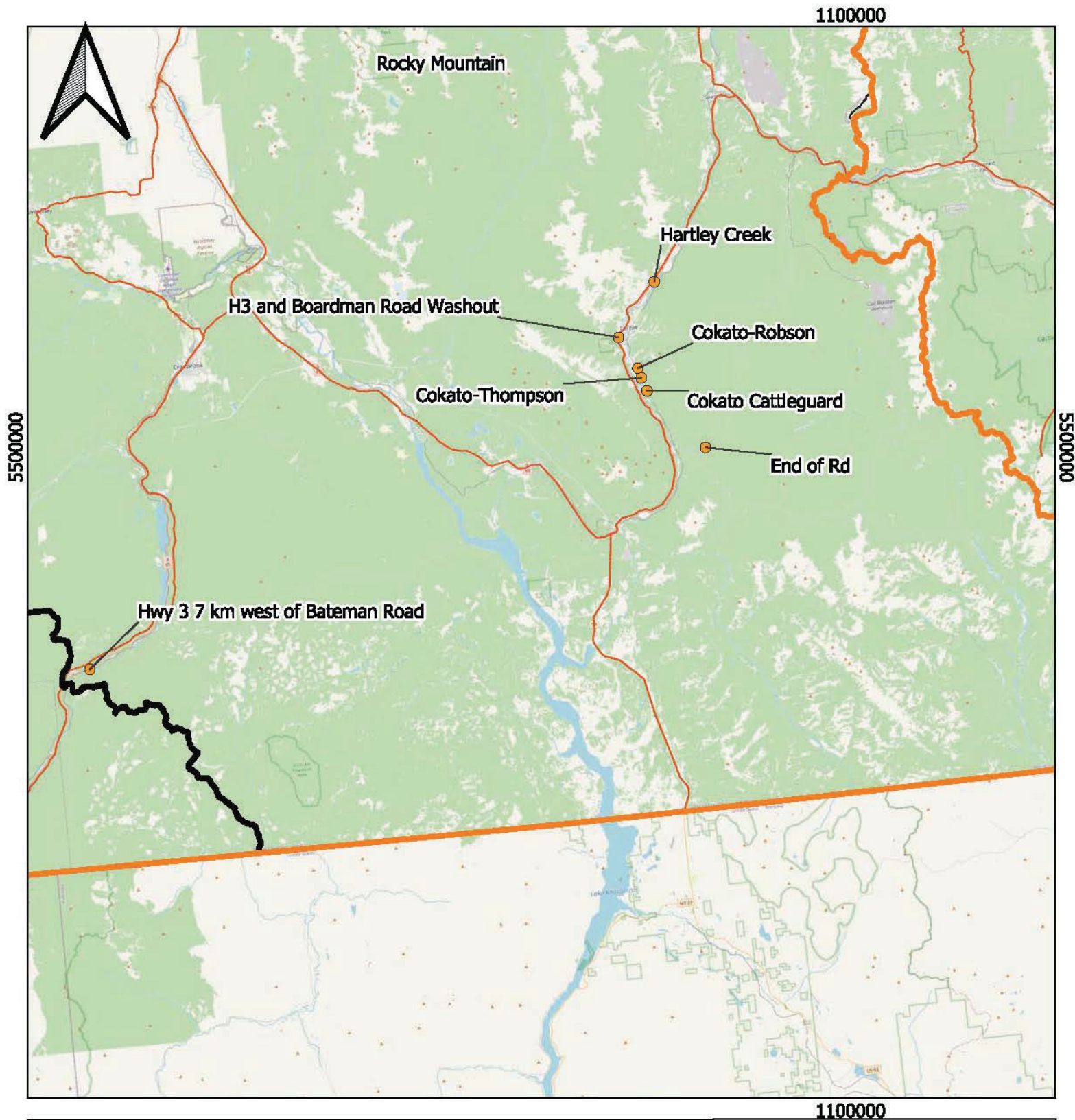


Fig. 6 Midrange - Rocky Mountain

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



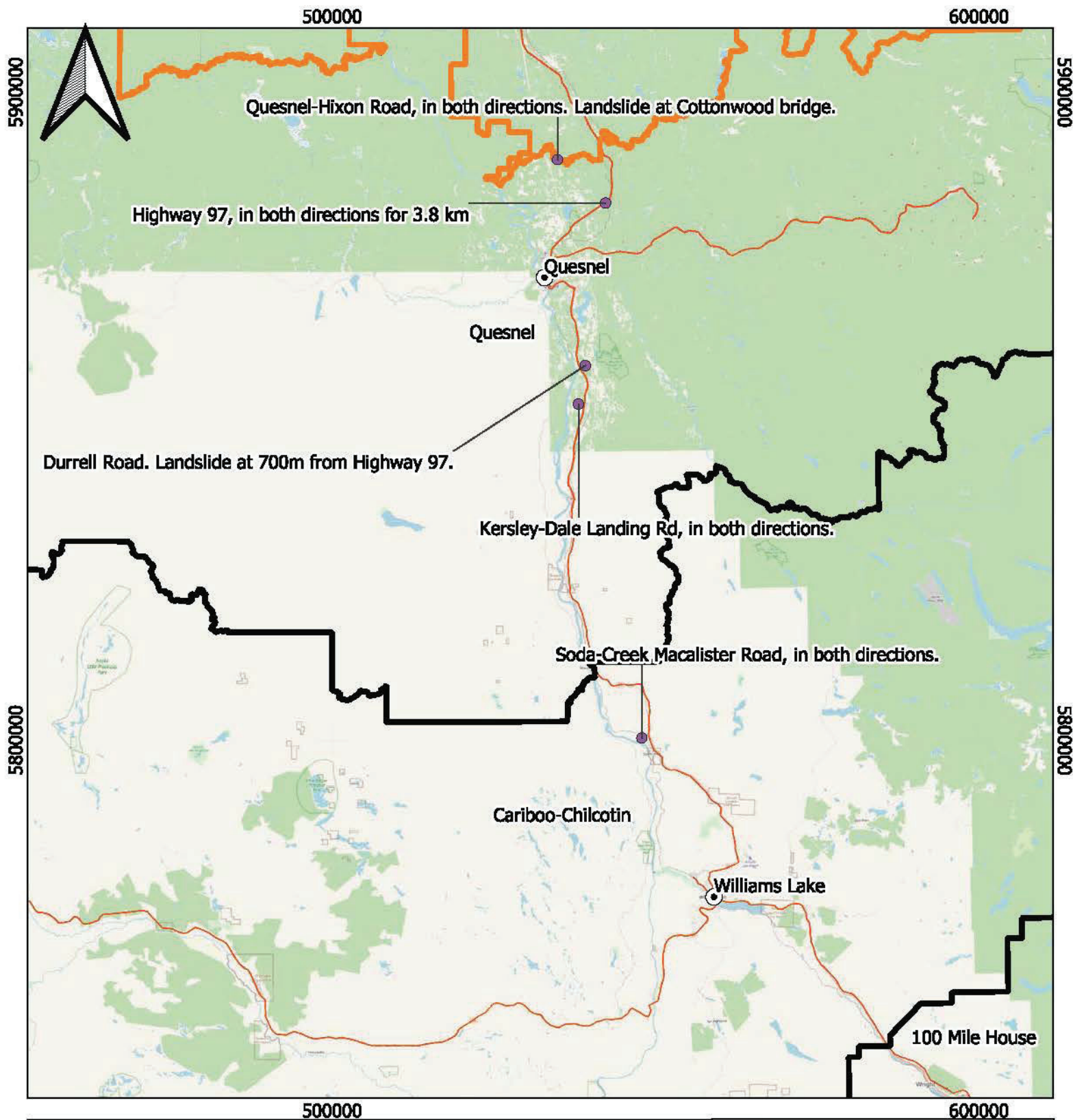


Fig. 7 Midrange - Quesnel & Cariboo-Chilcotin

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

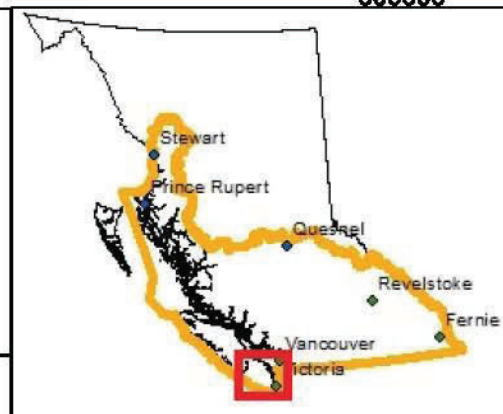
Cities

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: 
--------------------------------------	---	--	--

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.:	14
Project:	Hatzic Emergency Works Program SCR35 McNab Creek & SCR36 Eng Creek	Page:	1 of 3
Location:	Sylvester Road, Fraser Valley, BC 49°14'56.81"N, 122°13'2.69"W	Project No.:	S-CR-35&36 2022-2632
Contractor:	Mission Contractors	File No.:	
Contract:		Date:	October 25, 2023
Contract No.:		Temperature:	High: 11°C Low: 5°C
Weather:	Partly cloudy.		

Labour Force: Mission Contractors: Foreman, 3 operators.

Contractor's Equipment: Volvo A30F, 200 Komatsu Excavator, 360 Komatsu Excavator, Mini excavator.

1.0 Report:

- Taylor Johnston (AE) on site: 745am to 3pm.
- Mission Contractors on site: 730am to 3pm.
- Aqua-terra on site: 730am to 1230pm.
- Leq'a:mel First Nation: 730am to 3pm.
- Mint Traffic Control: 730am to 3pm.

1.1 Mission Contractors:

- Removing creek sediment from under the Hartley Rd bridge. Installing rip-rap underneath the Sylvester Rd bridge. Hauling sediment off site. Hauling rip-rap to site.
- Traffic control on site to assist with crossing Sylvester road.
- Issues and Concerns: Concrete abutments from older bridge found under Sylvester Rd bridge, due to the tight schedule the concrete will be left in place for now.

1.2 Environmental Monitoring

- Aqua-terra on site. Re-established the isolation fence around the contaminated sediment.

1.3 First Nations

- Environment Monitor - Leq'a:mel on site to do the Western Toad sweep. No toads found.

2.0 Site Photographs



Figure - 1
Facing E – Placing rip-rap underneath the
Sylvester road bridge.



Figure - 2
Facing N – Finished rip-rap on the west side of
the Sylvester road bridge.



Figure - 3
Facing S – Removing sediment from under the
Hartley road bridge.



Figure - 4
Facing W – Finished rip-rap on the east side of
the Sylvester road bridge.



DAILY CONSTRUCTION REPORT

Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	15
Project:	Hatzic Emergency Works Program SCR35 McNab Creek & SCR36 Eng Creek	Page:	1 of 3
Location:	Sylvester Road, Fraser Valley, BC 49°14'56.81"N, 122°13'2.69"W	Project No.:	S-CR-35&36 2022-2632
Contractor:	Mission Contractors	File No.:	
Contract:		Date:	October 26, 2023
Contract No.:		Temperature:	High: 10°C Low: 1°C
Weather:	Partly cloudy.		

Labour Force: Mission Contractors: Foreman, 3 operators.

Contractor's Equipment: Volvo A30F, 200 Komatsu Excavator, 360 Komatsu Excavator, Mini excavator.

1.0 Report:

- Taylor Johnston (AE) on site: 745am to 3pm.
- Mission Contractors on site: 730am to 3pm.
- Aqua-terra not on site.
- Leq'a:mel First Nation: 730am to 3pm.
- Mint Traffic Control: 730am to 3pm.

1.1 Mission Contractors:

- Removing the remaining sediment between the 2 bridges. Installing rip-rap underneath the Hartley Rd bridge and at the Allen lake inlet. Hauling sediment off site. Hauling rip-rap to site.
- Traffic control on site to assist with crossing Sylvester road.
- Issues and Concerns: N a

1.2 Environmental Monitoring

- Aqua-terra not on site.

1.3 First Nations

- Environment Monitor - Leq'a:mel on site to do the Western Toad sweep. No toads found.

2.0 Site Photographs



Figure - 1
Facing S – Finished rip-rap at the Hartley Rd
bridge.



Figure - 2
Facing N – Removing remaining sediment
from between the 2 bridges.



Figure - 3
Facing NW – Installing filter fabric at the Allen
Lake inlet.



Figure - 4
Facing NW – Finished rip-rap at the Allen
Lake inlet.



Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	16
Project:	Hatzic Emergency Works Program SCR35 McNab Creek & SCR36 Eng Creek	Page:	1 of 3
Location:	Sylvester Road, Fraser Valley, BC 49°14'56.81"N, 122°13'2.69"W	Project No.:	S-CR-35&36 2022-2632
Contractor:	Mission Contractors	File No.:	
Contract:		Date:	October 27, 2023
Contract No.:		Temperature:	High: 10°C Low: -1°C
Weather:	Mainly Sunny.		

Labour Force: Mission Contractors: Foreman, 3 operators.

Contractor's Equipment: Volvo A30F, 200 Komatsu Excavator, 360 Komatsu Excavator.

1.0 Report:

- Taylor Johnston (AE) on site: 745am to 4pm.
- Mission Contractors on site: 730am to 4pm.
- Aqua-terra on site: 730am to 12pm.
- Leq'a:mel First Nation: 730am to 4pm.
- Mint Traffic Control: 730am to 4pm.

1.1 Mission Contractors:

- Mission mobilized to McNab. Established the laydown across Sylvester Rd next to Allan lake. Started sediment removal at station 0 370 made it to station 0 310. Allan Lake strata contact onsite to approve laydown usage.
- Traffic control on site to assist with crossing Sylvester road.
- Issues and Concerns: N/a

1.2 Environmental Monitoring

- Aqua-terra on site. No concerns with McNab.

1.3 First Nations

- Environment Monitor - Leq'a:mel on site to do the Western Toad sweep. No toads found.

2.0 Site Photographs



Figure - 1
Facing W – Establishing the laydown area.



Figure - 2
Facing W – Sediment removal at station
0 350



Figure - 3
Facing NW – Sediment removal near station
0+340



Figure - 4
Facing NW – Offloading creek sediment at the
laydown.



DAILY CONSTRUCTION REPORT

Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	17
Project:	Hatzic Emergency Works Program SCR35 McNab Creek & SCR36 Eng Creek	Page:	1 of 3
Location:	Sylvester Road, Fraser Valley, BC 49°14'56.81"N, 122°13'2.69"W	Project No.:	S-CR-35&36 2022-2632
Contractor:	Mission Contractors	File No.:	
Contract:		Date:	October 28, 2023
Contract No.:		Temperature:	High: 10°C Low: -2°C
Weather:	Mainly Sunny.		

Labour Force: Mission Contractors: Foreman, 4 operators.

Contractor's Equipment: Volvo A30F, 200 Komatsu Excavator, 360 Komatsu Excavator.

1.0 Report:

- Taylor Johnston (AE) on site: 815am to 3pm.
- Mission Contractors on site: 730am to 3pm.
- Aqua-terra not on site.
- Leq'a:mel First Nation: 10am to 11am.
- Mint Traffic Control: 730am to 3pm.

1.1 Mission Contractors:

- Continue sediment removal between stations 0 310 made it to station 0 210. Haul trucks started up again. Removing sediment from site.
- Traffic control on site to assist with crossing Sylvester road.
- Issues and Concerns: N/a

1.2 Environmental Monitoring

- Aqua-terra not on site.

1.3 First Nations

- Environment Monitor - Leq'a:mel on site to do the Western Toad sweep. No toads found.

2.0 Site Photographs



Figure - 1
Facing W – Hauling sediment to the laydown
area next to Allan lake.



Figure - 2
Facing N – Sediment removal near station 310



Figure - 3
Facing NW – Hauling sediment from site.
Flaggers controlling traffic.



Figure - 4
Facing NW – Sediment removal near station
210.



Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	18
Project:	Hatzic Emergency Works Program SCR35 McNab Creek & SCR36 Eng Creek	Page:	1 of 3
Location:	Sylvester Road, Fraser Valley, BC 49°14'56.81"N, 122°13'2.69"W	Project No.:	S-CR-35&36 2022-2632
Contractor:	Mission Contractors	File No.:	
Contract:		Date:	October 29, 2023
Contract No.:		Temperature:	High: 11°C Low: -1°C
Weather:	Mainly Sunny.		

Labour Force: Mission Contractors: Foreman, 3 operators.

Contractor's Equipment: Volvo A30F, 200 Komatsu Excavator, 360 Komatsu Excavator.

1.0 Report:

- Taylor Johnston (AE) on site: 8am to 3pm.
- Mission Contractors on site: 730am to 3pm.
- Aqua-terra not on site.
- Leq'a:mel First Nation: 730am to 3pm.
- Mint Traffic Control: 730am to 3pm.
- Lisbeth (AE) on site: 1030am to 230pm.

1.1 Mission Contractors:

- Continue sediment removal from station 0 210 down to the Sylvester Rd culverts. Haul trucks removing sediment from site.
- Traffic control on site to assist with crossing Sylvester road.
- Issues and Concerns: Mission and AE discussed deficiencies at Eng creek and to fix the toe of slopes at McNab. Additional rip-rap to be placed at the top of McNab.

1.2 Environmental Monitoring

- Aqua-terra not on site.

1.3 First Nations

- Environment Monitor - Leq'a:mel on site to do the Western Toad sweep. No toads found.

2.0 Site Photographs



Figure - 1
Facing N – Excavating sediment near station 210.



Figure - 2
Facing NW – Hauling sediment to the laydown area next to Allan lake.



Figure - 3
Facing S – Hauling sediment from site.
Flaggers controlling traffic.



Figure - 4
Facing W – Sediment removed up to the
Sylveser Rd culverts.



DAILY CONSTRUCTION REPORT

Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	19
Project:	Hatzic Emergency Works Program SCR35 McNab Creek & SCR36 Eng Creek	Page:	1 of 3
Location:	Sylvester Road, Fraser Valley, BC 49°14'56.81"N, 122°13'2.69"W	Project No.:	S-CR-35&36 2022-2632
Contractor:	Mission Contractors	File No.:	
Contract:		Date:	October 30, 2023
Contract No.:		Temperature:	High: 14°C Low: 0°C
Weather:	Mainly Sunny.		

Labour Force: Mission Contractors: Foreman, 2 operators.

Contractor's Equipment: Volvo A30F, 200 Komatsu Excavator, 360 Komatsu Excavator.

1.0 Report:

- Taylor Johnston (AE) on site: 8am to 3pm.
- Mission Contractors on site: 730am to 3pm.
- Aqua-terra on site: 730am to 1230pm.
- Leq'a:mel First Nation: 730am to 3pm.
- Mint Traffic Control: 730am to 3pm.

1.1 Mission Contractors:

- Installing additional rip-rap and filter fabric near station 0 350 and near station 0 150. Haul trucks removing sediment from site.
- Traffic control on site to assist with crossing Sylvester road.
- Issues and Concerns: N/a

1.2 Environmental Monitoring

- Aqua-terra on site. No concerns.

1.3 First Nations

- Environment Monitor - Leq'a:mel on site to do the Western Toad sweep. No toads found.

2.0 Site Photographs



Figure - 1
Facing NW – Loading sediment from the
laydown area.



Figure - 2
Facing NE – Hauling rip-rap upstream to
station 350.



Figure - 3
Facing SE – Installing rip-rap at station 350.



Figure - 4
Facing SW – Installing rip-rap at station 150.



Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	20
Project:	Hatzic Emergency Works Program SCR35 McNab Creek & SCR36 Eng Creek	Page:	1 of 3
Location:	Sylvester Road, Fraser Valley, BC 49°14'56.81"N, 122°13'2.69"W	Project No.:	S-CR-35&36 2022-2632
Contractor:	Mission Contractors	File No.:	
Contract:		Date:	October 31, 2023
Contract No.:		Temperature:	High: 13°C Low: 1°C
Weather:	Mainly Sunny.		

Labour Force: Mission Contractors: Foreman, 2 operators.

Contractor's Equipment: Volvo A30F, 200 Komatsu Excavator, 360 Komatsu Excavator.

1.0 Report:

- Taylor Johnston (AE) on site: 730am to 330pm.
- Mission Contractors on site: 730am to 330pm.
- Aqua-terra not on site.
- Leq'a:mel First Nation: 730am to 330pm.
- Mint Traffic Control: 730am to 330pm.

1.1 Mission Contractors:

- Excavated the last of the creek sediment from McNab. Installing additional rip-rap and filter fabric near the culvert inlets on the east side of Sylvester Rd. Haul trucks removing sediment from site. Haul trucks bringing rip-rap to site.
- Traffic control on site to assist with crossing Sylvester road.
- Issues and Concerns: Haul truck hit the Strata gate post entering the laydown at McNab. Strata has been notified by Mission of the damage. Mission to repair gate and ensure the Strata is satisfied, if not the post will have to be replaced.

1.2 Environmental Monitoring

- Aqua-terra not on site.

1.3 First Nations

- Environment Monitor - Leq'a:mel on site to do the Western Toad sweep. No toads found.

2.0 Site Photographs



Figure - 1
Facing N – Removing the last of the sediment
from McNab creek.



Figure - 2
Facing SE – Installing filter fabric along the
banks near the culvert inlet.



Figure - 3
Facing S – Installing rip-rap at the culvert inlet.



Figure - 4
Facing W – Finished rip-rap at culvert inlet.



Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	21
Project:	Hatzic Emergency Works Program SCR35 McNab Creek & SCR36 Eng Creek	Page:	1 of 3
Location:	Sylvester Road, Fraser Valley, BC 49°14'56.81"N, 122°13'2.69"W	Project No.:	S-CR-35&36 2022-2632
Contractor:	Mission Contractors	File No.:	
Contract:		Date:	November 1, 2023
Contract No.:		Temperature:	High: 13°C Low: 1°C
Weather:	Mainly Sunny.		

Labour Force: Mission Contractors: Foreman, 3 operators.

Contractor's Equipment: Volvo A30F, 200 Komatsu Excavator, 360 Komatsu Excavator.

1.0 Report:

- Taylor Johnston (AE) on site: 730am to 330pm.
- Mission Contractors on site: 730am to 330pm.
- Aqua-terra on site: 730am to 130pm.
- Leq'a:mel First Nation: 730am to 330pm.
- Mint Traffic Control: 730am to 330pm.

1.1 Mission Contractors:

- Installing rip-rap and filter fabric at the culvert outlet on the west side of Sylvester Rd. Haul trucks removing sediment from site. Haul trucks bringing rip-rap to site.
- Traffic control on site to assist with crossing Sylvester road.
- Issues and Concerns: Utilities not picked up at McNab. Mission avoiding gas main.

1.2 Environmental Monitoring

- Aqua-terra on site. No concerns raised.

1.3 First Nations

- Environment Monitor - Leq'a:mel on site to do the Western Toad sweep. No toads found.

2.0 Site Photographs



Figure - 1
Facing W – Hauling sediment from McNab.



Figure - 2
Facing SW – Installing filter fabric along the
banks near the culvert outlet.



Figure - 3
Facing N – Installing rip-rap and filter fabric at
the culvert outlet.



Figure - 4
Facing E – Mobilized equipment back to Eng
Creek laydown.



DAILY CONSTRUCTION REPORT

Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	22
Project:	Hatzic Emergency Works Program SCR35 McNab Creek & SCR36 Eng Creek	Page:	1 of 3
Location:	Sylvester Road, Fraser Valley, BC 49°14'56.81"N, 122°13'2.69"W	Project No.:	S-CR-35&36 2022-2632
Contractor:	Mission Contractors	File No.:	
Contract:		Date:	November 2, 2023
Contract No.:		Temperature:	High: 17°C Low: 7°C
Weather:	Heavy rain.		

Labour Force: Mission Contractors: Foreman, 3 operators.

Contractor's Equipment: Volvo A30F, 200 Komatsu Excavator, 360 Komatsu Excavator. Mini Excavator.

1.0 Report:

- Taylor Johnston (AE) on site: 8am to 330pm.
- Mission Contractors on site: 730am to 330pm.
- Aqua-terra on site: 730am to 12pm.
- Leq'a:mel First Nation: 730am to 330pm.
- Mint Traffic Control: 730am to 330pm.

1.1 Mission Contractors:

- Working on deficiencies at both Eng and McNab. Removing sediment, clearing logs, and cleaning up excess geotextile. Haul trucks removing various stockpiles from each laydown area. Japanese Knotweed contaminated soil removed from site by BC Earth Exchange.
- Traffic control on site to assist with crossing Sylvester road.
- Issues and Concerns: N/a

1.2 Environmental Monitoring

- Aqua-terra on site. No concerns raised.

1.3 First Nations

- Environment Monitor - Leq'a:mel on site to do the Western Toad sweep. No toads found.

2.0 Site Photographs



Figure - 1
Facing S – Removing excess sediment from
Eng creek.



Figure - 2
Facing E – Removing a large from the Eng
creek.



Figure - 3
Facing E – Loading contaminated soil offsite.



Figure - 4
Facing N – Removing excess material at
McNab culvert outlets.



Owner:	Ministry of Environment & Natural Resources (MoE)	Report No.:	23
Project:	Hatzic Emergency Works Program SCR35 McNab Creek & SCR36 Eng Creek	Page:	1 of 3
Location:	Sylvester Road, Fraser Valley, BC 49°14'56.81"N, 122°13'2.69"W	Project No.:	S-CR-35&36 2022-2632
Contractor:	Mission Contractors	File No.:	
Contract:		Date:	November 3, 2023
Contract No.:		Temperature:	High: 15°C Low: 8°C
Weather:	Cloudy.		

Labour Force: Mission Contractors: Foreman, 3 operators.

Contractor's Equipment: Volvo A30F, 200 Komatsu Excavator, 360 Komatsu Excavator.

1.0 Report:

- Taylor Johnston (AE) on site: 830am to 2pm.
- Mission Contractors on site: 730am to 3pm.
- Aqua-terra on site: 11am to 1230pm.
- Leq'a:mel First Nation: 730am to 2pm.
- Mint Traffic Control: 730am to 3pm.
- AE environmental on site. 11am to 1pm

1.1 Mission Contractors:

- Final clean up on at both laydown areas. Topsoil and seeding placed at Eng creek laydown. Haul trucks bringing topsoil from Sanscorp Maple Ridge. AE Environmental on site doing there final audit, report to follow.
- Traffic control on site to assist with crossing Sylvester road. Mission demobilising equipment an excavator to be removed on Monday.
- Issues and Concerns: Shaina from the Allan Lake Strata confirmed she is good with the Laydown and gate at McNab, confirmation email to be sent out by Mission.

1.2 Environmental Monitoring

- Aqua-terra on site. No concerns raised.

1.3 First Nations

- Environment Monitor - Leq'a:mel on site to do the Western Toad sweep. No toads found.

2.0 Site Photographs



Figure - 1
Facing SE – Topsoiling Eng Creek laydown
area.



Figure - 2
Facing N – Seeding the Eng creek disturbed
extents of the laydown area.



Figure - 3
Facing W – Removing access ramp and temporary culvert from the Eng Creek laydown area.



Figure - 4
Facing NW – McNab laydown stockpiles removed.

Appendix M

SHEET LIST TABLE

SHEET	DRAWING NAME	REVISION	DRAWING TITLE	DRAWING DESCRIPTION
GENERAL				
1	2632-10-G-001	2	COVER	
2	2632-10-G-002	2	LEGEND	
3	2632-10-G-003	2	LOCATION PLAN	SCR35 MCNAB CREEK AND SCR36 ENG CREEK
4	2632-10-G-004	2	SCR35 PLAN	ACCESS AND LAYDOWN AREA
5	2632-10-G-005	2	SCR36 PLAN	ACCESS AND LAYDOWN AREA
CIVIL				
6	2632-10-C-001	2	SCR35 PLAN	SITE 35 WORKS
7	2632-10-C-002	2	SCR36 PLAN / PROFILE	STA 0+00 TO STA 0+80
8	2632-10-C-010	2	SCR35 PLAN	SITE 36 WORKS
9	2632-10-C-011	2	SCR36 PLAN / PROFILE	STA 0+00 TO STA 0+20
10	2632-10-C-001	2	SECTIONS	SCR35 AND SCR36
11	2632-10-C-001	2	DETAILS	

BC MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY HATZIC EMERGENCY WORKS PROGRAM SCR35 MCNAB CREEK AND SCR36 ENG CREEK

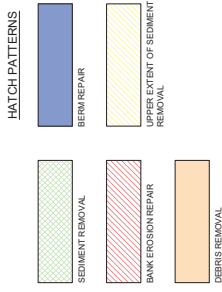
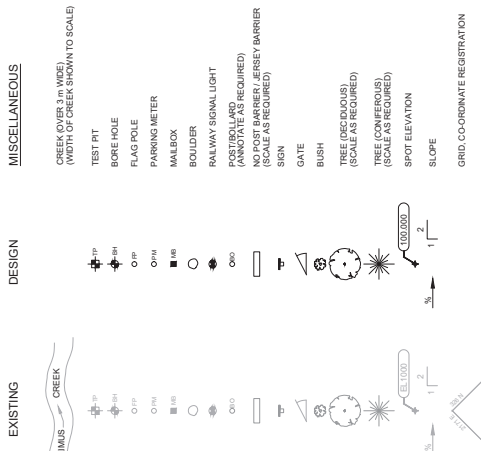
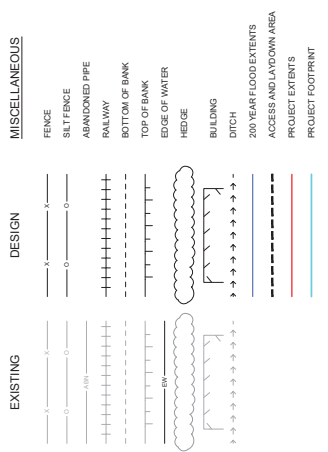
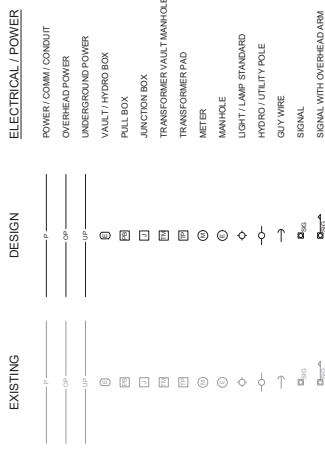
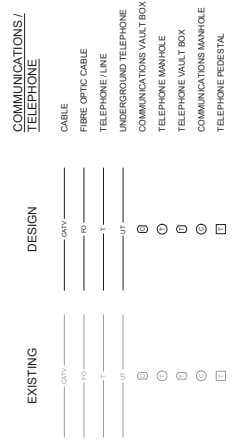
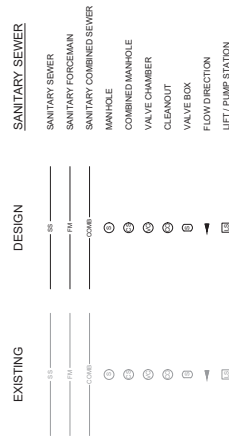
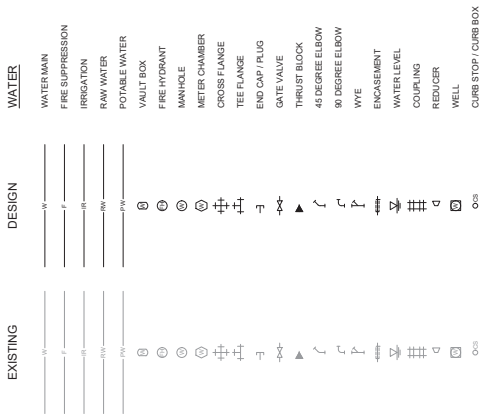
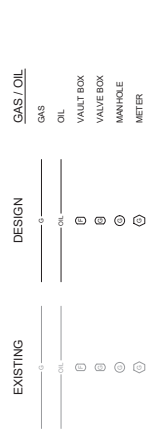
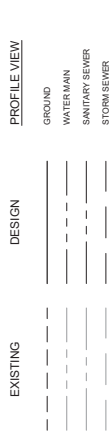
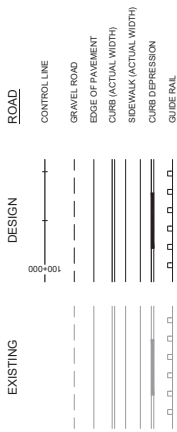
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SAVE BY: LIZOMK
DRAWN BY: LIZOMK
CHECKED BY: LIZOMK
DATE: 2/28/2024 10:24:24 AM
DRAWING: 2632-10-G-001.dwg



BC MINISTRY OF ENVIRONMENT
AND CLIMATE CHANGE STRATEGY
HATZIC EMERGENCY
WORKS PROGRAM
SITES SCR35 AND SCR36
20222632-09 AND 10

IF NOT DIMENSIONAL SCALES

SCALES SHOWN ARE INTENDED FOR A65 CADD/ISSUE DRAWINGS. VARIOUS (1:10) SIZE DRAWING LINE 1/2 OF SCALE SHOWN VALUES NOTED OTHERWISE



BC MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY

HATZIC EMERGENCY WORKS PROGRAM SITES SCR35 AND SCR36 2022/2632-09 AND 10

REV	DATE	DESIGN	DRAWN	DESCRIPTION
2	20 JAPR 2024	L. MEDINA	M. LEZON	RECORD DRAWING
1	20 JAPR 2024	A. WEND	M. LEZON	REVISION FOR SUBMITTAL
0	20 JAPR 2024	A. WEND	M. LEZON	PERMITTING

THE INFORMATION CONTAINED ON THESE DRAWINGS ORIGINATED FROM THE DESIGN OF THE PROJECT AND IS NOT TO BE USED FOR ANY OTHER PURPOSE. ASSOCIATED ENGINEERING IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS. THE ORIGINAL DESIGN IS CONTAINED IN THE CONTRACT DOCUMENTS.



GENERAL LEGEND

DRAWING	REVISION	SHEET
2632-10-G-002	2	2



IF NOT DIMENSIONED TO SCALE, DIMENSIONS SHOWN AS NOTED OTHERWISE
SCALE: 1:4000
DATE: 2022-03-22 10:26:16 AM
DRAWN BY: L. CHEN
CHECKED BY: L. CHEN
APPROVED BY: L. CHEN

1 PLAN
NTS

2 PLAN
1:4000



BC MINISTRY OF ENVIRONMENT
AND CLIMATE CHANGE STRATEGY

HATZIC EMERGENCY
WORKS PROGRAM
SITES SCR35 AND SCR36
2022-2632-09 AND 10

GENERAL
LOCATION PLAN
SCR35 MCNAB CREEK AND SCR36 ENG CREEK

DRAWING	REVISION	SHEET
2632-10-G-003	2	3

THE INFORMATION CONTAINED ON THESE DRAWINGS ORIGINATED FROM THE DESIGNER'S FIELD SURVEY AND IS NOT TO BE USED FOR ANY OTHER PURPOSE WITHOUT THE WRITTEN PERMISSION OF THE DESIGNER. THE ORIGINAL DESIGN IS CONTAINED IN THE CONTRACT DOCUMENTS.

REV	DATE	DESIGN	DRAWN	DESCRIPTION
2	2024-03-20	L. CHEN	M. LEON	RECORD DRAWING
1	2024-03-20	A. WONG	M. LEON	REVISION FOR SUBMITTAL
0	2024-03-20	A. WONG	M. LEON	PRELIMINARY DESIGN AND PERMITTING

IF NOT DIMENSIONAL SCALES

SCALES SHOWN ARE INTENDED FOR A3 AND C-SCALE DRAWINGS. ALL OTHER SCALES SHOWN ARE INTENDED FOR A3 AND C-SCALE DRAWINGS. ALL OTHER SCALES SHOWN ARE INTENDED FOR A3 AND C-SCALE DRAWINGS.



1 PLAN

1:500



BC MINISTRY OF ENVIRONMENT
AND CLIMATE CHANGE STRATEGY

HATZIC EMERGENCY
WORKS PROGRAM
SITES SCR35 AND SCR36
2022/2632-09 AND 10

SCALE: AS SHOWN

REV	DATE	DESIGN	DRAWN	DESCRIPTION
1	2024-04-11	A	LEON	RECORD DRAWING
0	2024-04-11	A	LEON	DESIGN FOR CONSTRUCTION
0	2024-04-11	A	LEON	DESIGN FOR CONSTRUCTION

THE INFORMATION CONTAINED ON THESE DRAWINGS ORIGINATED FROM THE DESIGNER'S FIELD SURVEYING AND PHOTOGRAPHY. THE DESIGNER'S FIELD SURVEYING AND PHOTOGRAPHY IS THE BASIS FOR THE DESIGN. THE DESIGNER'S FIELD SURVEYING AND PHOTOGRAPHY IS THE BASIS FOR THE DESIGN.

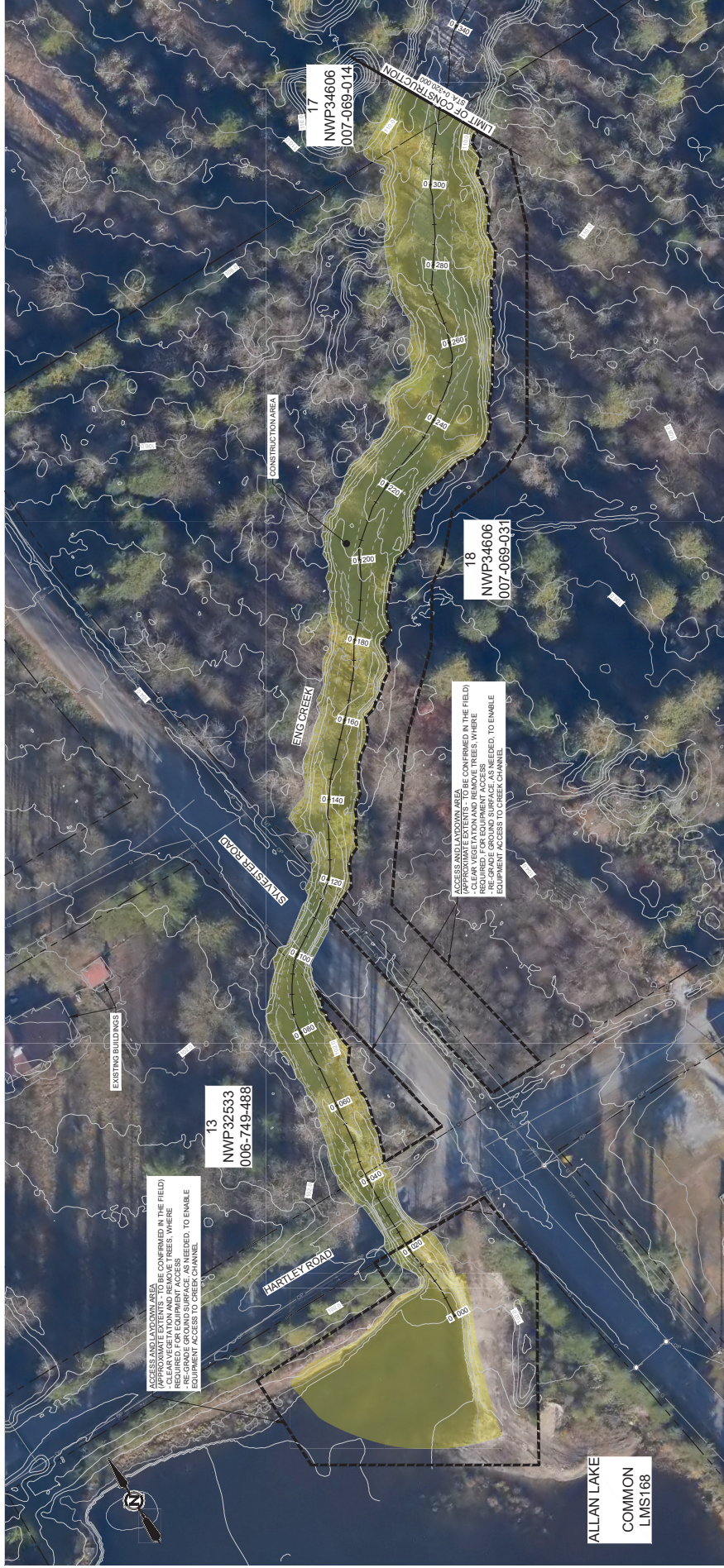


GENERAL
SCHEMATIC
ACCESS AND LAYDOWN AREA

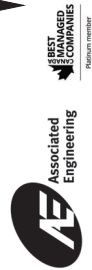
DRAWING	REVISION	SHEET
2632-10-G-004	2	4

IF NOT DIMENSIONAL SCALES

SCALES SHOWN ARE INTENDED FOR AND USED FOR USE DRAWINGS. VARIOUS (1:1) USE DRAWINGS. 10 OF SCALE SHOWN UNLESS NOTED OTHERWISE



1 PLAN 1:500



BC MINISTRY OF ENVIRONMENT
AND CLIMATE CHANGE STRATEGY

HATZIC EMERGENCY
WORKS PROGRAM
SITES SCR35 AND SCR36
2022/2632-09 AND 10

SCALE: AS SHOWN

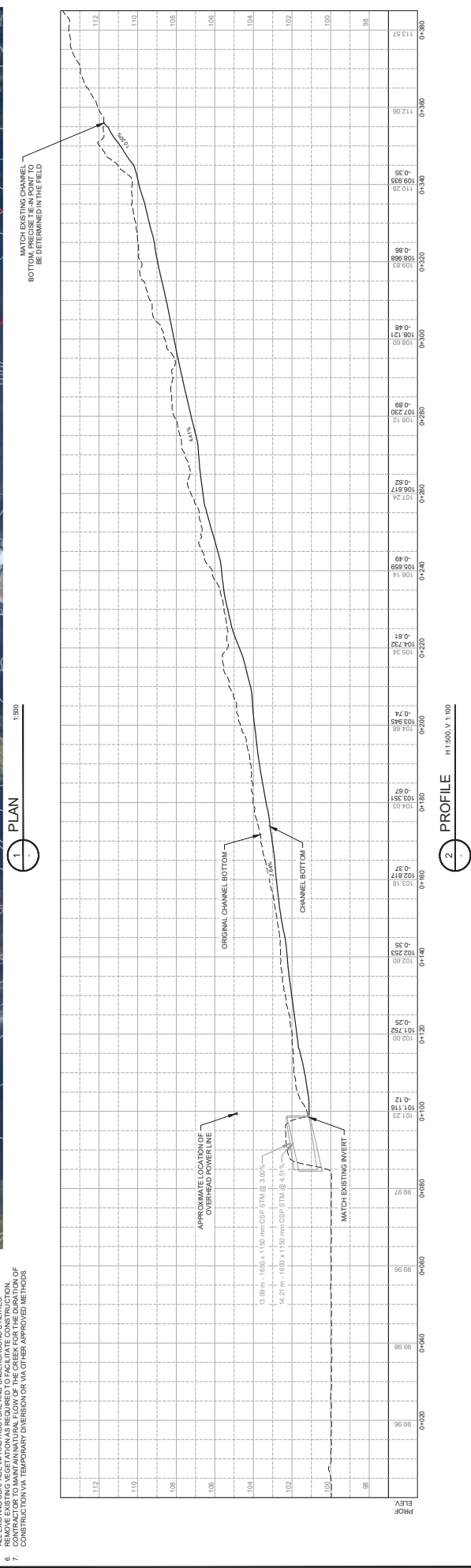
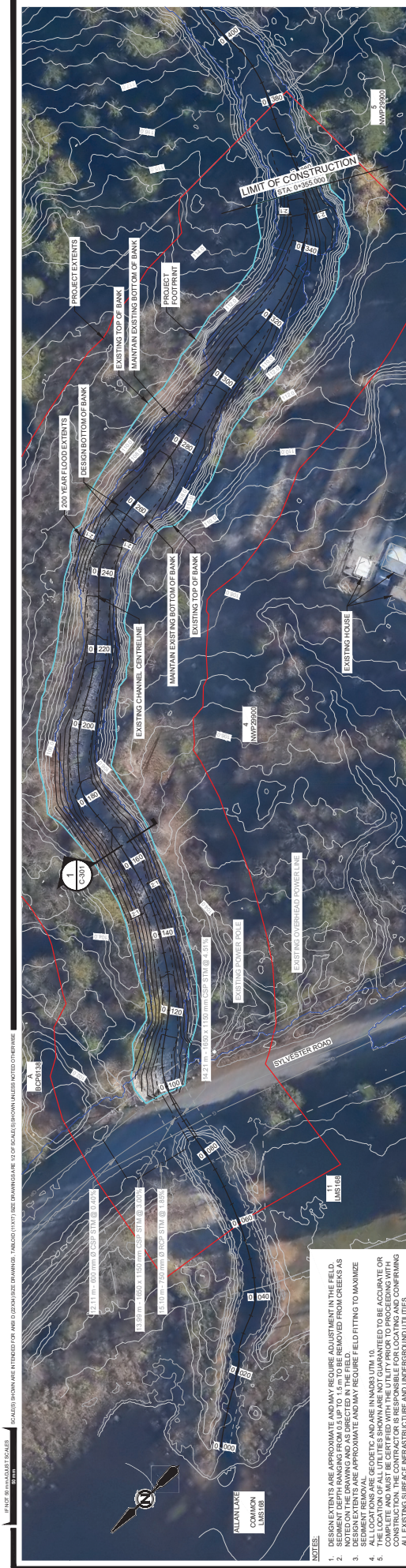


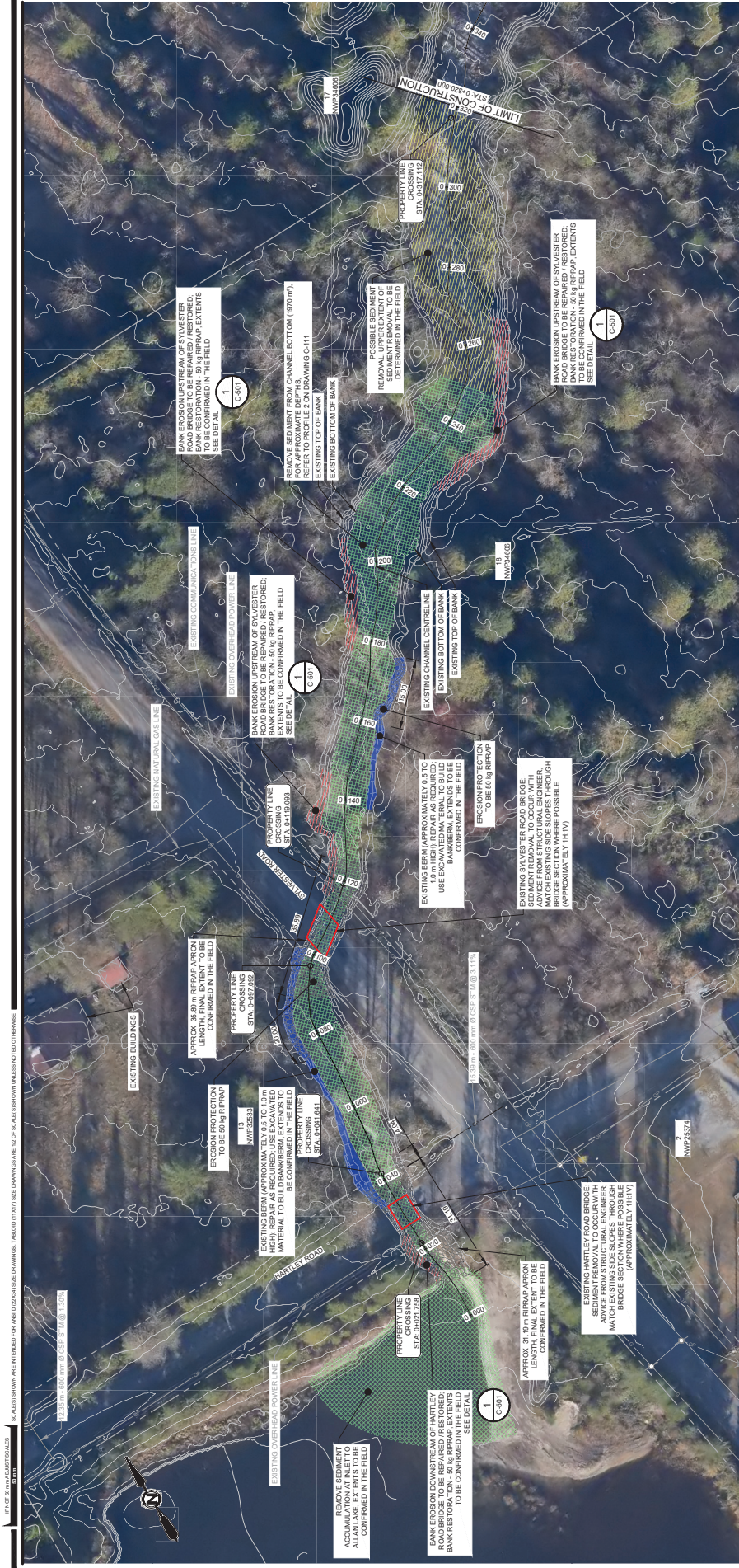
GENERAL
SCHEMATIC
ACCESS AND LAYDOWN AREA

DRAWING	REVISION	SHEET
2632-10-G-005	2	5

THE INFORMATION CONTAINED ON THESE DRAWINGS ORIGINATED FROM THE PROJECT AND IS NOT TO BE USED FOR ANY OTHER PURPOSE. THE ORIGINAL DESIGN IS CONTAINED IN THE CONTRACT DOCUMENTS.

REV	DATE	DESIGN	DRAWN	DESCRIPTION
2	2024/01/01	L. MEDINA	M. LEON	RECORD DRAWING
1	2024/01/01	A. MEDINA	M. LEON	REVISION FOR CONSTRUCTION PERMITTING
0	2024/01/01	A. MEDINA	M. LEON	REVISION FOR CONSTRUCTION PERMITTING





PLAN 1-5000

NOTES:

1. DESIGN DETAILS ARE APPROPRIATE TO THE REQUIRE ADJUSTMENT IN THE FIELD.
2. SEDIMENT DEPTH ANNOTATIONS UP TO 1.1 M TO BE REMOVED FROM CHECKS AS NOTED ON THE DRAWING AND AS DIRECTED IN THE FIELD.
3. DESIGN EXTENTS ARE APPROXIMATE AND MAY REQUIRE FIELD FITTING TO MAXIMIZE THE CONSTRUCTION OF THE PROJECT.
4. ALL LOCATIONS ARE GEODETIC AND ARE IN NAD83/10 UTM 10.
5. THE LOCATION OF ALL UTILITIES SHOWN ARE NOT GUARANTEED TO BE ACCURATE OR COMPLETE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND DEEPENING ALL EXISTING SURFACE INFRASTRUCTURE AND UNDERGROUND UTILITIES.
6. REMOVE EXISTING VEGETATION AS REQUIRED TO FACILITATE CONSTRUCTION.
7. CONSTRUCTION VIA TEMPORARY DIVERSION OR VIA OTHER APPROVED METHODS.

BC MINISTRY OF ENVIRONMENT
AND CLIMATE CHANGE STRATEGY

HATZIC EMERGENCY
WORKS PROGRAM
SITES SCR35 AND SCR36
20222632-09 AND 10

SCALE: AS SHOWN

CIVIL
SCR36 PLAN
SITE 36 WORKS

DRAWING

2632-10-C-110	2	8
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REV	DATE	DESIGN	DRAWN	DESCRIPTION
0	203AU08	A. WENS	M. LEZON	ISSUED FOR REP AND PERMITTING
1	2020CT04	A. WENS	M. LEZON	ISSUED FOR CONSTRUCTION
2	2024AP01	L. MEDINA	M. LEZON	RECORD DRAWING

Associated Engineering

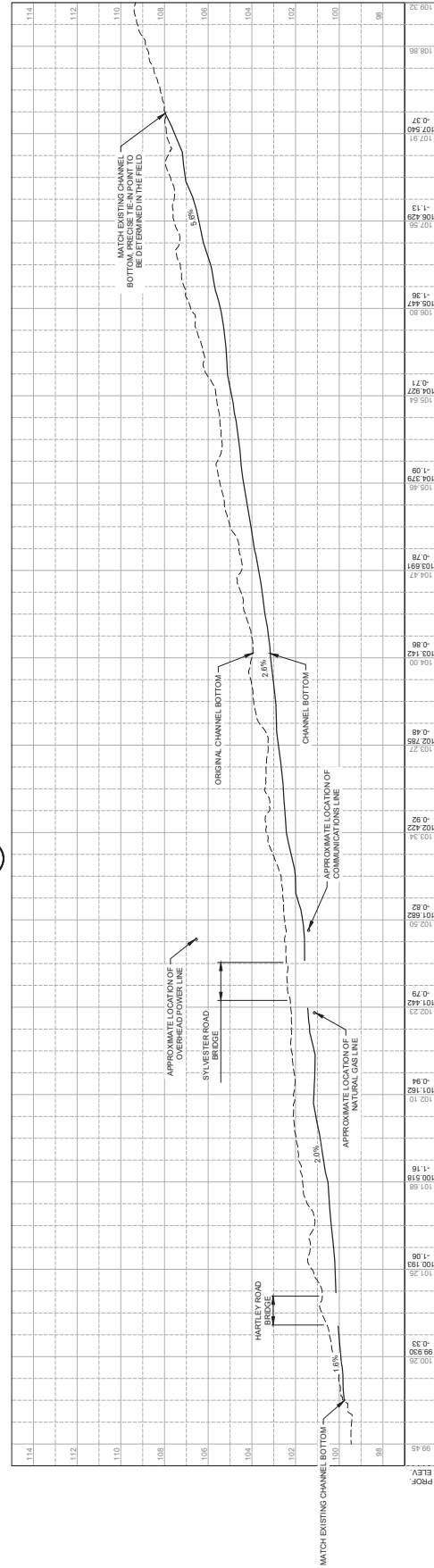
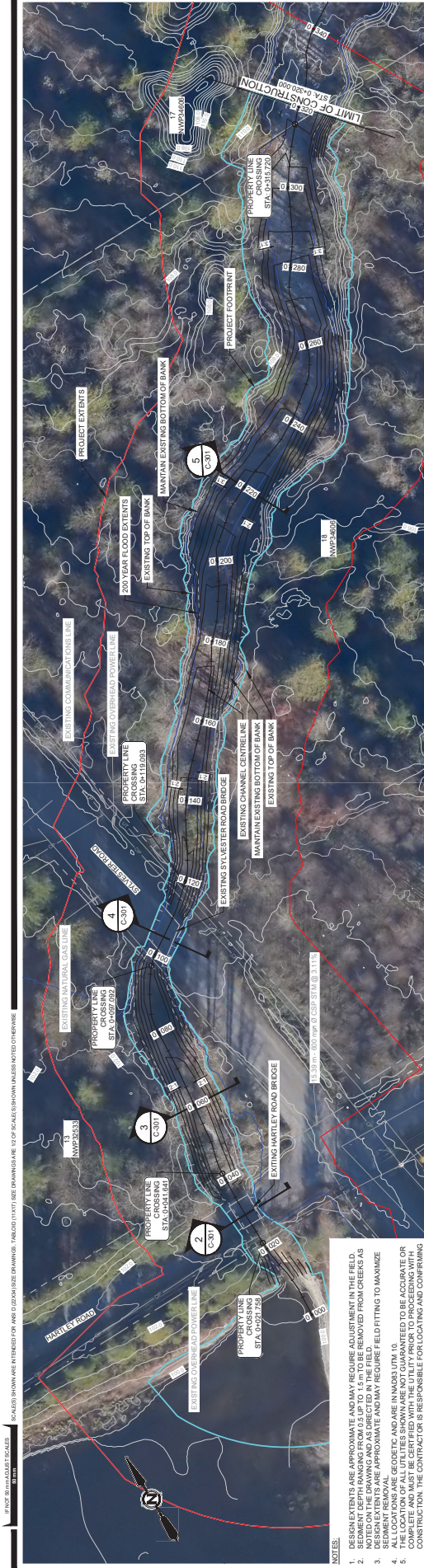
**BEST
MANAGED
COMPANIES**
CANADA

Platinum member

**100 BEST
MANAGED
COMPANIES**

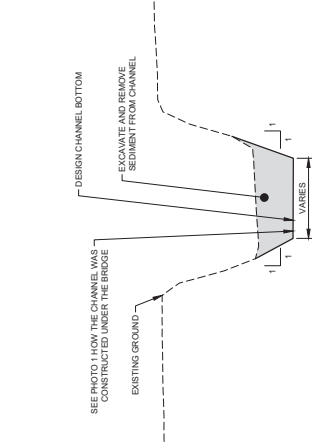
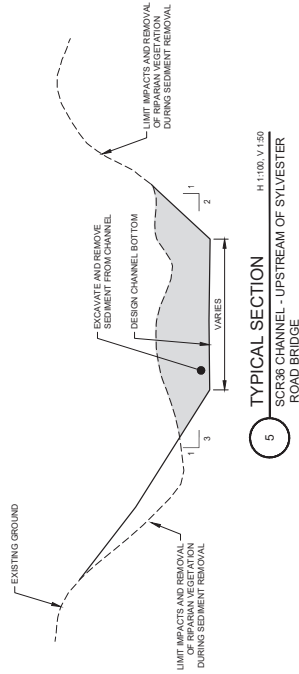
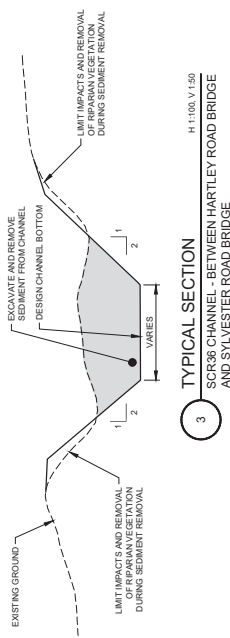
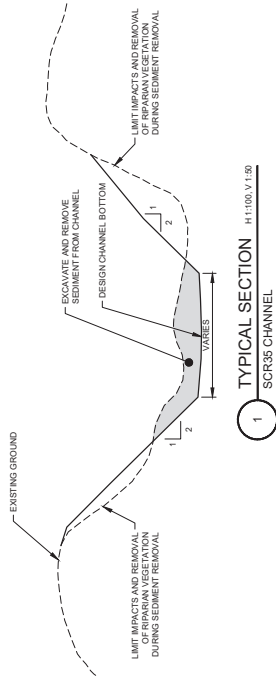


BRITISH
COLUMBIA

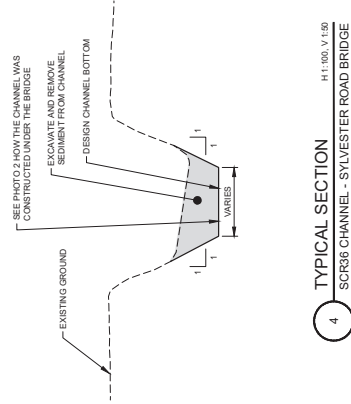


IF NOT DIMENSIONED TO SCALE, SHOWN VALUES APPLY OTHERWISE

SCALE: 1:100



2 TYPICAL SECTION
SCR36 CHANNEL - HARTLEY ROAD BRIDGE
H 1:100, V 1:50

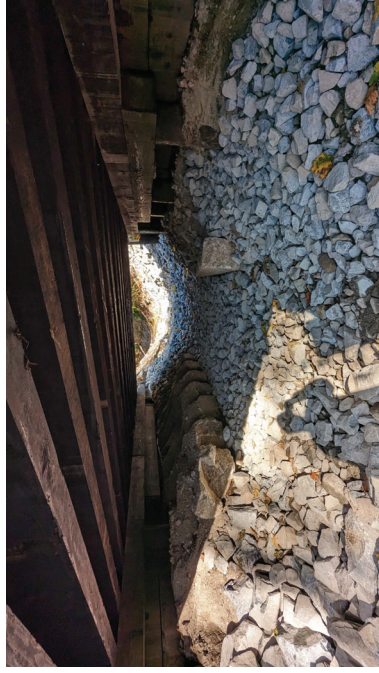


4 TYPICAL SECTION
SCR36 CHANNEL - SYLVESTER ROAD BRIDGE
H 1:100, V 1:50

- NOTES:
1. SEDIMENT REMOVAL AND CHANNEL ALTERATIONS TO BE COMPLETED BY A QUALIFIED ENVIRONMENTAL PROFESSIONAL.
 2. SEDIMENT DEPTH RANGING FROM 0.5 UP TO 1.5 m TO BE REMOVED FROM CHANNEL BED AND SIDES AT THE DRAWING AND AS DIRECTED IN THE FIELD.



1 PHOTO
SCR36 CHANNEL - HARTLEY ROAD BRIDGE (AS CONSTRUCTED)
NTS

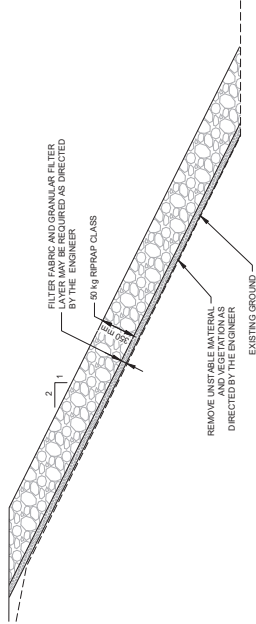


2 PHOTO
SCR36 CHANNEL - SYLVESTER ROAD BRIDGE (AS CONSTRUCTED)
NTS

IF NOT DIMENSIONAL SCALES

SCALES SHOWN ARE INTENDED FOR AND USED AS SUCH. DIMENSIONS SHALL BE SHOWN UNLESS NOTED OTHERWISE

0 mm



1 TYPICAL SECTION
EROSION PROTECTION

PROJECT DATE: 4/1/2024 10:35 AM
DWG PATH: \\ae\shared\engineering\2022-2023-2024\2024\AE\SAVED BY: LECOM
DATE DATE: 20240410 10:42:24 AM SAVED BY: LECOM



BC MINISTRY OF ENVIRONMENT
AND CLIMATE CHANGE STRATEGY
HATZIC EMERGENCY
WORKS PROGRAM
SITES SCR35 AND SCR36
20222632-09 AND 10
SCALE: AS SHOWN

REV	DATE	DESIGN	DRAWN	DESCRIPTION
2	20240410	L. MEDINA	M. LEZON	RECORD DRAWING
1	20240410	A. MEDINA	M. LEZON	REVISION FOR CONSTRUCTION
0	20240410	A. MEDINA	M. LEZON	DESIGN FOR PERMITTING

THE INFORMATION CONTAINED ON THESE DRAWINGS ORIGINATED
FROM THE PROJECT AND IS THE PROPERTY OF ASSOCIATED
ENGINEERING (B.C.) LTD. IT IS NOT TO BE REPRODUCED OR
TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC
OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING,
OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEMS.
THE ORIGINAL DESIGN IS CONTAINED IN THE CONTRACT DOCUMENTS.



CIVIL
DETAILS

DRAWING	REVISION	SHEET
2632-09-C-501	2	11

Appendix N

ENVIRONMENTAL MONITORING MEMORANDUM

TO: Adam Wodzianek and Jon Murphy
Mission Contractors Ltd.
9333 Manzer Street
Mission BC V4S 1K2



DATE: 18 October 2023

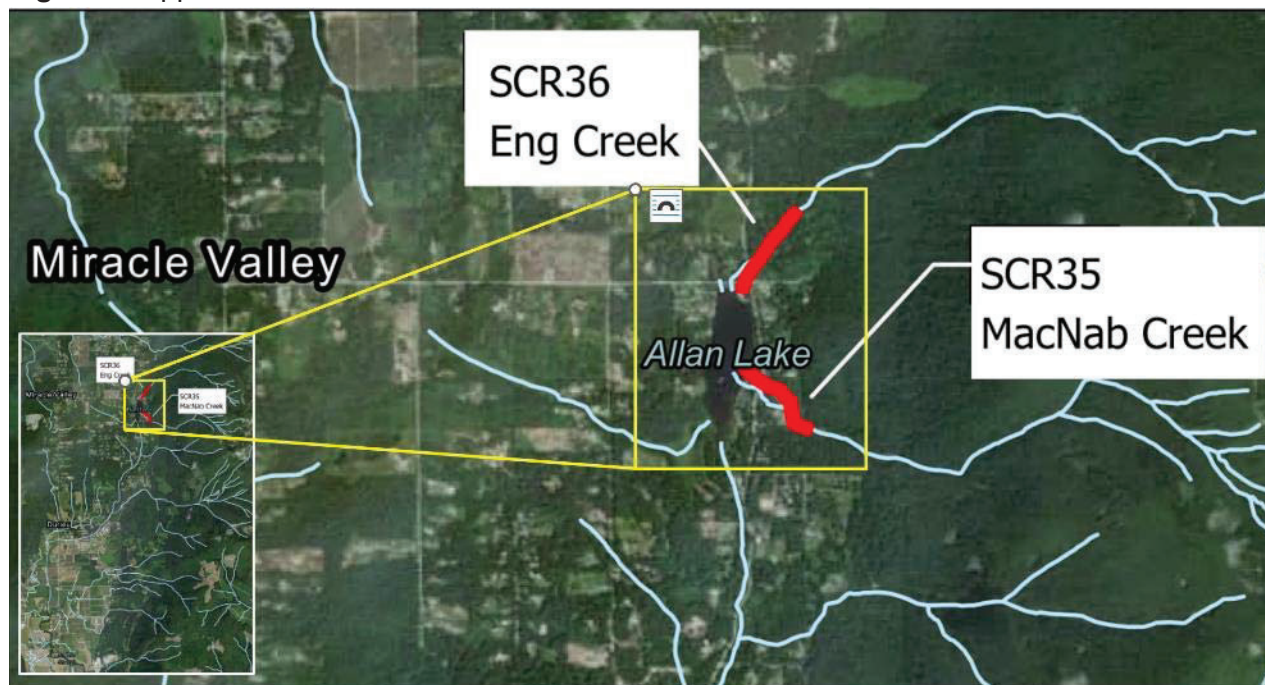
CC: Andrew Wiens and Dianna Christopoulos
Associated Engineering
500-2889 E. 12 Avenue
Vancouver BC V5M 4T5

FROM: Chris Lee, M.Sc., R.P. Bio., QEP, BC-CESCL and Nicole
Chin, Dipl. Tech.
AquaTerra Environmental Ltd.
PO Box 18120
Port Moody V3H 0A2

**Subject: Hatzic Emergency Program – MacNab and Eng Creek Project -
AquaTerra Environmental Monitoring Memorandum #1**

AquaTerra Environmental Ltd. ('AquaTerra') is pleased to provide Mission Contractors Ltd. ('Mission' Contractors') with this Environmental Monitoring Memorandum (the 'memo'), which includes daily Environmental Monitoring observations and recommendations associated with the Hatzic Emergency Program – MacNab and Eng Creek Project (the 'project'; **Figure 1**).

Figure 1: Approximate Site Extents – identified in Red.



In September 2023, AquaTerra was retained by Mission Contractors to prepare a Construction Environmental Management Plan (CEMP), as well as provide environmental monitoring for the proposed Hatzic Emergency Program – MacNab and Eng Creeks Project, in Mission, BC.

The project involves removing accumulated (during the November 2021 Atmospheric River Event (ARE)) sediment and restoring channel banks. Environmental Monitoring summary notes are provided in the following section.

Environmental Monitoring Summary

Date: 06 October 2023	
<i>Time On & Off site:</i>	08:10 – 10:00
<i>Weather:</i>	Sunny (19°C)
<i>Precipitation:</i>	0.0 mm (<i>Source: Environment Canada – Mission West Abbey</i>)
<i>Environmental Monitor & QEP Supervisor:</i>	Olga Grunlund, Nicole Chin & Chris Lee
<i>Monitoring event description:</i>	CEMP Review & initial environmental monitoring event.

Environmental Monitoring Observations

08:10 | Environmental Monitor (EM) arrived on site.

- The CEMP was reviewed with Mission Contractors, and access to Eng creek was discussed. Extensive Japanese Knotweed (herein ‘knotweed’) was present on the east bank of the creek within the riparian zone. A treated knotweed patch was present near the road, with a live infestation present approximately 50 m from the road.
- The EM recommended to access the creek within the previously treated with herbicide (for knotweed) area, where no visible, live plants were noted.
- Knotweed was present along the left bank of the creek, in one (1) small area.
- Policeman’s helmet was observed within the clearing boundary along the road (approximately 5-10 m wide strip off of the road). Sparse observations of Policeman’s helmet along the creek were noted.
- The cultural monitor was not onsite at the time of the monitoring. No ground disturbing work was anticipated to occur.
- No western toads were observed in the proposed access area or in the creek bed. One (1) pacific chorus frog was noted calling close to the worksite. Of note, AquaTerra provides incidental observations for terrestrial species only, with formal salvages conducted by the Associated Engineering (AE) team / subcontractors.

- No water was present in the creek at the time of the monitoring event..
- Avoid disturbing knotweed along top of bank and place material, as needed, adjacent to the area where knotweed was closes to the creek.

10:00 | The EM departed the site.

Monitoring Recommendations

1. During access clearing, if possible, try to retain the wildlife tree and stay outside of the dripline of the mature cedar to avoid disturbing roots.
2. Place geotextile material atop of treated knotweed area and atop of policeman's helmet to avoid excavator contact with soil.
3. It is recommended to have an environmental monitor (EM) on site during the construction of the access road to the creek. Avoid the (live) Knotweed infested areas and within 5 m of infestation areas, and access the project area via the creek, as long as no water was present in the creek.

Photographs

Photo 1: Overview of a section of Eng Creek.

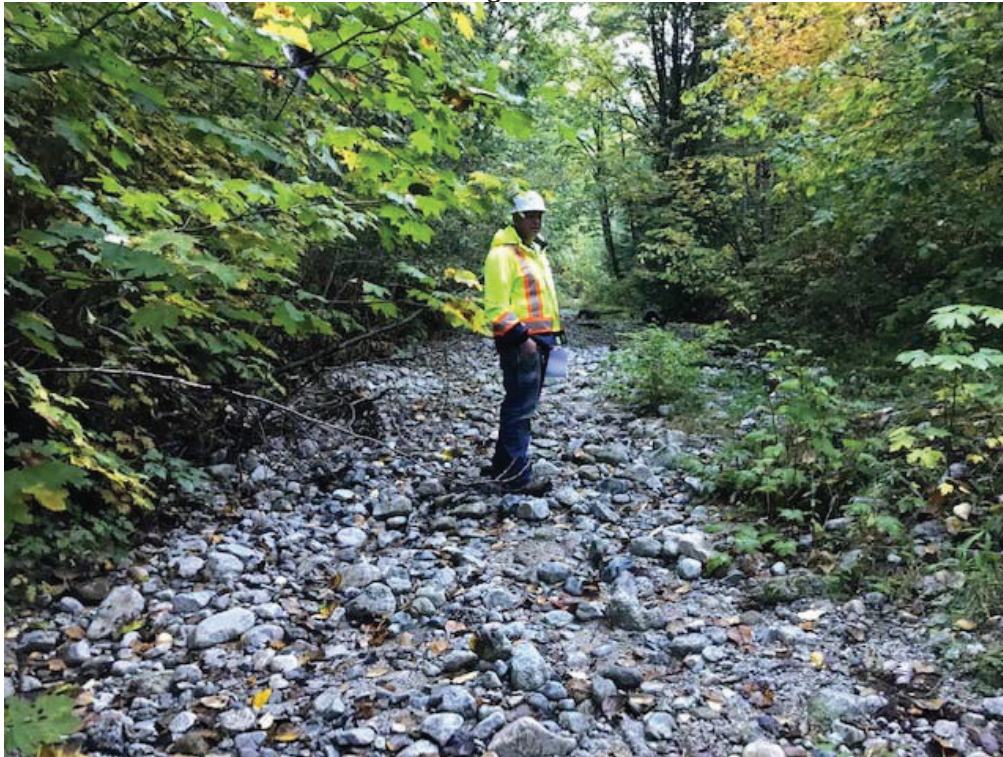


Photo 2: Previously treated knotweed area adjacent to the road.



Photo 3: Policeman's helmet present along the road.



Monitoring Conclusions

AquaTerra personnel evaluated general site conditions to verify project compliance with CEMP, associated DFO *Authorization* and WSA Approval as well as ESC strategies, associated BMPs, acts, and regulations over the duration of the project. No non-conformance / non-compliance issues resulting in environmental impacts were observed during the prescribed monitoring period. No incidents occurred or were reported to AquaTerra personnel during the prescribed monitoring period.

Closure

We trust this provides the information you currently require. Should you have any questions, please feel free to contact the undersigned.

Respectfully submitted,

Nicole Chin

Nicole Chin
Environmental Monitor

AquaTerra Environmental Ltd.

Chris Lee, M.Sc., RPBio, QEP
Principal / Project Manager
AquaTerra Environmental Ltd.

ENVIRONMENTAL MONITORING MEMORANDUM

TO: Adam Wodzianek and Jon Murphy
Mission Contractors Ltd.
9333 Manzer Street
Mission BC V4S 1K2



DATE: 18 October 2023

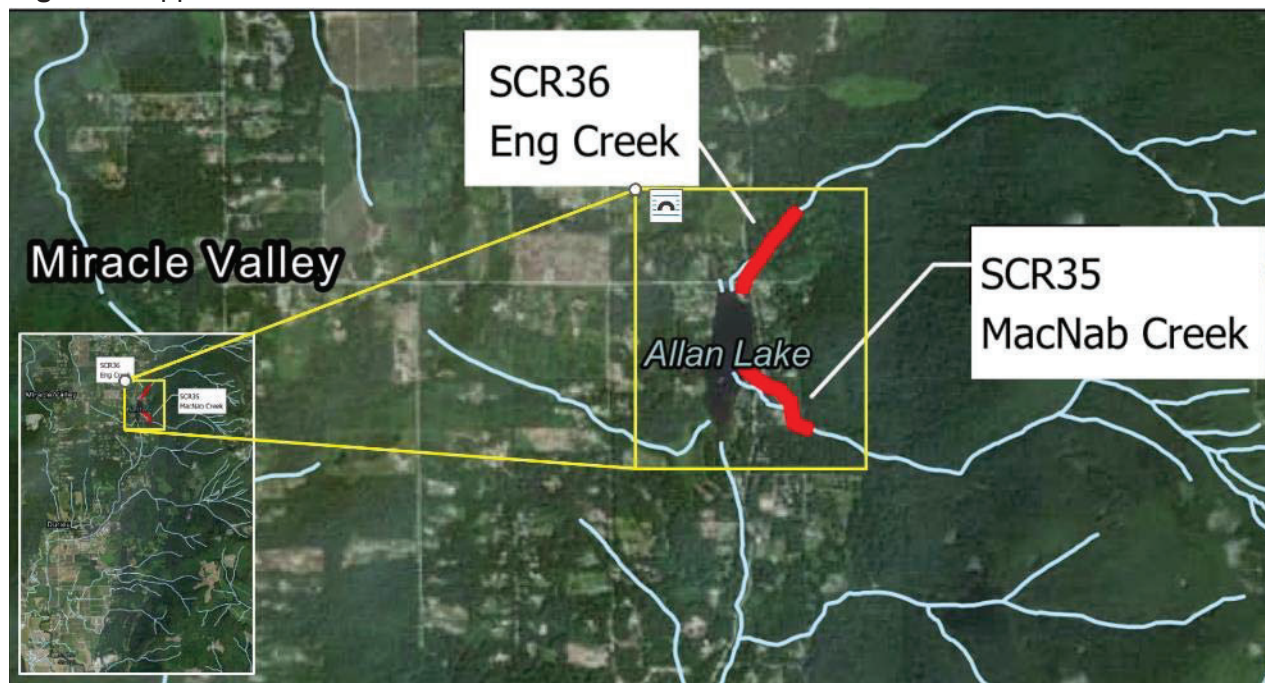
CC: Andrew Wiens and Dianna Christopoulos
Associated Engineering
500-2889 E. 12 Avenue
Vancouver BC V5M 4T5

FROM: Chris Lee, M.Sc., R.P. Bio., QEP, BC-CESCL and Nicole
Chin, Dipl. Tech.
AquaTerra Environmental Ltd.
PO Box 18120
Port Moody V3H 0A2

**Subject: Hatzic Emergency Program – MacNab and Eng Creek Project -
AquaTerra Environmental Monitoring Memorandum #2**

AquaTerra Environmental Ltd. ('AquaTerra') is pleased to provide Mission Contractors Ltd. ('Mission' Contractors') with this Environmental Monitoring Memorandum (the 'memo'), which includes daily Environmental Monitoring observations and recommendations associated with the Hatzic Emergency Program – MacNab and Eng Creek Project (the 'project'; **Figure 1**).

Figure 1: Approximate Site Extents – identified in Red.



In September 2023, AquaTerra was retained by Mission Contractors to prepare a Construction Environmental Management Plan (CEMP), as well as provide environmental monitoring for the proposed Hatzic Emergency Program – MacNab and Eng Creeks Project, in Mission, BC.

The project involves removing accumulated (during the November 2021 Atmospheric River Event (ARE)) sediment and restoring channel banks. Environmental Monitoring summary notes are provided in the following section.

Environmental Monitoring Summary

Date: 10 October 2023	
<i>Time On & Off site:</i>	08:00 – 14:50
<i>Weather:</i>	Overcast (4°C)
<i>Precipitation:</i>	<i>Precipitation: 10 mm (Source: Environment Canada – Mission West Abbey)</i>
<i>Environmental Monitor & QEP Supervisor:</i>	Nicole Chin & Chris Lee.
<i>Monitoring event description:</i>	Monitoring access road construction.

Environmental Monitoring Observations

08:00 | The Environmental Monitor (EM) arrived on site and completed a site-specific safety orientation with Mission Contractors.

08:30 | The EM discussed the work plan with the site superintendent:

- The creek access road was to be constructed 20 m from Neilson Road to avoid to areas with dense policeman's helmet along Sylvester Road.
- 40 m of young alder stands were proposed to be removed for the laydown area / access road between Neilson Road and Eng Creek.
- Silt fencing was to be installed on both sides of the constructed access road for western toad isolation, as directed by others.

08:40 | A toad sweep was conducted (by others) prior to the removal of alder stands and a patch of knotweed, approximately 20 m north of Neilson Road, was identified, flagged and avoided during access road construction.

09:15 | Excavator work was completed up to the creek bank.

10:30 | A large, stocked spill kit was present on site.

12:15 | No water was present in the creek during the monitoring event.

13:50 | One (1) small knotweed plant (previously identified and flagged by the EM) was removed from the creek, by hand, and bagged for proper disposal off site. Plant material including

stem, leaves, and root ball were bagged for proper disposal offsite. No seeds were noted on the plant. The root area on the bank was spray painted red, to avoid disturbance.

14:30 | In the constructed laydown area / creek access road, the EM observed:

- Isolation fencing installation.
- Excavator clearing and removing vegetation debris.

14:40 | The EM departed the site.

Monitoring Recommendations

1. Avoid identified and flagged live knotweed plants along with minimum 5 m buffer.
2. Switch the excavator bucket once clearing and access road construction was completed.
3. Equipment decontamination may be required prior to demobilization off site.

Photographs

Photo 1: Large, stocked spill kit was present onsite.



Photo 2: Removal of alders for the access road / laydown area (10 October).



Photo 3: Japanese knotweed removal from the creek, by hand.



Photo 4: Vegetation removed from the access road / laydown area.



Monitoring Conclusions

AquaTerra personnel evaluated general site conditions to verify project compliance with CEMP, associated DFO *Authorization* and WSA Approval as well as ESC strategies, associated BMPs, acts, and regulations over the duration of the project. No non-conformance / non-compliance issues resulting in environmental impacts were observed during the prescribed monitoring period. No incidents occurred or were reported to AquaTerra personnel during the prescribed monitoring period.

Closure

We trust this provides the information you currently require. Should you have any questions, please feel free to contact the undersigned.

Respectfully submitted,

Nicole Chin

Nicole Chin
Environmental Monitor
AquaTerra Environmental Ltd.

Chris Lee, M.Sc., RPBio, QEP
Principal / Project Manager
AquaTerra Environmental Ltd.

ENVIRONMENTAL MONITORING MEMORANDUM

TO: Adam Wodzianek and Jon Murphy
Mission Contractors Ltd.
9333 Manzer Street
Mission BC V4S 1K2



DATE: 18 October 2023

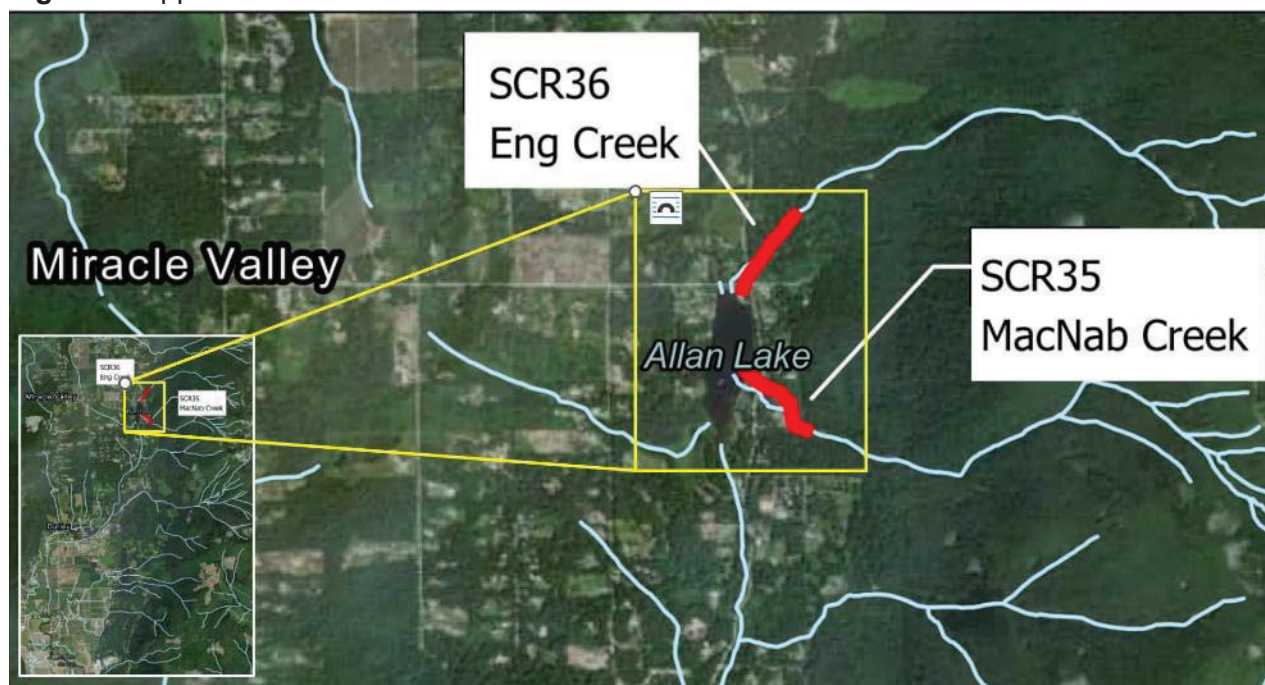
CC: Andrew Wiens and Dianna Christopoulos
Associated Engineering
500-2889 E. 12 Avenue
Vancouver BC V5M 4T5

FROM: Chris Lee, M.Sc., R.P. Bio., QEP, BC-CESCL and Nicole
Chin, Dipl. Tech.
AquaTerra Environmental Ltd.
PO Box 18120
Port Moody V3H 0A2

**Subject: Hatzic Emergency Program – MacNab and Eng Creek Project -
AquaTerra Environmental Monitoring Memorandum #3**

AquaTerra Environmental Ltd. ('AquaTerra') is pleased to provide Mission Contractors Ltd. ('Mission' Contractors') with this Environmental Monitoring Memorandum (the 'memo'), which includes daily Environmental Monitoring observations and recommendations associated with the Hatzic Emergency Program – MacNab and Eng Creek Project (the 'project'; **Figure 1**).

Figure 1: Approximate Site Extents – identified in Red.



In September 2023, AquaTerra was retained by Mission Contractors to prepare a Construction Environmental Management Plan (CEMP), as well as provide environmental monitoring for the proposed Hatzic Emergency Program – MacNab and Eng Creeks Project, in Mission, BC.

The project involves removing accumulated (during the November 2021 Atmospheric River Event (ARE)) sediment and restoring channel banks. Environmental Monitoring summary notes are provided in the following section.

Environmental Monitoring Summary

Date: 16 October 2023	
<i>Time On & Off site:</i>	07:45 – 11:30
<i>Weather:</i>	Overcast (4°C)
<i>Precipitation:</i>	<i>Precipitation: 10 mm (Source: Environment Canada – Mission West Abbey)</i>
<i>Environmental Monitor & QEP Supervisor:</i>	Nicole Chin & Chris Lee.
<i>Monitoring event description:</i>	Monitoring construction activities adjacent to knotweed area.

Environmental Monitoring Observations

07:45 | The Environmental Monitor arrived on site, as requested by Mission Contractors to monitor material placement in one (1) area where knotweed was present along top of bank.

07:55 | The Environmental Monitor discussed the daily scope of work with the site superintendent:

- The area adjacent to the live knotweed infestation along top of bank was backfilled approximately 5 m in from the bank over the weekend.
- Material excavated from the creek was stockpiled at the access road entrance on Neilson Road and was to be moved off-site within a day or two.

08:00 | At the access road entrance on Neilson Road the Environmental Monitor observed:

- Excavated material was removed from site in gravel trucks.

10:30 | In the creek, the Environmental Monitor observed textile fabric laid down on the exposed creek bank slope, in preparation for bank armoring.

11:30 | The Environmental Monitor discussed observations with the site superintendent.

11:30 | The EM departed the site.

Monitoring Recommendations

1. Additional ESC fencing was to be delivered and installed for the toad isolation, and for the fencing around the backfill stockpile.

Photographs

Photo 1: Overview of the creek bed.

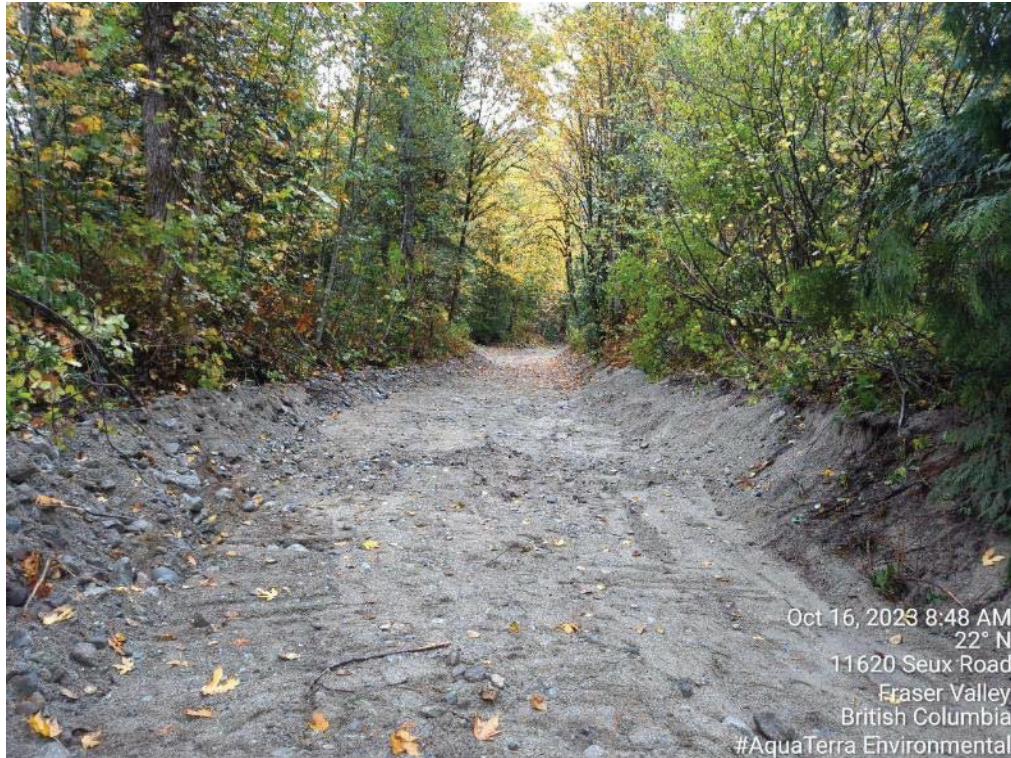


Photo 2: Japanese knotweed backfilled approximately 5 m in from bank.



Photo 3: Textile fabric covering exposed bank slope.



Communications

The AquaTerra PM (Chris Lee) discussed Japanese Knotweed management and CEMP compliance with Mission Contractors on 12 October 2023 including maintaining a minimum 5 m buffer and typical distance of rhizome/root migration from plants, and appropriateness of vegetation removal for laydown areas in the vicinity of observed knotweed infestations, coupled with ensuring appropriate disposal off-site and preventing the spread of knotweed. Mission advised AquaTerra that they had recommended to AE that the laydown area and access could be temporarily capped with inorganic gravel/cobble from the dry excavated watercourse to reduce the potential for spread and was assured that no knotweed contaminated material was to be disposed of off-site.

Monitoring Conclusions

AquaTerra personnel evaluated general site conditions to verify project compliance with CEMP, associated DFO *Authorization* and WSA Approval as well as ESC strategies, associated BMPs, acts, and regulations over the duration of the project. No non-conformance / non-compliance issues resulting in environmental impacts were observed during the prescribed monitoring period. No incidents occurred or were reported to AquaTerra personnel during the prescribed monitoring period.

Closure

We trust this provides the information you currently require. Should you have any questions, please feel free to contact the undersigned.

Respectfully submitted,

Nicole Chin

Nicole Chin

Environmental Monitor

AquaTerra Environmental Ltd.

Chris Lee, M.Sc., RPBio, QEP

Principal / Project Manager

AquaTerra Environmental Ltd.

ENVIRONMENTAL MONITORING MEMORANDUM

TO: Adam Wodzianek and Jon Murphy
Mission Contractors Ltd.
9333 Manzer Street
Mission BC V4S 1K2

CC: Andrew Wiens and Dianna Christopoulos
Associated Engineering
500-2889 E. 12 Avenue
Vancouver BC V5M 4T5



DATE: 30 October 2023

FROM: Chris Lee, M.Sc., R.P. Bio., QEP, BC-CESCL
Olga Grunlund EP, BC-CESCL
AquaTerra Environmental Ltd.
PO Box 18120
Port Moody V3H 0A2

**Subject: Hatzic Emergency Program – MacNab and Eng Creek Project -
AquaTerra Environmental Monitoring Memorandum #4**

AquaTerra Environmental Ltd. ('AquaTerra') is pleased to provide Mission Contractors Ltd. ('Mission' Contractors') with this Environmental Monitoring Memorandum (the 'memo'), which includes daily Environmental Monitoring observations and recommendations associated with the Hatzic Emergency Program – MacNab and Eng Creek Project (the 'project'; **Figure 1**).

Figure 1: Approximate Site Extents – identified in Red.



In September 2023, AquaTerra was retained by Mission Contractors to prepare this Construction Environmental Management Plan (CEMP), as well as provide environmental monitoring for the proposed Hatzic Emergency Program – MacNab and Eng Creeks Project, in Mission, BC.

The project involves removing accumulated (during the November 2021 Atmospheric River Event (ARE)) sediment and restoring channel banks. Environmental Monitoring summary notes are provided in the following sections.

Environmental Monitoring Summary

Date: 18 October 2023	
<i>Time On & Off site:</i>	08:30 – 10:00
<i>Weather:</i>	Rain (9°C)
<i>Precipitation:</i>	8.4 mm (<i>Source: Environment Canada – Mission West Abbotsford</i>)
<i>Environmental Monitor & QEP Supervisor:</i>	Olga Grunlund & Chris Lee
<i>Monitoring event description:</i>	Removing creek sediment and continuing armoring of creek bank

Environmental Monitoring Observations

08:30 | Environmental Monitor (EM) arrived on site.

- EM, AE Engineer and Site Superintendent walked the lower reaches of Eng Creek. Japanese Knotweed (undisturbed) was noted on the northeast shore of Allan Lake, near an access road.
- Creosote odor was present within the lower reached of the creek (downstream of the Nelson Road Bridge crossing) – unrelated to the project.
- Riparian area, where Stinging Nettle was present was surveyed for Oregon Forestsnail. None were observed during the monitoring event.
- Large spill kit was present on site.
- No changes to the construction footprint were noted. Previously installed section of silt fencing (for demarcation purposes) was down and required repair.
- Minor hydrocarbon sheen was observed along the road. The source was unknown.
- No water was present in Eng Creek. Water was present in MacNab Creek.
- No debris tracking was observed off site.
- No wildlife was observed during this monitoring event or reported to the EM.

Monitoring Recommendations

1. Repair silt fencing near the creek.
2. Leave a layer of clean material along the construction access road, to prevent disturbing organic layer.
3. Contact the EM if water is observed in the creek. Stop works until a bypass is installed.

Outstanding Environmental Issues

- No outstanding environmental issue was observed.

Site Photographs

Photo 1: Japanese Knotweed near access road to Allan Lake.



Photo 2: Overview of the work area / Eng Creek.



Photo 3: Silt fencing requiring repair.



Photo 4: MacNab Creek overview.



Date: 20 October 2023	
Time On & Off site:	07:50 – 10:00
Weather:	Overcast (9°C)
Precipitation:	0.0 mm (Source: Environment Canada – West Mission and Abbotsford)
Environmental Monitor & QEP Supervisor:	Nicole Chin & Chris Lee
Monitoring event description:	Removing creek sediment offsite and continued armoring of creek bank

Environmental Monitoring Observations

07:50 | Environmental Monitor (EM) arrived on site and signed the safety tailgate. The EM and Site Supervisor discussed the daily scope of work.

08:00 | While onsite the EM observed:

- No water was running in the creek while the EM was on site but a large isolated pool of water in the creek was noted adjacent to the road. Water appeared turbid but was contained within the low-lying area. No water was flowing downstream off site and no

water quality issues were noted in Allan Lake. No Western Toads were observed in the creek.

- Riprap was installed over geotextile material lining a south facing slope.
- Geotextile fabric laid down on the east bank of creek and covered with riprap.
- A dead patch of knotweed was identified in the creek section west of Sylvester Road, a small regrowth stem was seen in this patch. Another dead knotweed patch was observed within four (4) meters of the first patch.
- Two (2) excavators actively working with no observed leaks or spills.
- One (1) rock truck actively working with no observed leaks or spills.

10:00 | The EM departed the site.

Monitoring Recommendations

1. Inspect equipment regularly for leaks or excess grease.
2. Inform the EM of any leaks, spills or other environmental incidents or concerns that arise over the duration of the project.
3. The knotweed area should be flagged with a five (5) meter buffer zone delineated around the identified patch. The excavator should remain outside of this delineated area while excavating the knotweed. Live knotweed material should be bagged and removed offsite for disposal at an appropriate disposal facility.
4. Prior to moving equipment from Eng Creek to MacNab Creek, a thorough cleaning of tracks and equipment via spray down and sweeping is required to remove any potential knotweed contamination.
5. The excavator bucket should be cleaned with a stiff metal brush to ensure dirt and plant material is removed prior to works in noninfected knotweed areas. The bucket should be suspended over the excavated knotweed area during manual dirt removal.
6. The stockpiled Japanese knotweed infested material can be buried 3-5m below ground or removed off site for disposal at an appropriate disposal facility.

Outstanding Environmental Issues

- No outstanding environmental issue was observed.

Site Photographs

Photo 5: Riprap covering geotextile material with large pool of standing water observed in the foreground.



Photo 6: Two Japanese knotweed patches outlined in red.



Photo 7: Dead Japanese knotweed (patch one) with live regrowth stems present.



Photo 8: Live knotweed regrowth stems observed in patch one.



Monitoring Conclusions

During the period of 18 October to 27 October 2023, two (2) monitoring events were completed. AquaTerra personnel evaluated general site conditions to verify project compliance with CEMP, EMP, associated DFO *Authorizations* and WSA Approvals as well as ESC strategies, associated BMPs, acts, and regulations over the duration of the project. No non-conformance / non-compliance issues resulting in environmental impacts were observed during the prescribed monitoring period. No incidents occurred or were reported to AquaTerra personnel during the prescribed monitoring period.

Closure

We trust this provides the information you currently require. Should you have any questions, please feel free to contact the undersigned.

Respectfully submitted,

Nicole Chin

Nicole Chin
Environmental Monitor
AquaTerra Environmental Ltd.

Chris Lee, M.Sc., RPBio, QEP
Principal / Project Manager
AquaTerra Environmental Ltd.

ENVIRONMENTAL MONITORING MEMORANDUM

TO: Adam Wodzianek and Jon Murphy
Mission Contractors Ltd.
9333 Manzer Street
Mission BC V4S 1K2

CC: Andrew Wiens and Dianna Christopoulos
Associated Engineering
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Vancouver BC V5M 4T5

FROM: Chris Lee, M.Sc., R.P. Bio., QEP, BC-CESCL
Olga Grunlund EP, BC-CESCL
AquaTerra Environmental Ltd.
PO Box 18120
Port Moody V3H 0A2

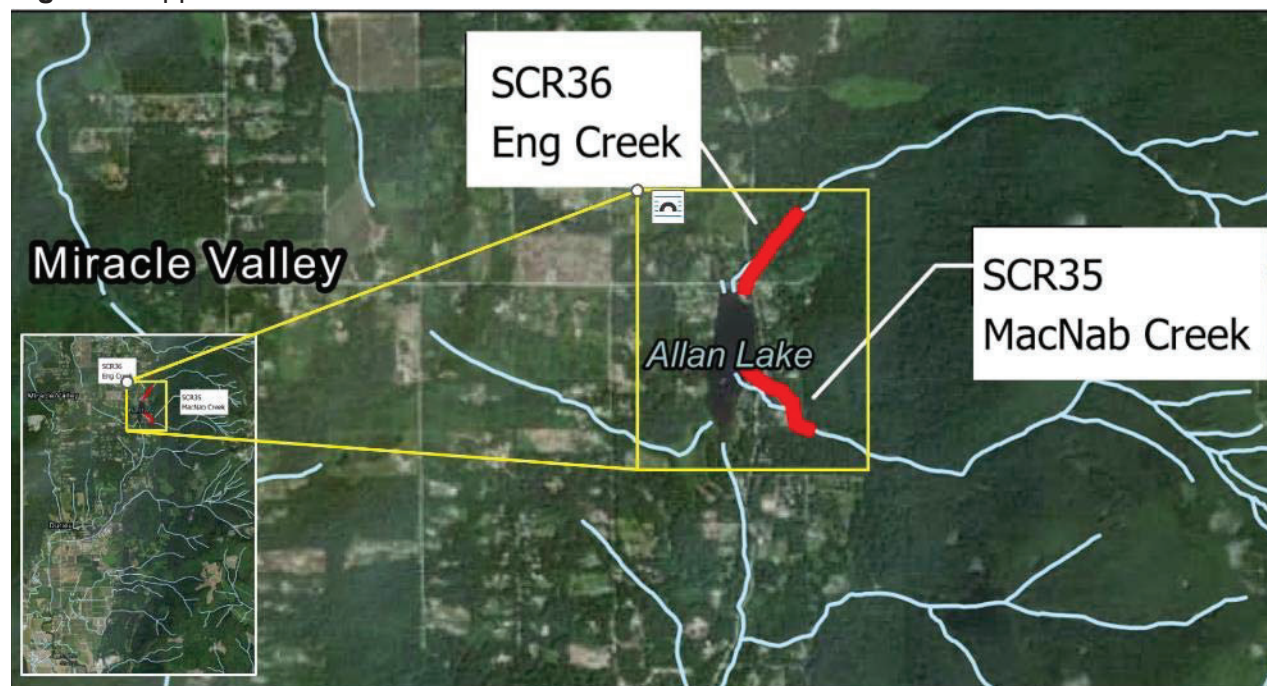


DATE: 30 October 2023

**Subject: Hatzic Emergency Program – MacNab and Eng Creek Project -
AquaTerra Environmental Monitoring Memorandum #5**

AquaTerra Environmental Ltd. ('AquaTerra') is pleased to provide Mission Contractors Ltd. ('Mission' Contractors') with this Environmental Monitoring Memorandum (the 'memo'), which includes daily Environmental Monitoring observations and recommendations associated with the Hatzic Emergency Program – MacNab and Eng Creek Project (the 'project'; **Figure 1**).

Figure 1: Approximate Site Extents – identified in Red.



In September 2023, AquaTerra was retained by Mission Contractors to prepare this Construction Environmental Management Plan (CEMP), as well as provide environmental monitoring for the proposed Hatzic Emergency Program – MacNab and Eng Creeks Project, in Mission, BC.

The project involves removing accumulated (during the November 2021 Atmospheric River Event (ARE)) sediment and restoring channel banks. Environmental Monitoring summary notes are provided in the following sections.

Environmental Monitoring Summary

Date of Site Inspection: 23 October 2023	
<i>Time:</i> 07:30 – 12:30	
<i>Weather:</i> Overcast (9°C)	<i>Precipitation:</i> 0 mm (<i>Source: Environment Canada – West Mission and Abbotsford</i>)
<i>Environmental Monitor & Supervisor:</i> Nicole Chin & Chris Lee.	
<i>Construction activities:</i> Complete armoring of creek section east of Sylvester Road, excavating Japanese knotweed area in creek section west of Sylvester Road.	
<i>Monitoring event description:</i> Monitoring the excavation of Japanese knotweed in the creek bed west of Sylvester Road.	

Environmental Monitoring Observations

07:30 | Environmental Monitor (EM) arrived on site and participated in a safety tailgate with Mission Contractors. The EM and Site Supervisor discussed the scope of work for the day:

- Brush is anticipated to be cleared to create an entrance for machinery to enter the creek on the west side of Sylvester Road.
- The rock truck is anticipated to be lined with geotextile fabric to transport excavated Japanese knotweed infested creek material. The excavated knotweed material is anticipated to be stockpiled in the laydown area where it will be isolated with silt fencing.
- A stiff metal brush will be used to remove soil and other particles off the excavator bucket and the inside of the rock truck prior to removing clean creek substrate.
- Excavation of the creek is anticipated to commence today.

07:45 | The EM conducted a walkthrough of the western creek bed with the Site Supervisor to identify / demarcate the dead patches of knotweed and the live regrowth stems. The perimeter of the knotweed patches was flagged by the EM.

08:45 | Onsite the EM observed:

- Crews cleaning dirt off the road tracked across by the excavator.
- Crews lining the rock truck with geotextile fabric.
- One (1) large, fully stocked spill kit near the entrance of the equipment storage.
- Heavy machineries were equipped with absorbent pads.
- One (1) large, tracked excavator was being actively utilized in the laydown area. The EM inspected the area for any indication of leaks or excess grease. No concerns were observed at the time of inspection.
- One (1) rock truck in active use with no observed leaks or excess grease. No concerns were observed at the time of inspection.

09:45 | The EM observed:

- Removal of the dead knotweed and infested creek substrate by the excavator and transported by the rock truck to the staging area.
- The rock truck was relined with new geotextile fabric as the initial lining fell off with the dumped substrate.
- A second load of knotweed and substrate was removed.

10:38 | The EM inspected the exposed substrate and plant roots in the creek bed for signs of knotweed.

- Two rhizomes displayed orange-colored cross sections and were suspected to be knotweed while all other roots displayed white cross sections indicating non knotweed species. This was pointed out to the Site Supervisor and the suspected knotweed roots were buried with gravel per the protocol agreed upon with AE.

10:40 | The EM observed the interior and exterior of the excavator bucket being cleaned by crews with a stiff metal brush. The bucket was suspended over the excavated knotweed area during cleaning. The rock truck tailgate was also cleaned with the same wire brush.

- The excavator bucket and the rock truck were inspected for cleanliness by the EM.
- Silt isolation fencing was installed around the excavated knotweed material in the staging area.
- Excavation work under Sylvester Road commenced shortly after.

12:30 | Work crews break for lunch and the EM departed the site.

Monitoring Recommendations

1. Contact the EM if water is observed in the creek. Stop works until a bypass is installed.
2. The stockpiled Japanese knotweed infested material can be buried 3-5 m below ground or removed off site for disposal at an appropriate disposal facility.
3. Inspect equipment regularly for leaks or excess grease.

Outstanding Environmental Issues

- No outstanding environmental issue was observed.

Site Photographs

Photo 1: Japanese knotweed perimeter flagged.



Photo 2: Drip pad observed under inactive excavator.



Photo 3: Geotextile fabric lining in the rock truck.



Photo 4: Japanese knotweed being excavated from the creek bed.



Photo 5: Excavated Japanese knotweed creek material stockpiled in laydown area.



Photo 6: Excavator bucket cleaned with stiff metal brush.



Photo 7: Excavating under Sylvester Road.



Date: 25 October 2023	
Time On & Off site:	07:22 – 12:00
Weather:	Overcast (6°C)
Precipitation:	0.0 mm (Source: Environment Canada – West Mission and Abbotsford)
Environmental Monitor & QEP Supervisor:	Nicole Chin & Chris Lee
Monitoring event description:	Weekly environmental monitoring event
Construction activities during the monitoring event:	Continued armoring of Eng Creek and excavating under Hartley Rd.
Upcoming planned construction activities:	Armoring of creek bank.

Environmental Monitoring Observations

07:22 | Environmental Monitor ('EM') arrived on site and participated in a safety tailgate with Mission Contractors. The EM and site supervisor discussed the scope of work for the day:

- Armoring of the creek between Sylvester Rd and Hartley Rd.
- Continued excavating under the Hartley Road bridge.
- The site supervisor requested the EM conduct a walkthrough of MacNab Creek and to identify and flag any Japanese knotweed and other invasive plants if present.

08:00 | The EM did not observe any water running in the creek at the time of the site inspection.

At the creek west of Sylvester Road the Environmental Monitor observed:

- Excavation and riprap installation under Sylvester Road bridge.
- Excavation and riprap installation under Hartley Road bridge.
- One (1) large, tracked excavator conducting work in the creek area. The EM inspected the area for any indication of leaks or excess grease. No concerns were observed at the time of inspection.
- One (1) rock truck transporting riprap between the laydown area and the creek. No indication of leaks or excess grease was observed.
- One (1) excavator loading the rock truck with riprap in the laydown area for transport. No indication of leaks or excess grease was observed.

09:10 | The EM conducted a site walkthrough of MacNab creek with the AE engineer and no knotweed was observed in the proposed work area.

10:20 | The EM noted that the armoring of Sylvester Rd bridge with riprap was completed.

11:45 | The EM observed removal of vegetation and shrubbery on the south side of Hartley Road with an excavator.

11:30 | The EM discussed observations with the site superintendent.

- No knotweed observed or identified in MacNab creek.
- Silt isolation fencing around knotweed contaminated stockpiles blown down and deficient. Site personnel promptly reinstalled fencing.

13:00 | The EM departed the site.

Monitoring Recommendations

1. Contact the EM if water is observed in the creek. Stop works until a bypass is installed.
2. The stockpiled Japanese Knotweed infested material should be buried 3-5 m below ground or removed off site for disposal at an appropriate disposal facility.
3. Inspect equipment regularly for leaks or excess grease.

Outstanding Environmental Issues

- No outstanding environmental issue was observed.

Site Photographs

Photo 8: The rock truck adequately protected with a drip tray at the time of inspection.



Photo 9: Excavated creek bed with Hartley Road bridge in the background.



Photo 10: Excavation of Sylvester Road bridge.



Photo 11: MacNab creek.



Photo 12: Excavation under Hartley Road bridge in progress.



Photo 13: Stockpiles of Japanese knotweed infested material excavated from the creek.



Date of Site Inspection: 27 October 2023	
Time: 07:15 – 10:00 am	
Weather: Sunny (2°C)	Precipitation: 0 mm (Source: Environment Canada – West Mission and Abbotsford)
Environmental Monitor & Supervisor: Nicole Chin & Chris Lee.	
Construction activities: Expansion of staging area and excavation of MacNab creek.	
Monitoring event description: Monitoring the expansion of the laydown area.	

Environmental Monitoring Observations

07:15 | Environmental Monitor (EM) arrived on site and participated in a safety tailgate with Mission Contractors. The EM was advised by the Site Supervisor that Mission Contractors moved their machinery from the Eng creek staging area 200 m south to the MacNab creek staging area the day prior (26 October 2023). Decontamination protocols followed included spinning out excavator tracks to remove soil and debris from tracks and using a stiff wire brush to remove dirt and debris from the excavator bucket.

The EM and Site Supervisor discussed the scope of work for the day anticipated to start today:

- Clearing and expansion of laydown area to commence today.
- Excavation of MacNab creek is anticipated to commence today.

08:07 | The EM observed no water running in MacNab creek at the time of the site inspection. A Western Toad sweep was conducted in the creek and no toads were observed.

In the staging area the EM observed:

- Two (2) excavators were observed inactive and on standby without containment tray coverage. No obvious signs of leaks or spills were observed.
- One (1) rock truck was observed inactive and on standby without containment tray coverage. No obvious signs of leaks or spills were observed.
- One (1) fully stocked spill kit was observed in the staging area.

08:37 | The EM was present when Mission Contractors acquired approval from the strata president to remove the danger tree and expand the laydown area footprint.

09:15 | The EM, AE engineer, Mission Contractors, and Leq'a:mel First Nations cultural monitors participated in a walkthrough of the creek.

09:32 | The EM observed a toad sweep conducted by Leq'a:mel First Nations cultural monitors in the excavated laydown area. No toads were identified.

09:50 | The EM stopped at Eng creek to observe the completed creek works and take photographs.

10:06 | The EM departed the site.

Monitoring Recommendations

1. Contact the EM if water is observed in the creek. Stop works until a bypass is installed.
2. The stockpiled Japanese knotweed infested material can be buried 3-5 m below ground or removed off site for disposal at an appropriate disposal facility.
3. Inspect equipment regularly for leaks or excess grease.

Outstanding Environmental Issues

- No outstanding environmental issue was observed.

Site Photographs

Photo 14: The excavator expanding the staging area.



Photo 15: The excavator entering MacNab Creek.



Photo 16: One (1) large and fully stocked spill kit observed in staging area.



Photo 17: Eng Creek facing north.



Photo 18: Riprap installed at the outflow of Eng Creek on the southside of Hartley.



Photo 19: No effluent leakage or spills were observed from the portable toilet.



Monitoring Conclusions

During the period of 23 October to 27 October 2023, three (3) monitoring events were completed. AquaTerra personnel evaluated general site conditions to verify project compliance with CEMP, EMP, associated DFO *Authorizations* and WSA Approvals as well as ESC strategies, associated BMPs, acts, and regulations over the duration of the project. No non-conformance / non-compliance issues resulting in environmental impacts were observed during the prescribed monitoring period. No incidents occurred or were reported to AquaTerra personnel during the prescribed monitoring period.

Closure

We trust this provides the information you currently require. Should you have any questions, please feel free to contact the undersigned.

Respectfully submitted,

Nicole Chin

Nicole Chin
Environmental Monitor
AquaTerra Environmental Ltd.

Chris Lee, M.Sc., RPBio, QEP
Principal / Project Manager
AquaTerra Environmental Ltd.

ENVIRONMENTAL MONITORING MEMORANDUM

TO: Adam Wodzianek and Jon Murphy
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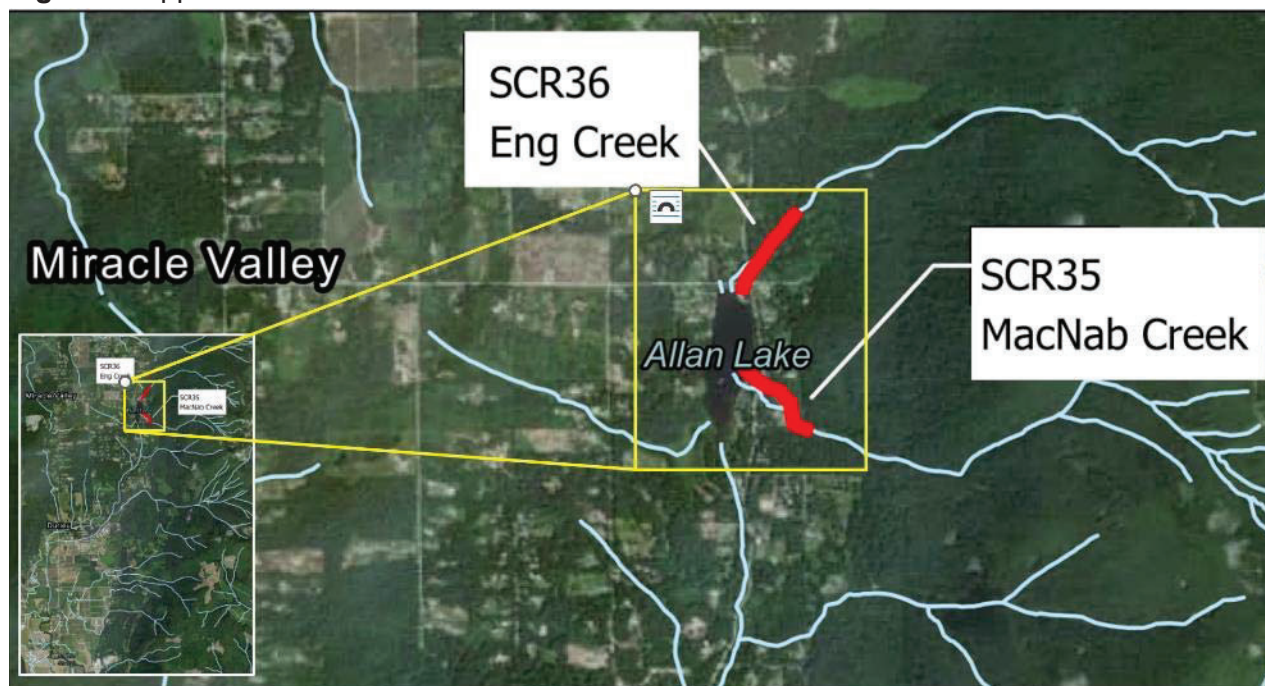


DATE: 6 November 2023

**Subject: Hatzic Emergency Program – MacNab and Eng Creek Project -
AquaTerra Environmental Monitoring Memorandum #6**

AquaTerra Environmental Ltd. ('AquaTerra') is pleased to provide Mission Contractors Ltd. ('Mission' Contractors') with this Environmental Monitoring Memorandum (the 'memo'), which includes daily Environmental Monitoring observations and recommendations associated with the Hatzic Emergency Program – MacNab and Eng Creek Project (the 'project'; **Figure 1**).

Figure 1: Approximate Site Extents – identified in Red.



In September 2023, AquaTerra was retained by Mission Contractors to prepare this Construction Environmental Management Plan (CEMP), as well as provide environmental monitoring for the proposed Hatzic Emergency Program – MacNab and Eng Creeks Project, in Mission, BC.

The project involves removing accumulated (during the November 2021 Atmospheric River Event (ARE)) sediment and restoring channel banks. Environmental Monitoring summary notes are provided in the following sections.

Environmental Monitoring Summary

Date of Site Inspection: 30 October 2023	
<i>Time:</i> 06:04 – 13:38	
<i>Weather:</i> Sunny 1°C (high 13°C / low 1°C)	<i>Precipitation:</i> 0 mm (<i>Source: Environment Canada – West Mission and Abbey</i>)
<i>Environmental Monitor & Supervisor:</i> Nicole Chin & Chris Lee.	
<i>Construction activities:</i> Complete armoring of MacNab creek.	
<i>Monitoring event description:</i> Observe installation of geotextile fabric and riprap on exposed creek banks.	

Environmental Monitoring Observations

07:31 | The Environmental Monitor ('EM') arrived on site and participated in a safety tailgate with Mission Contractors. The EM and site supervisor discussed the anticipated scope of work for the day:

- Installation of riprap on the stream banks'
- Hauling of creek gravel offsite; and
- Installation of riprap at the mouth of the culvert.

07:50 | The EM walked up MacNab Creek to observe the continued installation of riprap at the top boundary of the project footprint.

08:10 | Onsite the EM observed:

- The excavator was compacting riprap into the bank with the bucket.
- Laydown of geotextile fabric onto the exposed south bank and installation of riprap over top.
- Continued installation of riprap over geotextile fabric.

- Continued compaction of gravel and riprap with the excavator bucket.
- Ongoing delivery of riprap to the laydown area, and the transport of the riprap to the creek by rock truck.
- One (1) large, tracked excavator was being actively utilized in the laydown area. The EM inspected the area for any indication of leaks or excess grease. No concerns were observed at the time of inspection.
- One (1) excavator was being actively utilized in MacNab Creek to install riprap. The EM inspected the area for any indication of leaks or excess grease. No concerns were observed at the time of inspection.
- One (1) rock truck in active use with no observed leaks or excess grease. No concerns were observed at the time of inspection.

13:00 | EM discussed upcoming work on Wednesday and recommended having an EM onsite for the removal of the Japanese knotweed infested material.

13:38 | EM departed the site.

Monitoring Recommendations

1. An environmental monitor is to be on site for the removal of the Japanese knotweed infested material at the laydown area.
2. The stockpiled Japanese knotweed infested material can be buried 3-5 m below ground or removed off site for disposal at an appropriate disposal facility.
3. Inspect equipment regularly for leaks or excess grease.

Outstanding Environmental Issues

- No outstanding environmental issue was observed.

Site Photographs

Photo 1: Excavation of MacNab Creek.



Photo 2: Laydown area with stockpile of riprap and creek gravel.



Photo 3: Laydown of geotextile fabric on the exposed bank.



Photo 4: Installation of riprap over geotextile fabric.

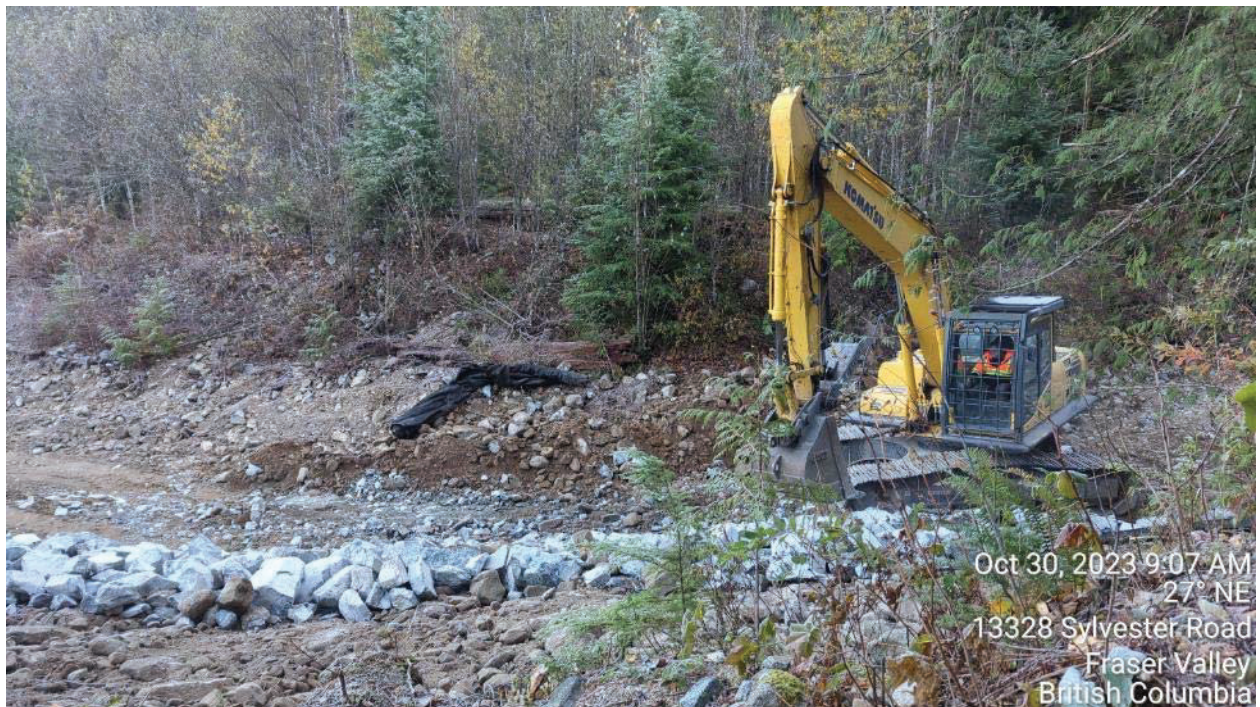
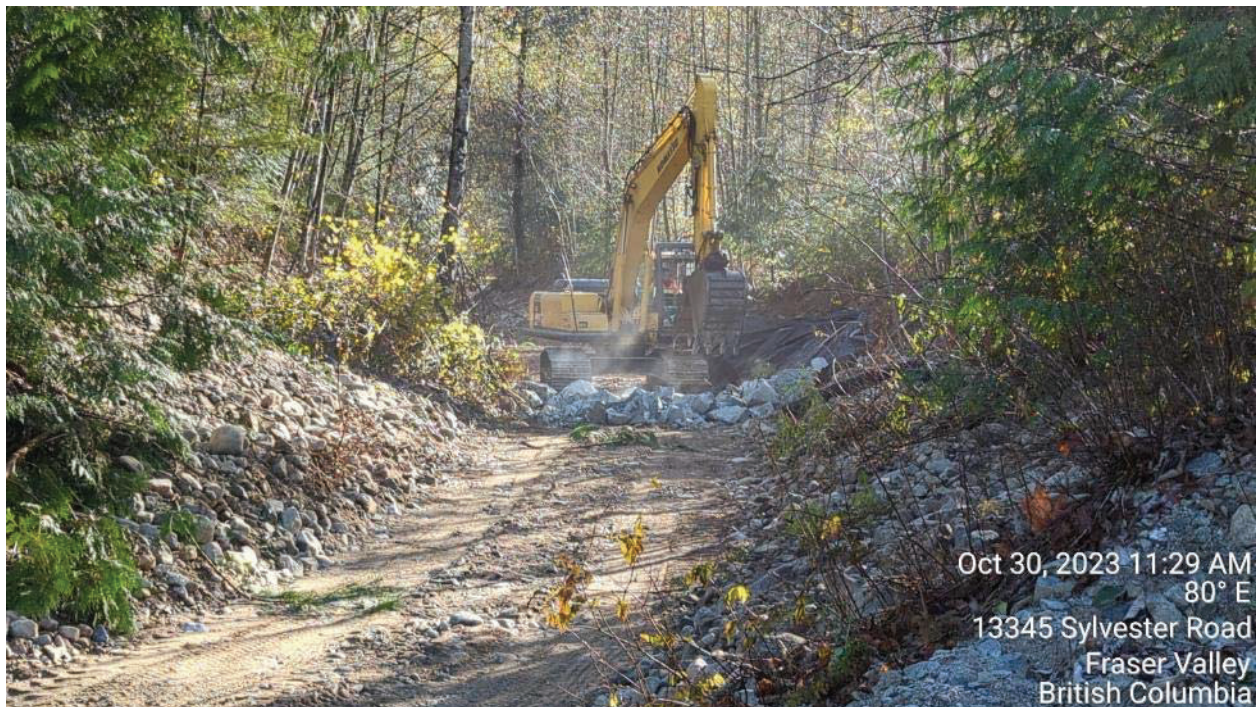


Photo 5: Completed riprap installation work.



Photo 6: Continued installation of riprap in MacNab Creek.



Date: 1 November 2023	
Time On & Off site:	07:45 – 14:44
Weather:	Overcast (6°C)
Precipitation:	0.0 mm (Source: Environment Canada – West Mission and Abbey)
Environmental Monitor & QEP Supervisor:	Nicole Chin & Chris Lee
Monitoring event description:	Weekly environmental monitoring event
Construction activities during the monitoring event:	Armoring culvert outflow of MacNab Creek.
Upcoming planned construction activities:	Removal of Japanese knotweed material and cleanup of Eng creek laydown area.

Environmental Monitoring Observations

07:45 | The Environmental Monitor ('EM') arrived on site and participated in a safety tailgate with Mission Contractors. The EM and site supervisor discussed the anticipated scope of work for the day:

- Armoring the MacNab Creek culvert outflow.
- Transport the excavator to the Eng Creek laydown area.

08:05 | The EM did not observe any surface water flowing in the creek at the time of the site inspection. At the MacNab Creek culvert the Environmental Monitor observed:

- Continued delivery of riprap by gravel trucks to the MacNab Creek laydown area.
- Removal of creek sediment by gravel trucks.
- Geotextile laydown on the northwest exposed banks at the culvert outflow.
- Completed riprap installation on the southwest culvert bank.
- Completed riprap installation on the northwest culvert bank.

14:00 | In the laydown area the EM observed:

- The excavator spun out soil from both tracks prior to transport to the Eng Creek laydown area and swept the tracks and undersides / walkways.

14:30 | The EM discussed the disposal of the Japanese knotweed infested material with the site supervisor. BC Earth Exchange (Saskay Earth Exchange) will send a truck to pick up the infested knotweed material for disposal on 02 November 2023).

14:44 | The EM departed the site.

Monitoring Recommendations

1. An Environmental Monitor should be onsite during the removal of the Japanese knotweed infested material.

Outstanding Environmental Issues

- No outstanding environmental issue was observed.

Site Photographs

Photo 7: Completed riprap installation at MacNab Creek.



Photo 8: Completed work at the culvert intake.



Photo 9: Geotextile fabric laid down on the exposed northwest bank of the culvert outflow.



Photo 10: Installation of riprap over the geotextile material in progress.



Photo 11: Completed work at the culvert outflow.



Photo 12: The excavator spinning its tracks to remove soil prior to transportation to the Eng Creek laydown area.



Photo 13: Transporting the excavator by flatbed to Eng Creek after cleaning.



Date: 2 November 2023	
Time: 07:38 – 10:00 am	
Weather: Overcast (2°C)	Precipitation: 16 mm (Source: Environment Canada – West Mission and Abbey)
Environmental Monitor & Supervisor: Nicole Chin & Chris Lee.	
Construction activities: Clean up at Eng Creek laydown area	
Monitoring event description: Monitor removal of Japanese knotweed infested material.	

Environmental Monitoring Observations

07:45 | Environmental Monitor (EM) arrived on site and participated in a safety tailgate with Mission Contractors. The scope of work is anticipated to include:

- Correcting grading deficiencies in Eng Creek in the area between Sylvester Rd and Hartley Rd.
- The removal of the stockpiled Japanese knotweed infested material from the laydown area for disposal offsite.

08:05 | No running water was observed in Eng creek at the time of the site inspection. The EM observed the following:

- The excavator entered the creek between Sylvester Rd and Hartley Rd.
- The excavator removed additional creek material to correct the creek grading.
- Throughout the day multiple gravel trucks arrived onsite to pick up creek gravel for removal.

11:00 | The EM observed the arrival of one (1) BC Earth Exchange gravel truck with trailer. The excavator was used to load the material into the gravel truck. A total of two (2) loads of Japanese Knotweed were removed offsite.

11:45 | The EM observed crews clean the excavator bucket with a stiff wire brush. The excavator bucket was changed to a smaller bucket and brush was loaded into a separate truck for removal.

12:12 | The EM departed the site.

Monitoring Recommendations

1. Inspect equipment regularly for leaks or excess grease.

Outstanding Environmental Issues

- No outstanding environmental issue was observed.

Site Photographs

Photo 14: The excavator removing additional creek material from Eng creek.



Photo 15: Regrading of the creek complete.



Photo 16: Gravel trucks removing creek gravel from site.



Photo 17: Japanese knotweed infested material loaded into BC Earth Exchange truck for offsite disposal.



Photo 18: The excavator filling up a second load of Japanese knotweed.



Photo 19: Additional brush loaded into a truck.

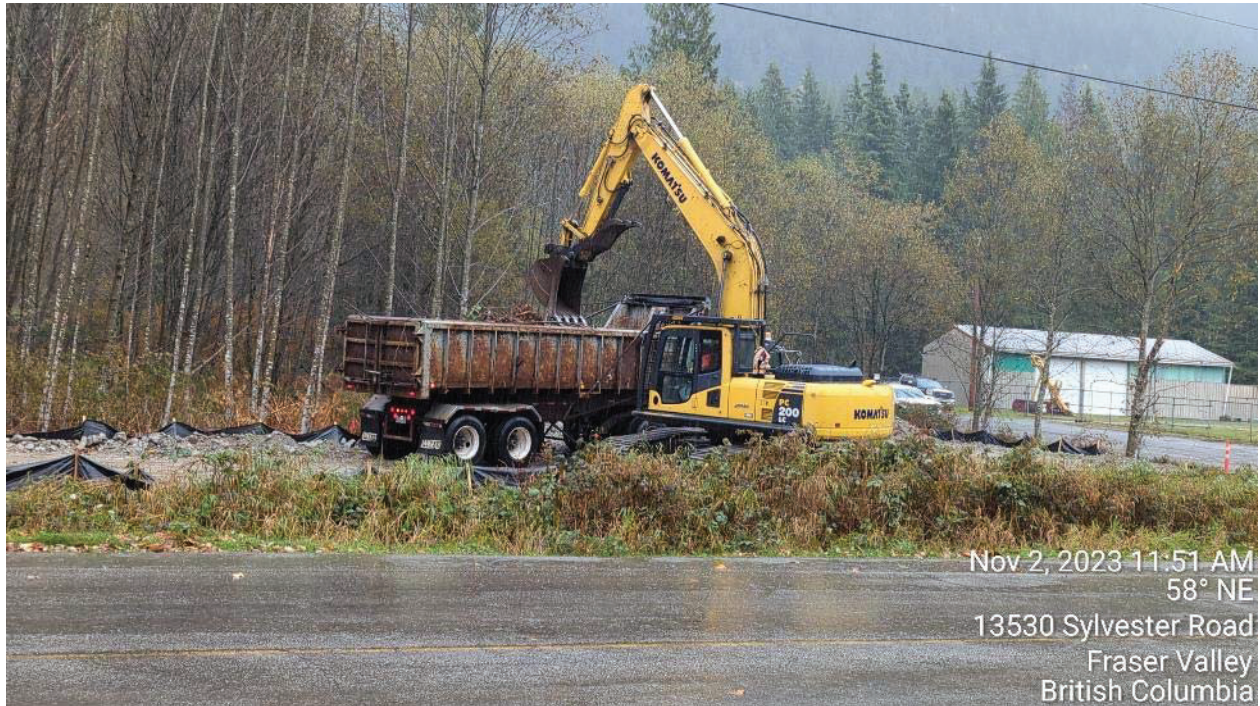


Photo 20: Crews cleaning the excavator bucket.



Photo 21: The excavator capping the stockpile area with clean creek gravel.



Date: 03 November 2023	
Time:	12:28 – 13:12
Weather:	Sunny (12°C) (High 13°C / low 1°C)
Precipitation:	0.0 mm (Source: Environment Canada – West Mission and Abbey)
Environmental Monitor & QEP Supervisor:	Nicole Chin & Chris Lee
Monitoring event description:	Weekly environmental monitoring event.
Construction activities during the monitoring event:	Capping the Eng Creek laydown area with topsoil and seeding with a grass mix.
Upcoming planned construction activities:	None, project is complete.

Environmental Monitoring Observations

12:28 | The Environmental Monitor ('EM') arrived on site and observed the following at Eng creek:

- No flowing surface water in Eng Creek.
- Topsoil had been laid down and spread across the Eng Creek laydown area.
- A grass seed mix was spread overtop of topsoil.
- The culvert in the ditch along Neilson Rd was removed.

12:42 | The EM observed the removal of the one (1) excavator from the site with a flatbed truck.
The portable toilet was also removed from site.

13:06 | One (1) excavator remains at the MacNab Creek laydown area secured behind a locked fence. It will be removed tomorrow (November 4, 2023) by a flatbed truck.

13:12 | EM departed the site.

Monitoring Recommendations

- No monitoring recommendations, project is complete.

Outstanding Environmental Issues

- No outstanding environmental issue was observed.

Site Photographs

Photo 22: Eng Creek laydown area was capped with topsoil and seeded with a grass mix.



Photo 23: Laydown area facing south.



Photo 24: The culvert at Neilson Rd was removed.



Photo 25: One (1) rock truck loaded onto the flatbed for removal.



Monitoring Conclusions

During the period of 27 October to 03 November 2023, four (4) monitoring events were completed. AquaTerra personnel evaluated general site conditions to verify project compliance with CEMP, EMP, associated DFO *Authorizations* and WSA Approvals as well as ESC strategies, associated BMPs, acts, and regulations over the duration of the project. No non-conformance / non-compliance issues resulting in environmental impacts were observed during the prescribed monitoring period. No incidents occurred or were reported to AquaTerra personnel during the prescribed monitoring period.

Closure

We trust this provides the information you currently require. Should you have any questions, please feel free to contact the undersigned.

Respectfully submitted,

Nicole Chin

Nicole Chin
Environmental Monitor
AquaTerra Environmental Ltd.

Chris Lee, M.Sc., RPBio, QEP
Principal / Project Manager
AquaTerra Environmental Ltd.

Appendix O



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: 2023-10-18	Time: 0800-1300	Eng Creek – Sylvester Rd, Hatzic Prairie			
Monitor Name: Jason Thompson		Signature:			
Meetings:					
Meeting Participants:					
Contractor(s) On Site: Mission Contractors A&E Leq'a:mel LNR		Name of Construction Representative Present:			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 14°/10°; 01KM Wind; Heavy rain/atmospheric river advisory;					
Ground Conditions: Dry ☐ Wet ☐ Saturated ☐					
Completed Construction Activities (Since Last Visit):					
Construction Activities: <i>Load-out and transport of bedload material; Placement of rip-rap along upstream banks; Site prep for in-stream works between Sylvester Rd & Hartley Rd bridges</i>			Photos:		
Construction Equipment Being Used: <i>Three excavators (360, 200, Mini) and one A30F rock truck</i>			Photos:		
Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)					
Boundary Flagging	OK	NC	NA	Comments & Mitigation	Photos:
General Construction					
Riparian Zone(s)					
Env. Sensitive Features					
Other					
Water Quality	OK	NC	NA	Comments & Mitigation	Photos:
Turbidity			X		
Temperature			X		
DO			X		
pH			X		
Conductivity			X		
Other			X	Water visible for only short period of the day in upstream	

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing	X			Appeared to be installed adequately and working	
Bank Stabilization	X			No visible concerns of sluffing	
Soil Stockpiles	X			No concerns of bedload stockpiles	
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/readily available	
Fuel Storage	X			No concerns of fuel storage	
Other					
Equipment	OK	NC	NA	Comments & Mitigation	Photos:
Condition (leaks, etc.)	X			Machines appeared to be leak-free	
Initial Cleaning (Mud, Seeds)	X			Muddy from work, but machines did not leave site	
Other					
Waste Management	OK	NC	NA	Comments & Mitigation	Photos:
Sanitary Facilities	X			Porty-potty onsite	
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			Crews flagged Knotweed & kept distance	
Other					
General Observations & Comments (Wildlife, New Sensitive Features, etc.): During this site visit, this writer observed no visible concerns regarding today's work. Work crew was approachable and good to work with; - Creek became wetted in the upper work section but ran subsurface about 3-5m into worksite; no concerns of working in the wet - All crew and equipment kept distance from known Japanese Knotweed areas - No visible spills noted during time of site visit - Bedload material was loaded out by truck, while rip-rap was unloaded for installation					Photos:
Other Comments:					Photos:
Upcoming Construction Events:					
Incident Report Required? Yes ☐ No ☐					

Natural Resource Department:
Daily Environmental Monitoring Report

PHOTO LOG – PYE CREEK 2023-10-18



Figure 1 - Upstream bank-right fabric/rip-rap installation



Figure 2 - Upstream bank-left fabric/rip-rap installation

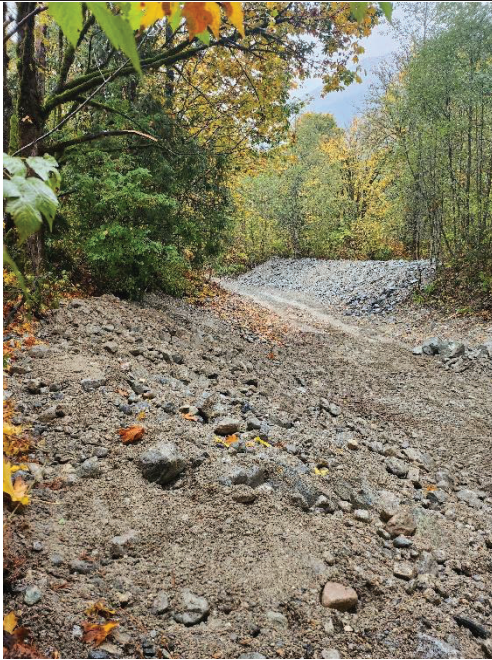


Figure 3 - Upper bank-left and bank-right with completed rip-rap



Figure 4 - Lower section bank-right fabric/rip-rap installation

Natural Resource Department:
Daily Environmental Monitoring Report

PHOTO LOG – PYE CREEK 2023-10-18



Figure 5 -Prep for middle section work between Sylvester & Hartley; Above Hartley Rd



Figure 6 - Test dig of bedload to find depth of bridge mooring



Figure 7 - Spill tray & kit onsite behind Allan Lake gate



Figure 8 - Spill Kit in Mission Truck along upper work area



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Natural Resource Department: Daily Environmental Monitoring Report

Report Number: 004		Location (Or Closest Address): Sylvester rd x Hartley rd at North end of Allan Lake.			
Date: 10/13/2023	Time: Start 7:30am – 11:30 (Tina)				
Monitor Name: Tina Pederson, Erik Still, Megan Friesen		Signature:			
Meetings: 7:30 safety/tailgate meeting.					
Meeting Participants: Jon (supervisor MC), Jim (operator MC), Chris (operator MC), Tina (LFN).					
Contractor(s) On Site: Mission Contractors Ltd A.E LFN		Name of Construction Representative Present: Taylor (Inspector AE) Jon (supervisor MC)			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Cloudy w/sun high of ~20°					
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐					
Completed Construction Activities (Since Last Visit): Temporary culvert installed at the Hartley Rd laydown entrance, Survey of creek completed, and Bedload removal of Eng creek started. Bedload/gravel was put down inside the laydown area to help with site isolation and prevent mud and soil transfer from site. Rental haul truck brought to sight until the MC haul truck is repaired.					
Construction Activities: Removal of vegetation stockpile in the morning via tandem bin truck, continued prep of pad w/native materials inside isolated laydown area. Good progress made of sediment removal on the channel of Eng creek ~6 loads of material transported off site.			Photos:		
Construction Equipment Being Used: Komatsu 360, Volvo haul truck (rental), 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			X		
pH			X		
Conductivity			X		
Other				Eng creek and Allan Lake are dry.	

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing	X			Some compromised sections of isolation fence after gravel material laid down inside isolated area. Portion of fence to be put up in the area where the vegetation stockpile was stored.	
Bank Stabilization	X				
Soil Stockpiles	X			Monitored by Aquaterra Environmental.	
Drainage & Diversions			X		
Detention Facilities			X		
Other					
Fuel & Oil Management	OK	NC	NA	Comments & Mitigation	Photos:
Spill Kits/SPER Plan	X			Spill kits inside all machines and located at two separate locations on site.	
Fuel Storage	X			Fuel stored in back of Jons truck.	
Other					
Equipment	OK	NC	NA	Comments & Mitigation	Photos:
Condition (leaks, etc.)	X			Machines appear clean and well maintained.	
Initial Cleaning (Mud, Seeds)	X			Machines and haul trucks operating inside Eng creek are remaining inside the Eng creek laydown area.	
Other	X			Separate buckets were used for vegetation removal and gravel/sediment extraction.	
Waste Management	OK	NC	NA	Comments & Mitigation	Photos:
Sanitary Facilities	X			Porta potty on site.	
Solid Waste & Recycling	X			Garbage on site.	
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			Himalayan Black Berry, Himalayan balsam, Japanese knotweed present at this site, managed/monitored by Aquaterra environmental.	
Other					
General Observations & Comments (Wildlife, New Sensitive Features, etc.):					Photos:
One doe and fawn spotted outside construction zone they appear to live in this area, no Western toads or any other amphibians discovered during a thorough sweep of the work zone. No culturally significant finds today.					
Other Comments:					Photos:
Along the North bank of Eng Creek is what appears to be a colonial style hearth, it has been altered in recent years but appears mostly intact.					

Natural Resource Department: Daily Environmental Monitoring Report

Upcoming Construction Events:

Continued bedload removal and bank stabilization/prep for rip rap install.

Incident Report Required?

Yes ☐

No ☒

Figure 1 Entrance to Laydown area Hartley Rd.



Figure 2 Beginning of Bedload as buffer pad in laydown are.



Natural Resource Department: Daily Environmental Monitoring Report

Figure 3 Survey stakes looking East from lower entrance Eng Creek.



Figure 4 Colonial style hearth ~50m upstream of Sylvester Rd. MoTi structure on N. bank.





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Natural Resource Department: Daily Environmental Monitoring Report

Report Number: 001		Location (Or Closest Address):			
Date: 10/10/2023	Time: 8-3:30	Hartley Rd. / Sylvester Rd. Eng Creek / Allan Lake			
Monitor Name: Melissa Friesen		Signature:			
Meetings: Safety meeting and tailgate 8 am					
Meeting Participants: Jon (MC-supervisor), Chris, Nicole (Aquaterra), Jim (MC-operator), Tina (Leq'á:mel) and this writer Melissa.					
Contractor(s) On Site: Mission Contractors LTD Associated Engineering Leq'á:mel First Nation		Name of Construction Representative Present: Taylor (AE) Jon (MC-supervisor) Tina (Leq'á:mel)			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 10° w/periods of heavy rain.					
Ground Conditions: Dry ☐ Wet ☒ Saturated ☐					
Completed Construction Activities (Since Last Visit): First Day planning.					
Construction Activities: Clearing an entrance to the creek. Entrance Started on Hartley rd. 20 meters east of Sylvester. Removal of brush and trees approx. 40 meters in length North of Hartley.			Photos:		
Construction Equipment Being Used: - Excavator (Komatsu PC 360 LC)			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	Creek is dry.	
Temperature			X		
DO			X		
pH			X		
Conductivity			X		
Other					
Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing	X				
Bank Stabilization	X				

Natural Resource Department: Daily Environmental Monitoring Report

Soil Stockpiles	x			Materials to be removed on oct.12th	
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			Porta potty on site.	
Solid Waste & Recycling			X	Will bring a garbage tomorrow.	
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			Himalayan Black Berry, Himalayan balsam, Japanese knotweed. Monitored by Aquaterra inv.	
Other					
General Observations & Comments (Wildlife, New Sensitive Features, etc.): One doe and fawn spotted outside construction zone they appear to live in this area, no Western toads or any other amphibians discovered during a thorough sweep of the work zone preconstruction. No culturally significant finds today.					Photos:
Other Comments:					Photos:
Upcoming Construction Events: Removal of bed load from Eng creek.					

Natural Resource Department: Daily Environmental Monitoring Report

Figure 2 Clearing vegetation at laydown pad Hartley Rd.



Figure 1 Machines parked at Allan Lake entrance Hartley Rd.



Natural Resource Department: Daily Environmental Monitoring Report

Figure 4 Drip trays being used under machines.



*Figure 3 Installing isolation/sediment fence around laydown pad
Hartley Rd./Eng Creek entrance.*



Natural Resource Department: Daily Environmental Monitoring Report

Figure 5 One of 2 Spill kits on site.



Figure 6 Porta potty Hartley rd.





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Natural Resource Department: Daily Environmental Monitoring Report

Report Number: 002		Location (Or Closest Address): Hartley and Sylvester rd. Eng Creek			
Date: 10/11/23	Time: 7:30-2:30				
Monitor Name: Melissa Friesen		Signature:			
Meetings: Safety meeting/Tailgate 730 am					
Meeting Participants: Jon (supervisor MC), Jim (operator MC), Chris (operator MC), Tina (LFN) and this writer Melissa.					
Contractor(s) On Site: Mission Contractors LTD A.E, LFN		Name of Construction Representative Present: Taylor (Inspector AE) Jon (supervisor MC)			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Highs of 17 degrees and lows of 9. Overcast in the morning but cleared up by the afternoon.					
Ground Conditions: Dry ☐ Wet ☒ Saturated ☐					
Completed Construction Activities (Since Last Visit): Cleared the path to Eng creek. Added isolation fencing to keep amphibians and other wildlife out of the construction area. Survey crew working inside channel.					
Construction Activities: Sediment removal at the tail of Eng creek/ head of Allan Lake. Thorough sweep of the construction zone for any amphibians or wildlife, none spotted today. Survey crew working inside channel.		Photos:			
Construction Equipment Being Used: Excavator (pc 200 LC) Volvo Haul truck (A30F) used for a small portion of the morning before having mechanical issues.		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	Eng creek and Allan Lake are both dry.	
Temperature			X		
DO			X		
pH			X		
Conductivity					
Other					

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing	X			Installed on parameter of laydown area.	
Bank Stabilization			x		
Soil Stockpiles	X			Vegetation from laydown area to be removed on Friday (oct,13 th)	
Drainage & Diversions	X				
Detention Facilities			x		
Other					
Fuel & Oil Management	OK	NC	NA	Comments & Mitigation	Photos:
Spill Kits/SPER Plan	X			Inside all machines and two separate locations on site.	
Fuel Storage	X			Back of Jons truck.	
Other					
Equipment	OK	NC	NA	Comments & Mitigation	Photos:
Condition (leaks, etc.)	X			Equipment appears clean and leak free.	
Initial Cleaning (Mud, Seeds)	X				
Other					
Waste Management	OK	NC	NA	Comments & Mitigation	Photos:
Sanitary Facilities	X			Porta potty on site.	
Solid Waste & Recycling	x			Garbage on site.	
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			Japanese knot weed, Himalayan Balsam, Himalayan Blackberry. Invasives being monitored by Aquaterra Environmental.	
Other					
General Observations & Comments (Wildlife, New Sensitive Features, etc.): One doe and fawn spotted outside construction zone they appear to live in this area, no Western toads or any other amphibians discovered during a thorough sweep of the work zone. No culturally significant finds today.					Photos:
Other Comments: Construction was postponed inside creek do to issues with the surveyor's equipment.					Photos:

Natural Resource Department: Daily Environmental Monitoring Report

Upcoming Construction Events:

Temporary culvert to be installed at Hartley rd. entrance to laydown area, sediment and bedload removal of Eng creek.

Incident Report Required?

Yes ☐

No ☒

Figure 1 Prepping sediment removal at confluence of Eng creek and Allan Lake.



Figure 2 Post sediment removal at confluence of Eng creek and Allan Lake.



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Figure 3 Signage at Sylvester Rd. and Hartley Rd. intersection.





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Report Number:005		Location (Or Closest Address): Sylvester rd x Hartley rd at North end of Allan Lake.			
Date:10-14-2023	Time: 7:30-9:30 2:30-5:30				
Monitor Name: Tina Pederson & Melissa Friesen		Signature:			
Meetings: Morning tailgate and safety.					
Meeting Participants: Jon (supervisor MC), Jim (operator MC), Chris (operator MC), Tina (LFN).					
Contractor(s) On Site: Mission Contractors Ltd A.E LFN		Name of Construction Representative Present: Taylor (Inspector AE) Jon (supervisor MC) Tina (LFN)			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Cloudy w/sunny periods ~17°					
Ground Conditions: Dry ☐ Wet ☒ Saturated ☐					
Completed Construction Activities (Since Last Visit): Removal of vegetation stockpile in the morning via tandem bin truck, continued prep of pad w/native materials inside isolated laydown area. Good progress made of sediment removal on the channel of Eng creek ~6 loads of material transported off site.					
Construction Activities: Continuing bedload and sediment removal on the upper channel of Eng creek ~6 loads of material transported off site. Prepping stream bank for riprap/bank stabilization to be done next week.			Photos:		
Construction Equipment Being Used: Komatsu 360, Volvo haul truck (rental), 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			X		
pH			X		
Conductivity			X		
Other			X	Eng creek and Allan Lake are dry.	

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing	X			Some compromised sections of isolation fence after gravel material laid down inside isolated area. Portion of fence to be put up in the area where the vegetation stockpile was stored.	
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 inside all machines and located at two separate locations on site.	
Fuel Storage	X				
Other					
Equipment	OK	NC	NA	Comments & Mitigation	Photos:
Condition (leaks, etc.)	X			Machines appear clean and well maintained.	
Initial Cleaning (Mud, Seeds)	X			Machines and haul trucks operating inside Eng creek are remaining inside the Eng creek laydown area.	
Other					
Waste Management	OK	NC	NA	Comments & Mitigation	Photos:
Sanitary Facilities	X			Porta potty on site.	
Solid Waste & Recycling	X			Garbage on site.	
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			Monitored by Aquaterra Environmental.	
Other					
General Observations & Comments (Wildlife, New Sensitive Features, etc.):					Photos:
One doe and fawn wondering inside channel/construction zone (outside of the current work area) they appear to live in this area and crew is aware and vigilant of their presence, no Western toads or any other amphibians discovered during a thorough sweep of the work zone today.					
Other Comments:					Photos:
During a final walk through (~3pm) of Eng Creek work zone this writer noticed what appeared to be a potential culturally significant artifact along the North bank of Eng creek. The ground and bank were previously disturbed from the work that occurred throughout the day. This writer contacted supervisor Rick McKamey who directed this writer to have the potential find looked at by LFN Archaeology consultant. After a thorough examination it was determined that the Artifact would be classified as a “probable”, depending on several factors, e.g., location, and whether there are any other finds in this area etc.					
A.E Inspector Taylor Johnson was notified the next morning (10-15-2023), it was determined that we would proceed with the “chance find” procedure in place for this project. The channel excavation had already been completed in the 30m parameter of the probable find, so there was no interruption to the construction work being completed. There has been continued monitoring of the area and no other finds have been made in this location. Rick McKamey of LFN came out to take a site walk with this writer and helped determine that work would continue as planned with LFN continuing to monitor any potential cultural finds.					

Natural Resource Department: Daily Environmental Monitoring Report

Upcoming Construction Events:

Riprap to be hauled into Eng creek site and bank stabilization/enforcement to proceed early next week, continued hauling out of sediment/gravel stockpiles from the laydown area of Eng creek project.

Incident Report Required?

Yes ☐

No ☒

Image One: Lower portion of Eng Creek above MoTi structure, looking East.



Image Two: Looking South Eng creek entrance to laydown.



Photo Three: Probable artifact location, North side of creek.



Photo four: Haul truck w/ drip tray inside Eng creek laydown area.





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Natural Resource Department: Daily Environmental Monitoring Report

Report Number: 005		Location (Or Closest Address): Sylvester rd x Hartley rd at North end of Allan Lake.			
Date: 10-14-2023	Time: 7:30-9:30 2:30-5:30				
Monitor Name: Tina Pederson & Melissa Friesen		Signature:			
Meetings: Morning tailgate and safety.					
Meeting Participants: Jon (supervisor MC), Jim (operator MC), Chris (operator MC), Tina (LFN).					
Contractor(s) On Site: Mission Contractors Ltd A.E LFN		Name of Construction Representative Present: Taylor (Inspector AE) Jon (supervisor MC) Tina (LFN)			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Cloudy w/sunny periods ~17°					
Ground Conditions: Dry ☐ Wet ☒ Saturated ☐					
Completed Construction Activities (Since Last Visit): Removal of vegetation stockpile in the morning via tandem bin truck, continued prep of pad w/native materials inside isolated laydown area. Good progress made of sediment removal on the channel of Eng creek ~6 loads of material transported off site.					
Construction Activities: Continuing bedload and sediment removal on the upper channel of Eng creek ~6 loads of material transported off site. Prepping stream bank for riprap/bank stabilization to be done next week.			Photos:		
Construction Equipment Being Used: Komatsu 360, Volvo haul truck (rental), 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			X		
pH			X		
Conductivity			X		
Other			X	Eng creek and Allan Lake are dry.	

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing	X			Some compromised sections of isolation fence after gravel material laid down inside isolated area. Portion of fence to be put up in the area where the vegetation stockpile was stored.	
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 inside all machines and located at two separate locations on site.	
Fuel Storage	X				
Other					
Equipment	OK	NC	NA	Comments & Mitigation	Photos:
Condition (leaks, etc.)	X			Machines appear clean and well maintained.	
Initial Cleaning (Mud, Seeds)	X			Machines and haul trucks operating inside Eng creek are remaining inside the Eng creek laydown area.	
Other					
Waste Management	OK	NC	NA	Comments & Mitigation	Photos:
Sanitary Facilities	X			Porta potty on site.	
Solid Waste & Recycling	X			Garbage on site.	
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			Monitored by Aquaterra Environmental.	
Other					
General Observations & Comments (Wildlife, New Sensitive Features, etc.):					Photos:
One doe and fawn wondering inside channel/construction zone (outside of the current work area) they appear to live in this area and crew is aware and vigilant of their presence, no Western toads or any other amphibians discovered during a thorough sweep of the work zone today.					
Other Comments:					Photos:
During a final walk through (~3pm) of Eng Creek work zone this writer noticed what appeared to be a potential culturally significant artifact along the North bank of Eng creek. The ground and bank were previously disturbed from the work that occurred throughout the day. This writer contacted supervisor Rick McKamey who directed this writer to have the potential find looked at by LFN Archaeology consultant. After a thorough examination it was determined that the Artifact would be classified as a “probable”, depending on several factors, e.g., location, and whether there are any other finds in this area etc.					
A.E Inspector Taylor Johnson was notified the next morning (10-15-2023), it was determined that we would proceed with the “chance find” procedure in place for this project. The channel excavation had already been completed in the 30m parameter of the probable find, so there was no interruption to the construction work being completed. There has been continued monitoring of the area and no other finds have been made in this location. Rick McKamey of LFN came out to take a site walk with this writer and helped determine that work would continue as planned with LFN continuing to monitor any potential cultural finds.					

Natural Resource Department: Daily Environmental Monitoring Report

Upcoming Construction Events:

Riprap to be hauled into Eng creek site and bank stabilization/enforcement to proceed early next week, continued hauling out of sediment/gravel stockpiles from the laydown area of Eng creek project.

Incident Report Required?

Yes ☐

No ☒

Image One: Lower portion of Eng Creek above MoTi structure, looking East.



Image Two: Looking South Eng creek entrance to laydown.



Photo Three: Probable artifact location, North side of creek.



Photo four: Haul truck w/ drip tray inside Eng creek laydown area.





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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:		Location (Or Closest Address): Sylvester Hartley			
Date: October 17, 2023	Time: 7:30-3:45 (Melissa/Erik)				
Monitor Name: Melissa Friesen, Tina Pederson, Erik Still		Signature:			
Meetings: Safety meeting 730					
Meeting Participants: Jon (supervisor) Chris, Jim (operator) Erik, Tina and myself.					
Contractor(s) On Site: Mission contractors LTD		Name of Construction Representative Present: AE (Taylor)			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.):					
Ground Conditions: Dry ☐ Wet ☒ Saturated ☐					
Completed Construction Activities (Since Last Visit):					
Completed removing bedload/sediment from the upper portion of Eng creek (East of the MoTi infrastructure. Riprap places along the South bank of Eng creek, keyed in with finer stream material. Two Dump trucks running today, continuing to load out stockpile of bedload material.					
Continued to remove the bed load from the stockpile using two trucks.					
Construction Activities: Two excavators working today, one in Eng creek, continuing to key in the riprap placed along the South bank and the other loading the haul truck with riprap and 4 dump trucks with bedload being hauled off site. Two dump trucks hauling in riprap.			Photos:		
Construction Equipment Being Used: Komatsu Excavator pc 200 Lc, Komatsu excavator 360 pc Lc, Volvo rock truck A30F.			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		

Natural Resource Department: Daily Environmental Monitoring Report

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				
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			Knotweed, Himalayan Balsom	
Other					
General Observations & Comments (Wildlife, New Sensitive Features, etc.): Adult Western Toad spotted ~150m N/E of the Work zone, it appeared to be in a safe location and salvage was not necessary. The site inspector was notified, and we are continuing regular sweeps of the work zone and parameter. No other amphibians or wildlife spotted today, no culturally significant finds.					Photos:
Other Comments:					Photos:

Natural Resource Department: Daily Environmental Monitoring Report

Upcoming Construction Events:		
Incident Report Required?	Yes ☐	No ☒

Image 1 – South bank stabilization and riprap installation.



Image 2 – Western Toad



Image 3 – Loading and tipping point Hartley rd.

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Image 4 – Silt isolation fencing.

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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:003		Location (Or Closest Address): Sylvester, Hartley Rd			
Date: 10/12/23	Time: Start 7:30am – End of day.				
Monitor Name: Melissa Friesen		Signature:			
Meetings: 730 safety/tailgate meeting.					
Meeting Participants: Jon (supervisor MC), Jim (operator MC), Chris (operator MC), Tina (LFN) and this writer Melissa.					
Contractor(s) On Site: Mission Contractors Ltd A.E LFN		Name of Construction Representative Present: AE inspector (Taylor) Jon (supervisor MC)			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): lows of 8 degrees with highs of 16 degrees. the morning had a thick fog and cleared up by the afternoon.					
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐					
Completed Construction Activities (Since Last Visit): Entrance to creek was cleared and isolation fencing installed around parameter of laydown area. The sediment/bed load removed from head of Allan Lake (North/East) parallel to Sylvester Rd. at the tail of Eng creek.					
Construction Activities: The crew added a temporary culvert at the Hartley Rd laydown entrance. Tina and I inspected the area for western toad and amphibians and or wildlife, none were spotted after a thorough sweep of the area. The crew then started the removal of the bed load at the creek starting at the 250m mark working their way West toward Sylvester rd. Bedload/gravel was put down inside the laydown area to help prevent mud and soil transfer from site.			Photos:		
Construction Equipment Being Used: Excavator (pc 360 LC)			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	Eng Creek and Allan Lake are dry.	
Temperature			X		
DO			X		
pH			X		
Conductivity			X		

Natural Resource Department: Daily Environmental Monitoring Report

Other						
Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation		Photos:
Silt Fencing	X			Installed around parameter of laydown area.		
Bank Stabilization	X					
Soil Stockpiles	x					
Drainage & Diversions	X			Temporary culvert placed at entrance of laydown area (Hartley rd entrance)		
Detention Facilities			x			
Other						
Fuel & Oil Management	OK	NC	NA	Comments & Mitigation		Photos:
Spill Kits/SPER Plan	X			Inside all machines and at two separate locations on site.		
Fuel Storage	X			Back of Jons truck.		
Other						
Equipment	OK	NC	NA	Comments & Mitigation		Photos:
Condition (leaks, etc.)	X			All equipment appears clean and leak free.		
Initial Cleaning (Mud, Seeds)	X					
Other						
Waste Management	OK	NC	NA	Comments & Mitigation		Photos:
Sanitary Facilities	X			Porta potty on site.		
Solid Waste & Recycling	X			Garbage on site.		
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			Japanese Knotweed, Himalayan balsam, Himalayan blackberry. Being monitored by Aquaterra environmental		
Other						
General Observations & Comments (Wildlife, New Sensitive Features, etc.):						Photos:
One doe and fawn spotted outside construction zone they appear to live in this area, no Western toads or any other amphibians discovered during a thorough sweep of the work zone. No culturally significant finds today.						
Other Comments:						Photos:
The rock truck needed repair and the day ended early.						

Natural Resource Department: Daily Environmental Monitoring Report

Upcoming Construction Events:

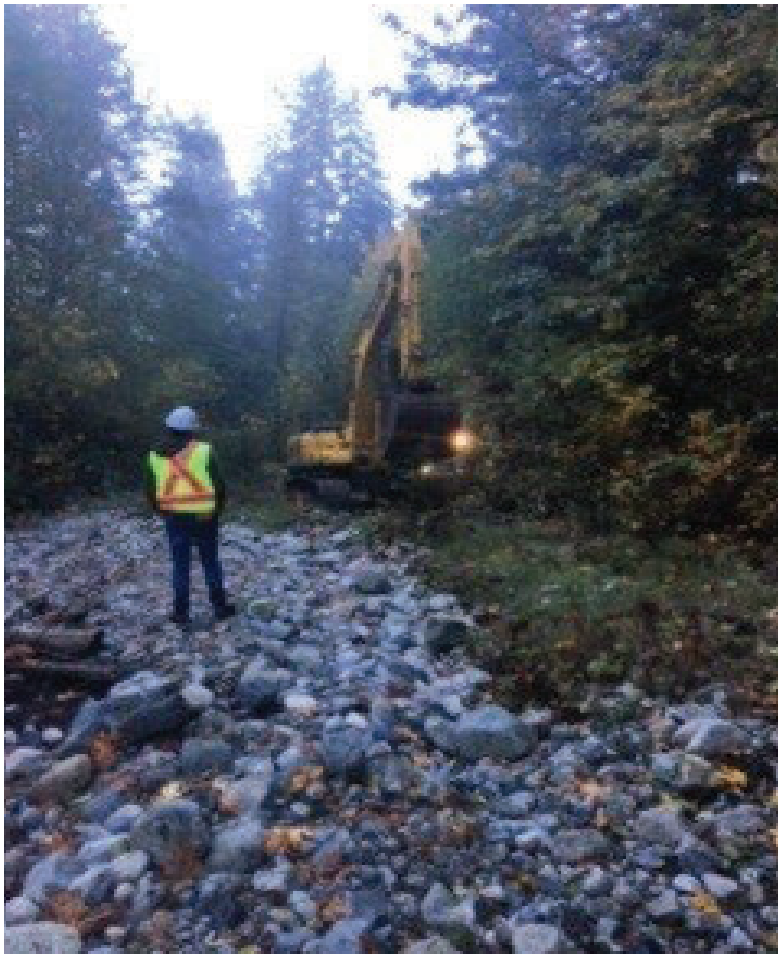
Continue to remove sediment and bedload from Eng creek.

Incident Report Required?

Yes ☐

No ☒

Figure 1 Beginning work in Eng creek channel.



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Figure 2 Installing temporary culvert at Hartley Rd. entrance to lay down.





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Report Number: 006		Location (Or Closest Address):			
Date:10/15/2023	Time: 8am-1:30pm	Sylvester rd x Hartley rd at North end of Allan Lake.			
Monitor Name: Tina Pederson		Signature:			
Meetings: Morning Tailgate/safety at 730					
Meeting Participants: n/a					
Contractor(s) On Site: Mission Contractors Ltd A.E LFN		Name of Construction Representative Present: Taylor (Inspector AE) Jon (supervisor MC) Tina (LFN)			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Cloud in the morning with sunny breaks in the afternoon ~18°					
Ground Conditions: Dry ☐ x Wet ☐ Saturated ☐					
Completed Construction Activities (Since Last Visit): Bedload and sediment removal on the upper channel of Eng creek ~6 loads of material transported off site. Prepping stream bank for riprap/bank stabilization to be done next week.					
Construction Activities: Remainder of bedload removed from upper reach of Eng creek (East of Sylvester Rd. infrastructure. Continued loading of bedload/sediment off site until ~12:30pm.			Photos:		
Construction Equipment Being Used: Komatsu 360, Volvo haul truck (rental), Komatsu PC200, Dump truck x 2			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				Creek is dry	

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing	x			Continue to check and repair as needed.	
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				
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.): Continued to observe 30m area of ‘probable” culturally significant find, no new finds inside the work zone of Eng creek. Doe and Fawn spotted inside channel ~150m East of MoTi infrastructure on Eng creek. The were headed N/E away from the work zone.					Photos:
Other Comments: LFN Consultant Rick McKamey visited Eng Creek site today for a thorough walk through of the work zone and Eng creek location.					Photos:
Upcoming Construction Events: Haul in riprap starting bank stabilization, haul out bedload/sediment from Hartley Rd. stockpile.					

Natural Resource Department: Daily Environmental Monitoring Report

Incident Report Required?	Yes ☐	No ☒
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Figure 1 Fawn on bank of Eng Creek outside active work zone.



Figure 2 Doe on bank of Eng creek outside active work zone.



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Figure 3 Stockpile Eng creek laydown/Hartley rd.



Figure 4 Looking down stream at banks prepped for riprap on Monday.





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Report Number: 002		Location (Or Closest Address):			
Date: 2023-10-19	Time: 0800-1500	Eng Creek – Sylvester Rd, Hatzic Prairie			
Monitor Name: Jason Thompson, Environmental & Cultural Monitor		Signature:			
Meetings:					
Meeting Participants:					
Contractor(s) On Site: Mission Contractors A&E Leq'á:mel LNR		Name of Construction Representative Present:			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 15°/11°; 5KM Wind; Heavy rain/atmospheric river advisory; No surface flow in-stream at the start of today's work					
Ground Conditions: Dry ☐ Wet ☒ Saturated ☐					
Completed Construction Activities (Since Last Visit): <i>Load-out and transport of bedload material; Placement of rip-rap along upstream banks; Site prep for in-stream works between Sylvester Rd & Hartley Rd bridges</i>					
Construction Activities: <i>Cont'd offsite bedload hauling; Cont'd armoring in lower portion above Sylvester Rd bridge</i>			Photos:		
Construction Equipment Being Used: <i>Three excavators (360, 200, Mini) and one A30F rock truck</i>			Photos:		
Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)					
Boundary Flagging	OK	NC	NA	Comments & Mitigation	Photos:
General Construction					
Riparian Zone(s)					
Env. Sensitive Features					
Other					
Water Quality	OK	NC	NA	Comments & Mitigation	Photos:
Turbidity			X		
Temperature			X		
DO			X		
pH			X		
Conductivity			X		
Other			X	Stream became fully wetted at approximately 1330 Hrs	

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[illegible]

Natural Resource Department:
Daily Environmental Monitoring Report

PHOTO LOG – PYE CREEK 2023-10-19

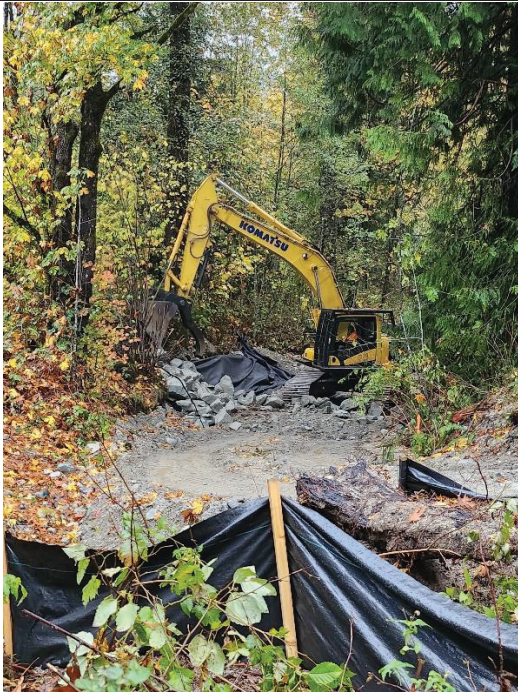


Figure 1 - First rip-rap placement of the day



Figure 2 - Finishing of first rip-rap placement



Figure 3 - Excavating bedload to creek level above Sylvester Rd Bridge

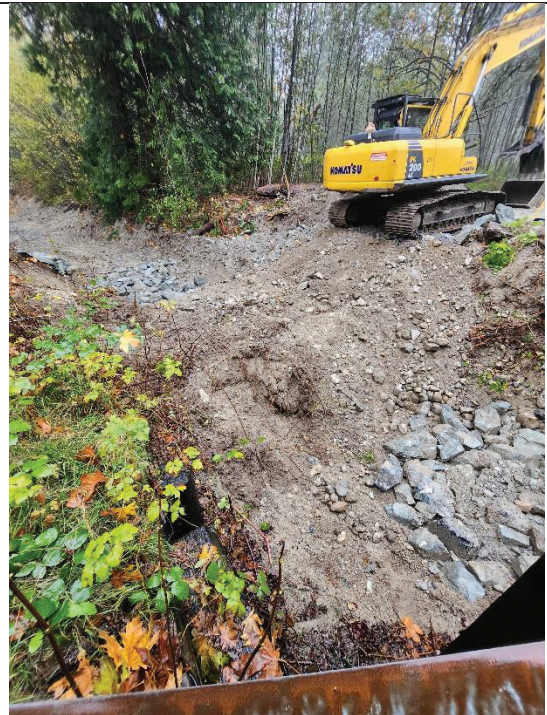


Figure 4 - Rip-rap placement and bedload removal

Natural Resource Department:
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PHOTO LOG – PYE CREEK 2023-10-19



Figure 5 - Instream work area becoming wetted



Figure 6 - Poor visibility preventing rip-rap placement

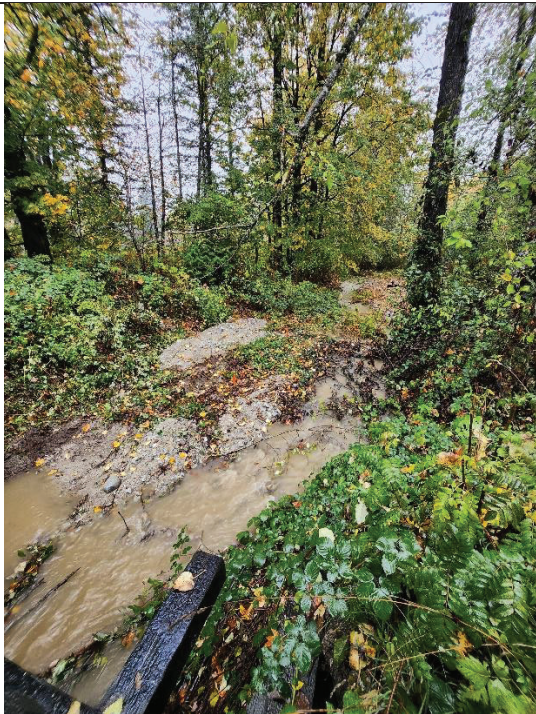


Figure 7 - Instream flow below Sylvester Rd Bridge

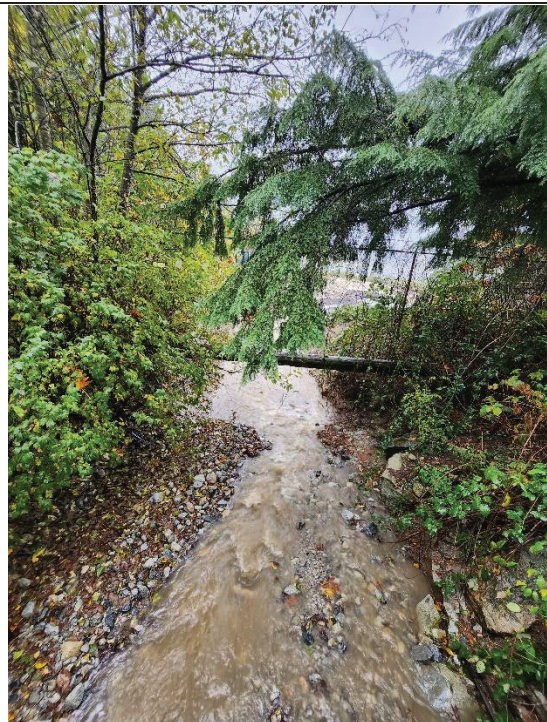


Figure 8 - Wetted outflow into Allan Lake



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Report Number: 003		Location (Or Closest Address):			
Date: 2023-10-20	Time: 0745-1145	Eng Creek – Sylvester Rd, Hatzic Prairie			
Monitor Name: Jason Thompson, Environmental & Cultural Monitor		Signature:			
Meetings:					
Meeting Participants:					
Contractor(s) On Site: Mission Contractors A&E Leq'á:mel LNR AquaTerra		Name of Construction Representative Present:			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 13°/11°; 5KM Wind; Mostly cloud w/low laying fog; No surface flow in-stream at the start of today's work but shallow pooled water from previous day's rainfall visible above Sylvester Rd Bridge only					
Ground Conditions: Dry ☐ Wet ☒ Saturated ☐					
Completed Construction Activities (Since Last Visit): Cont'd offsite bedload hauling; Cont'd armoring in lower portion above Sylvester Rd bridge, armoring was halted due to sudden instream flow causing poor visibility of rip-rap placement					
Construction Activities: Cont'd offsite bedload hauling; Cont'd armoring in lower portion above Sylvester Rd bridge			Photos:		
Construction Equipment Being Used: Three excavators (360, 200, Mini) and one A30F rock 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			X		
pH			X		
Conductivity			X		
Other			X	No visible surface flows during today's work	

**Natural Resource Department:
Daily Environmental Monitoring Report**

Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing	X			Appeared to be installed adequately and working	
Bank Stabilization	X			No concerns on this day	
Soil Stockpiles	X			No concerns of bedload stockpiles	
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/readily available	
Fuel Storage	X			No concerns of fuel storage	
Other					
Equipment	OK	NC	NA	Comments & Mitigation	Photos:
Condition (leaks, etc.)	X			Machines appeared to be leak-free	
Initial Cleaning (Mud, Seeds)	X			Muddy from work, but machines did not leave site	
Other					
Waste Management	OK	NC	NA	Comments & Mitigation	Photos:
Sanitary Facilities	X			Porty-potty onsite and maintained	
Solid Waste & Recycling	X			No visible trash within/around work site	
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			Crews flagged Knotweed & kept distance	
Other					
General Observations & Comments (Wildlife, New Sensitive Features, etc.): During this site visit, this writer observed no visible concerns regarding today's work: - No visible oil/fuel leaks along access road or work areas during today's site visit - Stream was visibly dry on the surface with the exception of pooled/standing water that remained from yesterday's downpour; work was able to commence - Site crew ran out of rip-rap to finish armoring NE bank above Sylvester Rd Bridge; instream work stopped for the remainder of the day and crews continued to load bedload for hauling off-site for remainder of the morning					Photos:
Other Comments: 					Photos:
Upcoming Construction Events: Crew indicated finishing the remainder of the armoring above Sylvester Rd Bridge on Monday when more rip-rap arrives, as well as beginning stages of in-stream bedload removal between Sylvester Rd and Hartley Rd bridges.					
Incident Report Required? Yes ☐ No ☐					

Natural Resource Department:
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PHOTO LOG – PYE CREEK 2023-10-20



Figure 1 - Standing water with armor placement at creek bottom



Figure 2 - Photo showing disconnection of water to below Sylvester Rd Bridge



Figure 3 - Geo Fabric & rip-rap placement on NW bank above Sylvester Rd



Figure 4 - Final armoring of NW bank

Natural Resource Department:
Daily Environmental Monitoring Report

PHOTO LOG – PYE CREEK 2023-10-20



Figure 5 - Initial Geo Fabric/Rip-rap placement on NE bank



Figure 6 - Last of armoring before site ran out of rip-rap

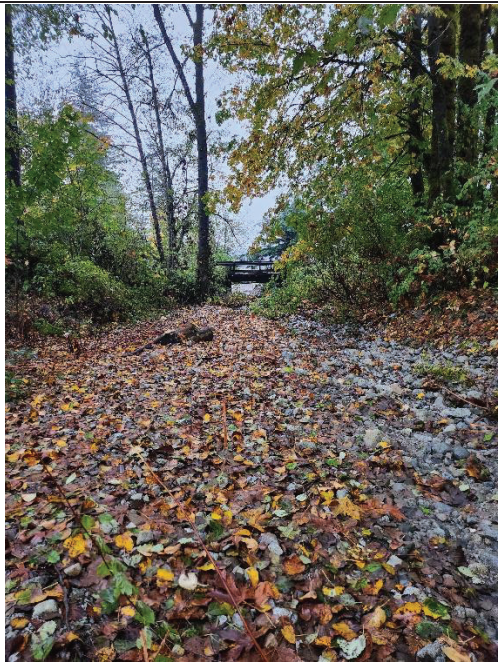


Figure 7 - Eng Creek unwetted surface below Sylvester Rd

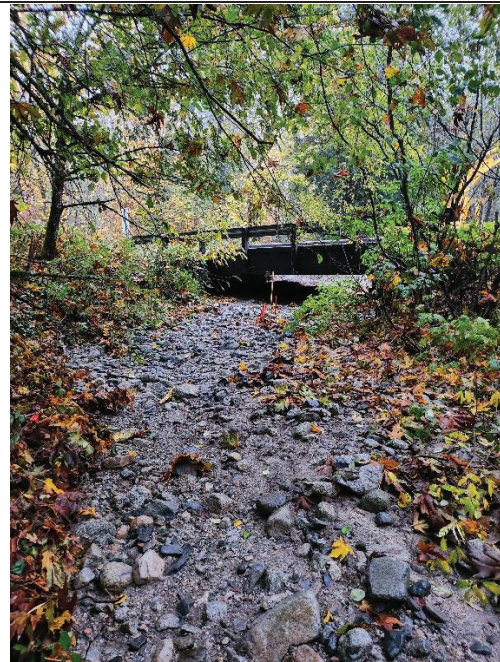


Figure 8 - Eng Creek unwetted surface above Hartley Rd



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Natural Resource Department:
Daily Environmental Monitoring Report

Report Number: 001		Location (Or Closest Address):	
Date: 2023-10-30	Time: 0720-1500	McNab Creek – Sylvester Rd, Hatzic Prairie	
Monitor Name: Jason Thompson, Environmental & Cultural Monitor Erik Still, Environmental Monitor/Guardian		Signature:	
Meetings:			
Meeting Participants:			
Contractor(s) On Site: Mission Contractors A&E Leq'a:mel LNR AquaTerra		Name of Construction Representative Present:	
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 15°/-1°; 10KM Wind; Clear skies w/sunshine; No surface flow in-stream at the start of today's work; 77% Humidity; Dry/Icy Conditions			
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐			
Completed Construction Activities (Since Last Visit): <i>Offsite bedload hauling; Geo-Fabric & rip-rap placement along upper and lower eastern bank</i>			
Construction Activities: <i>Cont'd offsite bedload hauling; Geo-Fabric & rip-rap placement along upper and lower eastern bank</i>			Photos:
Construction Equipment Being Used: <i>Two excavators (360, 200) and one A30F rock truck</i>			Photos:
Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)			
Boundary Flagging	OK	NC	NA
General Construction	X		
Riparian Zone(s)	X		
Env. Sensitive Features	X		
Other			
Water Quality	OK	NC	NA
Turbidity			X
Temperature			X
DO			X
pH			X
Conductivity			X
Other			X
			No visible surface flows during today's work

Natural Resource Department: Daily Environmental Monitoring Report

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PHOTO LOG – MCNAB CREEK 2023-10-30



Figure 1 – Eastern bank of upper reach with Geo-Fabric/Armor

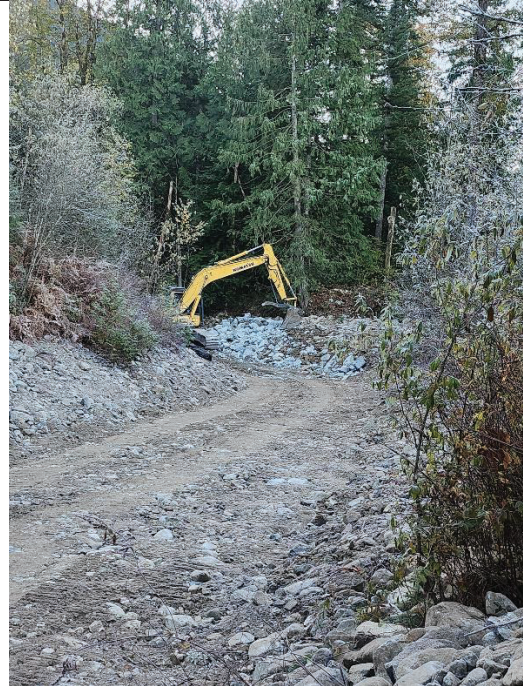


Figure 2 - Eastern bank of upper reach w/Geo-Fabric/Armor
cont'd

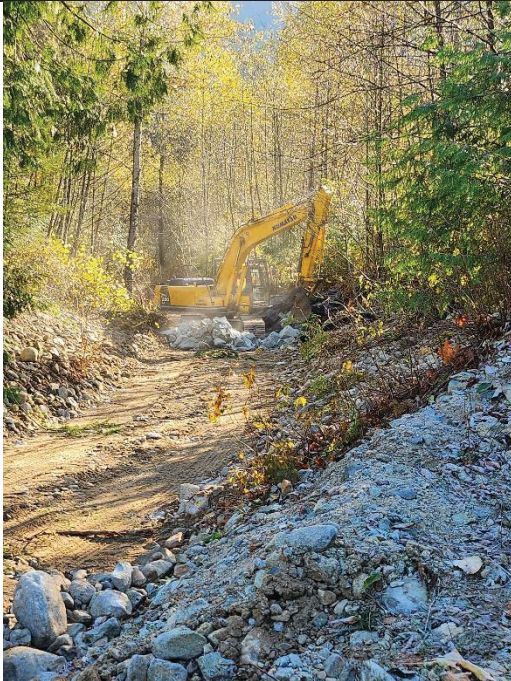


Figure 3 - Eastern bank of lower reach with Geo-Fabric/Armor

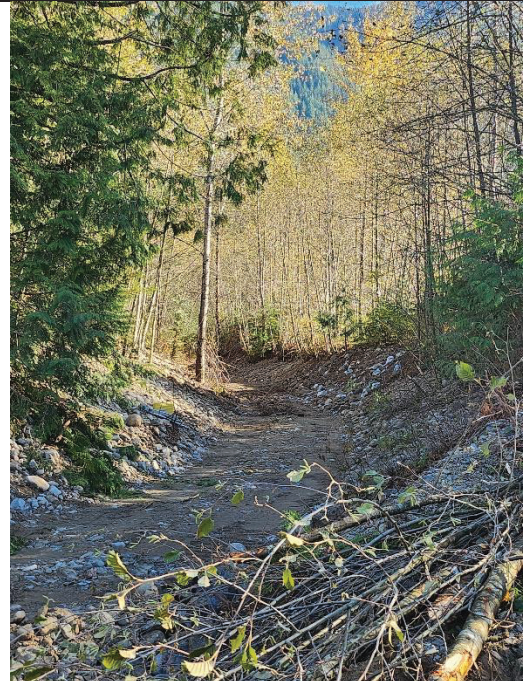


Figure 4 - Eastern bank of lower reach with Geo-
Fabric/Armor cont'd

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Natural Resource Department:
Daily Environmental Monitoring Report

Report Number: 001		Location (Or Closest Address):	
Date: 2023-10-30	Time: 0720-1500	McNab Creek – Sylvester Rd, Hatzic Prairie	
Monitor Name: Jason Thompson, Environmental & Cultural Monitor Erik Still, Environmental Monitor/Guardian		Signature:	
Meetings:			
Meeting Participants:			
Contractor(s) On Site: Mission Contractors A&E Leq'a:mel LNR AquaTerra		Name of Construction Representative Present:	
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 15°/-1°; 10KM Wind; Clear skies w/sunshine; No surface flow in-stream at the start of today's work; 77% Humidity; Dry/Icy Conditions			
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐			
Completed Construction Activities (Since Last Visit): <i>Offsite bedload hauling; Geo-Fabric & rip-rap placement along upper and lower eastern bank</i>			
Construction Activities: <i>Cont'd offsite bedload hauling; Geo-Fabric & rip-rap placement along upper and lower eastern bank</i>			Photos:
Construction Equipment Being Used: <i>Two excavators (360, 200) and one A30F rock truck</i>			Photos:
Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)			
Boundary Flagging	OK	NC	NA
General Construction	X		
Riparian Zone(s)	X		
Env. Sensitive Features	X		
Other			
Water Quality	OK	NC	NA
Turbidity			X
Temperature			X
DO			X
pH			X
Conductivity			X
Other			X
			No visible surface flows during today's work

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PHOTO LOG – MCNAB CREEK 2023-10-30



Figure 1 – Eastern bank of upper reach with Geo-Fabric/Armor

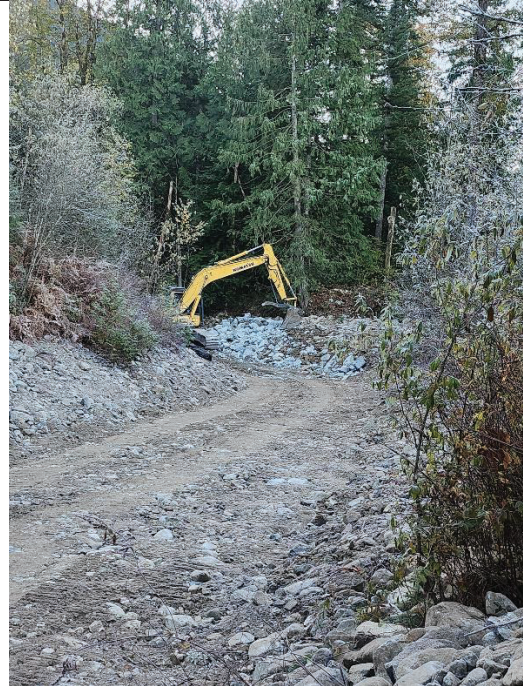


Figure 2 - Eastern bank of upper reach w/Geo-Fabric/Armor
cont'd

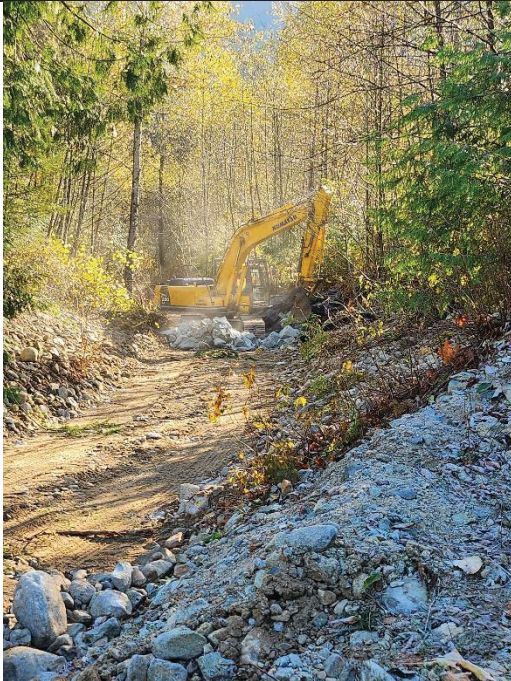


Figure 3 - Eastern bank of lower reach with Geo-Fabric/Armor

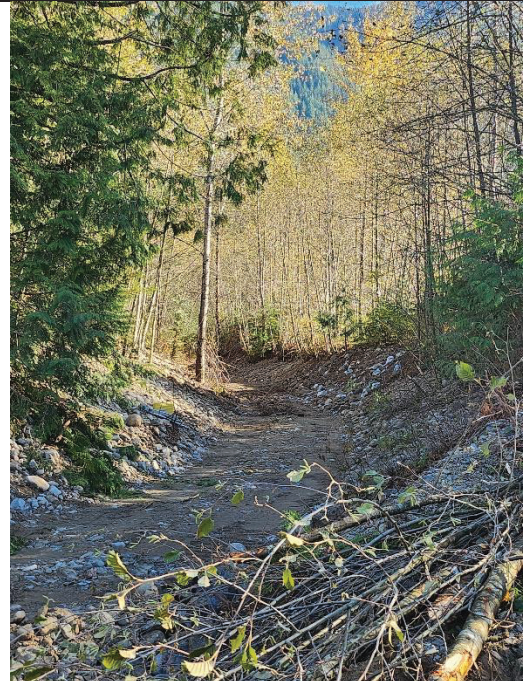


Figure 4 - Eastern bank of lower reach with Geo-
Fabric/Armor cont'd

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Natural Resource Department:
Daily Environmental Monitoring Report

Report Number: 002		Location (Or Closest Address):			
Date: 2023-10-31	Time: 0720-1500	McNab Creek – Sylvester Rd, Hatzic Prairie			
Monitor Name: Jason Thompson, Environmental & Cultural Monitor Erik Still, Environmental Monitor/Guardian		Signature:			
Meetings:					
Meeting Participants:					
Contractor(s) On Site: Mission Contractors A&E Leq'a:mel LNR		Name of Construction Representative Present:			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 14°/-1°; 10KM Wind; Clear skies w/sunshine; No surface flow in-stream at the start of today's work; 70% Humidity; Dry/Icy Conditions					
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐					
Completed Construction Activities (Since Last Visit): <i>Cont'd offsite bedload hauling; Geo-Fabric & rip-rap placement along upper and lower eastern bank</i>					
Construction Activities: <i>Cont'd offsite bedload hauling; Geo-Fabric & rip-rap placement above culvert upstream; begin downstream work below culvert with initial rip-rap placement</i>			Photos:		
Construction Equipment Being Used: <i>Two excavators (360, 200) and one A30F rock truck</i>			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			X	No visible surface flows during today's work	

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PHOTO LOG – MCNAB CREEK 2023-10-31



Figure 1 – Upstream Geo-Fabric/Armor around culvert



Figure 2 - Upstream Geo-Fabric/Armor around culvert complete



Figure 3 - Downstream culvert side before armor placement



Figure 4 - Downstream culvert side after initial armor placement



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Natural Resource Department:
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Report Number: 002		Location (Or Closest Address):			
Date: 2023-10-31	Time: 0720-1500	McNab Creek – Sylvester Rd, Hatzic Prairie			
Monitor Name: Jason Thompson, Environmental & Cultural Monitor Erik Still, Environmental Monitor/Guardian		Signature:			
Meetings:					
Meeting Participants:					
Contractor(s) On Site: Mission Contractors A&E Leq'a:mel LNR		Name of Construction Representative Present:			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 14°/-1°; 10KM Wind; Clear skies w/sunshine; No surface flow in-stream at the start of today's work; 70% Humidity; Dry/Icy Conditions					
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐					
Completed Construction Activities (Since Last Visit): Cont'd offsite bedload hauling; Geo-Fabric & rip-rap placement along upper and lower eastern bank					
Construction Activities: Cont'd offsite bedload hauling; Geo-Fabric & rip-rap placement above culvert upstream; begin downstream work below culvert with initial rip-rap placement			Photos:		
Construction Equipment Being Used: Two excavators (360, 200) and one A30F rock 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			X		
pH			X		
Conductivity			X		
Other			X	No visible surface flows during today's work	

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PHOTO LOG – MCNAB CREEK 2023-10-31



Figure 1 – Upstream Geo-Fabric/Armor around culvert



Figure 2 - Upstream Geo-Fabric/Armor around culvert complete



Figure 3 - Downstream culvert side before armor placement



Figure 4 - Downstream culvert side after initial armor placement



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Natural Resource Department: Daily Environmental Monitoring Report

Report Number: 003		Location (Or Closest Address):			
Date: 2023-11-01	Time: 0720-1500	McNab Creek – Sylvester Rd, Hatzic Prairie			
Monitor Name: Jason Thompson, Environmental & Cultural Monitor Erik Still, Environmental Monitor/Guardian		Signature:			
Meetings:					
Meeting Participants:					
Contractor(s) On Site: Mission Contractors A&E Leq'á:mel LNR AquaTerra		Name of Construction Representative Present:			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 15°/4°; 10KM Wind; Clear skies w/sunshine; No surface flow in-stream at the start of today's work; 60% Humidity; Dry Conditions					
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐					
Completed Construction Activities (Since Last Visit): <i>Cont'd offsite bedload hauling; Geo-Fabric & rip-rap placement above culvert upstream; begin downstream work below culvert with initial rip-rap placement</i>					
Construction Activities: <i>Cont'd offsite bedload hauling; Geo-Fabric & rip-rap placement above culvert upstream; begin downstream work below culvert with initial rip-rap placement</i>			Photos:		
Construction Equipment Being Used: <i>Two excavators (360, 200) and one A30F rock truck</i>			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			X	No visible surface flows during today's work	

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing			X	No silt fencing onsite; no concerns	
Bank Stabilization	X			No concerns on this day	
Soil Stockpiles	X			No concerns of bedload stockpiles	
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/readily available	
Fuel Storage	X			No concerns of fuel storage	
Other					
Equipment	OK	NC	NA	Comments & Mitigation	Photos:
Condition (leaks, etc.)	X			Machines appeared to be leak-free	
Initial Cleaning (Mud, Seeds)	X			Dirty from work, but machines did not leave site	
Other					
Waste Management	OK	NC	NA	Comments & Mitigation	Photos:
Sanitary Facilities	X			Porty-potty onsite and maintained	
Solid Waste & Recycling	X			No visible trash within/around work site	
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 known/visible locations of knotweed	
Other					
General Observations & Comments (Wildlife, New Sensitive Features, etc.):					Photos:
During this site visit, this writer observed no visible concerns regarding today's work:					
- LFN Monitors conducted wildlife/toad sweep before commencement of today's instream work, channel continues to remain dry/unwetted - No visible oil/fuel leaks along access road or work areas during today's site visit - Stream was visibly dry on the surface for the duration of today's monitor activities					
Other Comments:					Photos:
Upcoming Construction Events:					
McNab in-stream works completed around 1430 Hrs on this day; 200 Excavator was loaded out and moved down to Eng Creek for site clean-up and deficiencies for next work day.					
Incident Report Required?					
Yes ☐ No ☐					

Natural Resource Department:
Daily Environmental Monitoring Report

PHOTO LOG – MCNAB CREEK 2023-11-01

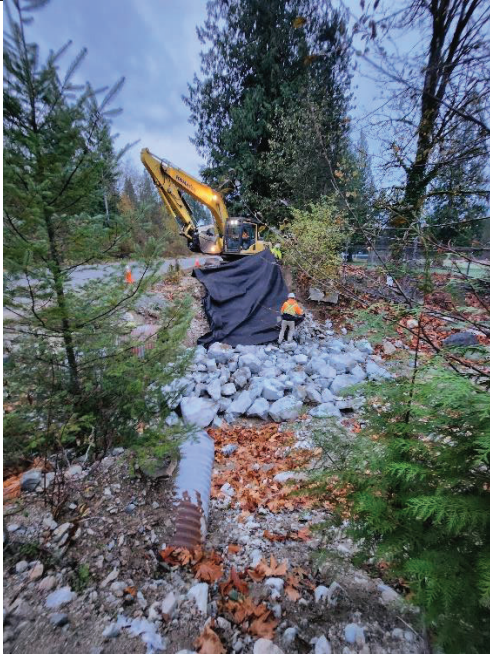


Figure 1 – Downstream Geo-Fabric/Armor east bank around culvert



Figure 2 - Downstream Geo-Fabric/Armor around culvert complete



Figure 3 - Downstream culvert side before armor placement on west bank



Figure 4 - Downstream culvert side after initial armor placement west bank complete



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Natural Resource Department:
Daily Environmental Monitoring Report

Report Number: 004		Location (Or Closest Address):			
Date: 2023-11-02	Time: 0720-1500	Eng Creek & McNab Creek – Sylvester Rd, Hatzic Prairie			
Monitor Name: Jason Thompson, Environmental & Cultural Monitor Erik Still, Environmental Monitor/Guardian		Signature:			
Meetings:					
Meeting Participants:					
Contractor(s) On Site: Mission Contractors A&E Leq'á:mel LNR AquaTerra		Name of Construction Representative Present:			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 13°/6°; 10KM Wind; Rain Showers/Cloudy; No surface flow in-stream at the start of today's work in both locations; 100% Humidity; Wet/Saturated surface conditions					
Ground Conditions: Dry ☐ Wet ☒ Saturated ☒					
Completed Construction Activities (Since Last Visit): <i>Cont'd offsite bedload hauling; Geo-Fabric & rip-rap placement above culvert upstream; begin downstream work below culvert with initial rip-rap placement</i>					
Construction Activities: <i>(1)Complete/Address site-specific deficiencies sediment bumps in Eng and removed some woody debris; Removed/lowered berm material along downstream banks along McNab; (2)Clean-up laydown areas at both locations</i>			Photos:		
Construction Equipment Being Used: <i>Three excavators (360, 200, and Mini) and one A30F rock truck</i>			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			X	No visible surface flows during today's work	

**Natural Resource Department:
Daily Environmental Monitoring Report**

Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing			X	Silt Fencing removed	
Bank Stabilization	X			Excess Eng material placed along banks	
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/readily available	
Fuel Storage	X			No concerns of fuel storage	
Other					
Equipment	OK	NC	NA	Comments & Mitigation	Photos:
Condition (leaks, etc.)	X			Machines appeared to be leak-free	
Initial Cleaning (Mud, Seeds)	X			Ex.200 track cleaned between site movements	
Other					
Waste Management	OK	NC	NA	Comments & Mitigation	Photos:
Sanitary Facilities	X			Porty-potty onsite and maintained	
Solid Waste & Recycling	X			No visible trash within/around work site	
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.): During this site visit, this writer observed no visible concerns regarding today's work: • Wildlife sweep conducted with no concerns • No visible oil/fuel leaks along access road or work areas during today's site visit • Both streams were unwetted at the start of the day; both became wetted approximately 1200hrs					Photos:
Other Comments: Eng – 200 Ex. Entered unwetted creek to remove minor excess sediments; Mini Ex. Entered unwetted upstream to remove minor excess woody debris; Silt fencing, excess brush and creek bedload removed from laydown area in prep to receive topsoil on next day. McNab – Brush and bedload removed from laydown area; Berms adjacent to downstream culverts were taken down slightly and excess gravels used to fill in holes around culvert outflows.					Photos:
Upcoming Construction Events: • Spread out topsoil at Eng Creek laydown area; Truck out unused rip-rap at Eng.					
Incident Report Required? Yes ☐ No ☐					

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Daily Environmental Monitoring Report

PHOTO LOG – ENG CREEK 2023-11-02

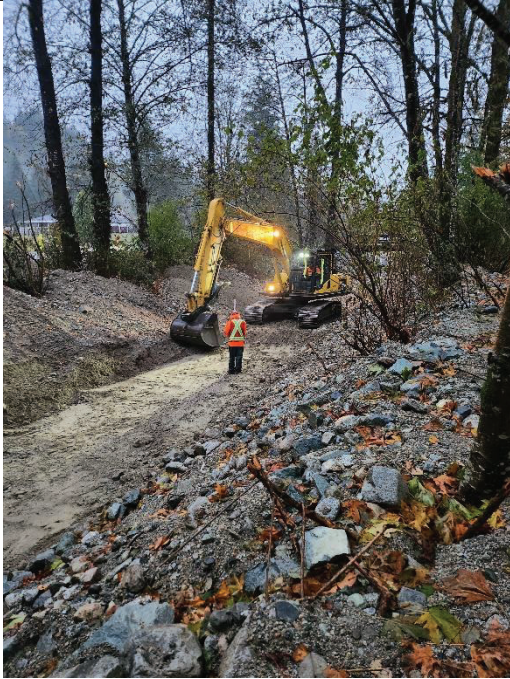


Figure 1 – 200 Ex. Removing minor bedload excess on Eng Creek

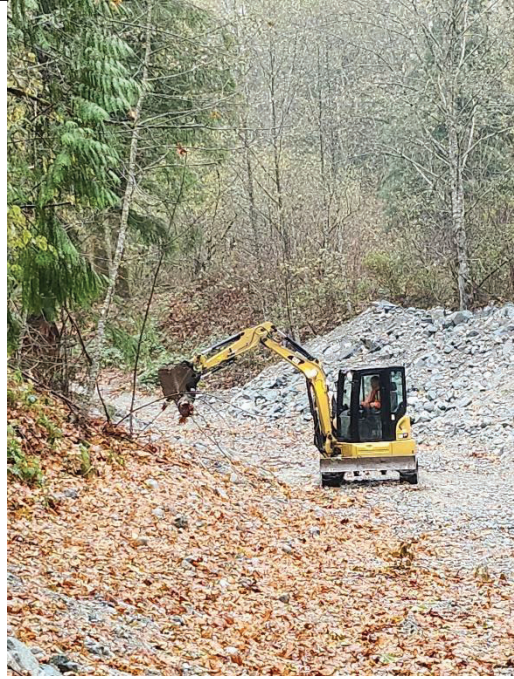


Figure 2 – Mini Ex. Removing woody debris upstream on Eng Creek



Figure 3 – Last of bedload loaded out from Eng Creek laydown yard



Figure 4 – Brush/woody debris loaded out from Eng Creek laydown yard

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PHOTO LOG – MCNAB CREEK 2023-11-02



Figure 5 – 360 Ex. Removing excess material from berm



Figure 6 – 360 Ex. Removing excess material from berm



Figure 7 – Brush/woody debris trucked out from McNab laydown area



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Natural Resource Department: Daily Environmental Monitoring Report

Report Number: 004				Location (Or Closest Address):	
Date: 2023-11-03		Time: 0720-1400		Eng Creek & McNab Creek – Sylvester Rd, Hatzic Prairie	
Monitor Name: Jason Thompson, Environmental & Cultural Monitor Erik Still, Environmental Monitor/Guardian				Signature:	
Meetings:					
Meeting Participants:					
Contractor(s) On Site: Mission Contractors A&E Leq'á:mel LNR AquaTerra				Name of Construction Representative Present:	
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 13°/10°; 3KM Wind; Cloudy w/light rain; No surface flow in-stream at Eng; Surface flow visible at McNab; Wet conditions					
Ground Conditions: Dry ☐ Wet ☒ Saturated ☒					
Completed Construction Activities (Since Last Visit): 1)Complete/Address site-specific deficiencies sediment bumps in Eng and removed some woody debris; Removed/lowered berm material along downstream banks along McNab; (2)Clean-up laydown areas at both locations					
Construction Activities: (1)Remediation of Eng laydown yard with topsoil & seed, removal of culvert & load out of 200 Ex. & rock truck; (2)Remediation of McNab laydown yard flattening of soil/sediment humps throughout gravel yard					Photos:
Construction Equipment Being Used: Two excavators (360, 200) and one A30F rock truck					Photos:
Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)					
Boundary Flagging	OK	NC	NA	Comments & Mitigation	Photos:
General Construction					
Riparian Zone(s)					
Env. Sensitive Features					
Other					
Water Quality	OK	NC	NA	Comments & Mitigation	Photos:
Turbidity					
Temperature					
DO					
pH					
Conductivity					
Other					

**Natural Resource Department:
Daily Environmental Monitoring Report**

Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing					
Bank Stabilization					
Soil Stockpiles					
Drainage & Diversions					
Detention Facilities					
Other					
Fuel & Oil Management	OK	NC	NA	Comments & Mitigation	Photos:
Spill Kits/SPER Plan					
Fuel Storage					
Other					
Equipment	OK	NC	NA	Comments & Mitigation	Photos:
Condition (leaks, etc.)	X			Machines appeared to be leak-free	
Initial Cleaning (Mud, Seeds)	X			Ex.200 track clean prior to loadout	
Other					
Waste Management	OK	NC	NA	Comments & Mitigation	Photos:
Sanitary Facilities	X			Porty-potty onsite and maintained	
Solid Waste & Recycling	X			No visible trash within/around work site	
Special Waste & Hazardous Materials			X		
Other					
Atmosphere	OK	NC	NA	Comments & Mitigation	Photos:
Dust					
Air Quality					
Other					
Vegetation Management	OK	NC	NA	Comments & Mitigation	Photos:
Invasive Plants					
Other					
General Observations & Comments (Wildlife, New Sensitive Features, etc.): During this site visit, this writer observed no visible concerns regarding today's work: - Wildlife sweep conducted with no concerns; One toad was spotted on the road approximately 200m south of McNab creek - No visible oil/fuel leaks along access road or work areas during site clean-ups and remediation works					Photos:
Other Comments: A&E, AquaTerra, Mission Constructors and LFN representatives conducted final walk through of Eng & McNab creeks with no remaining concerns.					Photos:
Upcoming Construction Events: 360 Ex. Will be loaded out Monday morning.					
Incident Report Required? Yes ☐ No ☐					

Natural Resource Department:
Daily Environmental Monitoring Report

PHOTO LOG – ENG CREEK 2023-11-03



Figure 1 – Topsoil delivery at Eng laydown area



Figure 2 – Topsoil spreading



Figure 3 – Native blend seeding at Eng laydown area



Figure 4 – Removal of temporary culvert

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PHOTO LOG – MCNAB CREEK 2023-11-03



Figure 5 – 360 Ex. Removing leveling excess soil/gravel at McNab laydown area



Figure 6 Final look at McNab Creek



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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:		Location (Or Closest Address): Sylvester Hartley			
Date: October 17, 2023	Time: 7:30-3:45 (Melissa/Erik)				
Monitor Name: Melissa Friesen (this writer), Tina Pederson, Erik Still		Signature:			
Meetings: Safety meeting 730					
Meeting Participants: Jon (supervisor MC) Chris, Jim (operator MC) Erik, Tina, this writer (LFN) .					
Contractor(s) On Site: Mission contractors LTD LFN AE		Name of Construction Representative Present: AE (Taylor) MC (Jon)			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.):					
Ground Conditions: Dry ☐ Wet ☒ Saturated ☐					
Completed Construction Activities (Since Last Visit): Completed removing bedload/sediment from the upper portion of Eng creek (East of the MoTi infrastructure). Riprap placed along the South bank of Eng creek, keyed in with finer stream material. Two Dump trucks running today, continuing to load out stockpile of bedload material. Continued to remove the bed load from the stockpile using two trucks.					
Construction Activities: Two excavators working today, one in Eng creek, continuing to key in the riprap placed along the South bank and the other loading the haul truck with riprap and 4 dump trucks with bedload being hauled off site. Two dump trucks hauling in riprap.			Photos:		
Construction Equipment Being Used: Komatsu Excavator pc 200 Lc, Komatsu excavator 360 pc Lc, Volvo rock truck A30F.			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		

Natural Resource Department: Daily Environmental Monitoring Report

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				
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			Knotweed, Himalayan Balsom	
Other					
General Observations & Comments (Wildlife, New Sensitive Features, etc.):					Photos:
Adult Western Toad spotted ~150m N/E of the Work zone, located well outside of the work zone salvage was not necessary. The site inspector and construction supervisor have been notified, LFN are continuing regular sweeps of the work zone and parameter. No other amphibians or wildlife spotted today, no culturally significant finds.					
Other Comments:					Photos:

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Upcoming Construction Events:		
Incident Report Required?	Yes ☐	No ☒

Image 1 – South bank stabilization and riprap installation.



Image 2 – Western Toad



Image 3 – Loading and tipping point Hartley rd.

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Image 4 – Silt isolation fencing.

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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:		Location (Or Closest Address):			
Date: 10/23/2023	7:30-3:30	Sylvester Rd x Hartley Rd (North end of Allan Lake)			
Monitor Name: Melissa Friesen, Erik Still		Signature:			
Meetings: 7:30 meeting /Tailgate					
Meeting Participants: Jon (supervisor MC), Jim (operator MC), Chris (operator MC), Tina (LFN), Erik Still (LFN) Melissa Friesen (LFN)					
Contractor(s) On Site: Mission Contractors Ltd A.E LFN		Name of Construction Representative Present: Taylor (Inspector A.E) Jon (supervisor MC) Tina (LFN)			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 10 degrees, light rain					
Ground Conditions: Dry ☐ Wet ☒ Saturated ☐					
Completed Construction Activities (Since Last Visit): Continued to remove sediment/bedload off site w/ tandem bin truck. Finished the Riprap bank stabilization along the banks on the North/East side of creek.					
Construction Activities: Started bedload removal on South/West side of Sylvester Rd. Eng creek. Small amounts of vegetation removed along the banks after toad sweep completed.			Photos:		
Construction Equipment Being Used: Komatsu 360, Komatsu 200 (Bedload removal), Tandem bin 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			X		
pH			X		
Conductivity			X		
Other			x	Eng creek is dry.	

Natural Resource Department: Daily Environmental Monitoring Report

[illegible]

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Upcoming Construction Events:

Continue to remove bedload from creek and start removing the material under the bridges on the North and south end of creek.

Incident Report Required?

Yes ☐

No ☒

Jim (operator) starting bedload removal west side of Sylvester Rd



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Reinforcing bank, prepping the rip wrap placement.





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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:		Location (Or Closest Address): Sylvester Rd x Hartley Rd (North end of Allan Lake)			
Date: 10/24/2023	Time: 7:30- 4:15				
Monitor Name: Melissa Friesen, Erik Still		Signature:			
Meetings: 7:30 Safety meeting/ tailgate					
Meeting Participants: Jon (supervisor MC), Jim (operator MC), Chris (operator MC), Tina (LFN), Erik Still (LFN), Melissa Friesen (LFN)					
Contractor(s) On Site: Mission Contractors Ltd A.E LFN		Name of Construction Representative Present: Taylor (inspector AE) Jon (Supervisor MC) Tina (LFN)			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 7 Degrees, Heavy rain in the afternoon.					
Ground Conditions: Dry ☐ Wet ☒ Saturated ☐					
Completed Construction Activities (Since Last Visit): Removed bedload to the bridges on Sylvester Rd and Hartley Rd. excavator built-up banks to prep for riprap.					
Construction Activities: Mini excavator removing bed load from under the bridge. Riprap added to bank on West side of creek bank.			Photos:		
Construction Equipment Being Used: Mini excavator (Takeuchi), Komatsu 360 and 200, Volvo haul truck (rental) 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			X		
pH			X		
Conductivity			X		
Other				Eng creek is dry	

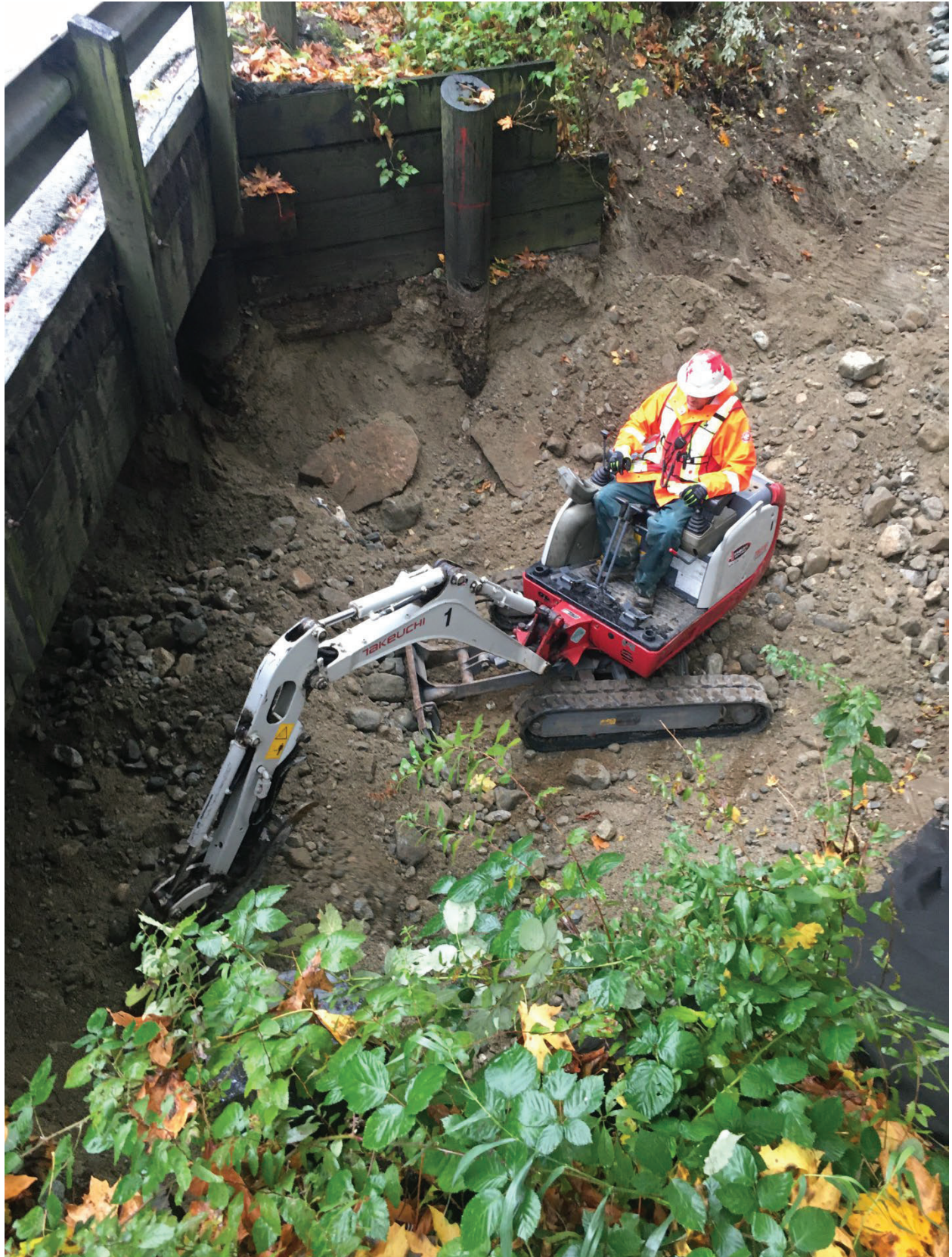
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Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing	X				
Bank Stabilization	X				
Soil Stockpiles	x				
Drainage & Diversions			X		
Detention Facilities			X		
Other					
Fuel & Oil Management	OK	NC	NA	Comments & Mitigation	Photos:
Spill Kits/SPER Plan	X			Spill kits in machines and two located onsite	
Fuel Storage	x			Fuel stored in bed of work trucks	
Other					
Equipment	OK	NC	NA	Comments & Mitigation	Photos:
Condition (leaks, etc.)	X				
Initial Cleaning (Mud, Seeds)	x			Machines are clean and maintained	
Other					
Waste Management	OK	NC	NA	Comments & Mitigation	Photos:
Sanitary Facilities	x			Jimmy Jon on site	
Solid Waste & Recycling	X			Garbage receptacle remains onsite beside bathroom	
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			Himalayan Black berry, Himalayan balsam, Japanese Knotweed on site	
Other					
General Observations & Comments (Wildlife, New Sensitive Features, etc.): No wildlife onsite. Sweep of work zone for amphibians and wildlife no discoveries. No culturally significant finds today.					Photos:
Other Comments:					Photos:
Upcoming Construction Events: Continue to remove the bedload and stabilize banks with riprap.					
Incident Report Required? Yes ☐ No ☒					

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Bed-load removal under bridge



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Rip-rap along bank of creek





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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:		Location (Or Closest Address): Sylvester Rd and Hartley Rd (North end of Allan Lake)			
Date: 10/25/2023	Time: 7:30-4				
Monitor Name: Melissa Friesen, Erik Still		Signature:			
Meetings: &:30 Safety/ tailgate meeting					
Meeting Participants: Jon (supervisor MC), Jim (operator MC), Chris (operator MC), Tina (LFN). Erik (LFN) Melissa (LFN)					
Contractor(s) On Site: Mission Contractors Ltd A.E LFN		Name of Construction Representative Present: Taylor (Inspector A.E) Jon (Supervisor MC)			
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Cloudy in the am, Sun/ partly cloudy in the afternoon 6 degrees Celsius					
Ground Conditions: Dry ☐ Wet ☒ Saturated ☐					
Completed Construction Activities (Since Last Visit): Removal of bedload and placing rip-wrap along the west side of creek.					
Construction Activities: Continued to remove bedload under the bridge on Hartley Rd. Removing material off site with a single truck.			Photos:		
Construction Equipment Being Used: : Mini excavator (Takeuchi), Komatsu 360 and 200, Volvo haul truck (rental) 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			X		
pH			X		
Conductivity			X		
Other				Eng Creek is dry.	

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Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing	x			Remains in work area and surrounding materials	
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			No leaks/ well maintained	
Initial Cleaning (Mud, Seeds)	x			Machines have been kept clean	
Other					
Waste Management	OK	NC	NA	Comments & Mitigation	Photos:
Sanitary Facilities	x			Porta Potty remains on-site	
Solid Waste & Recycling	x			Garbage receptacle provided beside bathroom	
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.): Work zone amphibian and wildlife sweeps continue, no wildlife or amphibians have been discovered today. No culturally significant finds today.					Photos:
Other Comments: 					Photos:
Upcoming Construction Events: Placing Rip-rap along banks. Continue to remove bedload material with dump truck (truck and pony).					
Incident Report Required? Yes ☐ No ☒					

Natural Resource Department: Daily Environmental Monitoring Report

Removal of bed-load under Hartley bridge

