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REPORT

Ministry of Environment and Parks

Hatzic Emergency Works Program Post Construction Report for Herford Creek - Sites S-CR-34/37



MAY 2025

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1 INTRODUCTION

1.1 Purpose of Report

This report documents the post-construction activities for flood recoveryworks at North and South Herford Creeks (S-CR-37 and 34), located in the Hatzic Valley, British Columbia. The works involved sediment removal, bank protection and stabilization as part of the ongoing recovery from the November 2021 Atmospheric River Event (ARE).

Associated Engineering (Associated) was retained by the Ministry of Environment and Parks (ENV) to lead the technical aspects of this project.

Note that the works are under the jurisdiction of Crown land and private property.

1.2 Background

The November 2021 ARE caused significant debris mobilization, bank failures, and sediment deposition across both creeks, resulting in flood risks, reduced channel capacity, and infrastructure damage, particularly near Sylvester Road. The project was initiated to restore the hydraulic capacity of these creeks and to prevent future flooding events.

Key observations included:

- North Herford Creek (S-CR-37): Sediment and debris deposition reduced flow capacity at the Sylvester Road culvert, with bank failures observed at various locations.
- South Herford Creek (S-CR-34): Extensive sediment deposition, restricted culvert capacity, and bank failures downstream of Sylvester Road were significant concerns.

ENV/PwC (Price Waterhouse Coopers) commissioned QP assessments and tech memos (see **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. This work is intended to restore the area to “pre-flood conditions.”

1.3 Location

The project sites are located in the Hatzic Valley, in the southern lowland portion of the Fraser Valley Regional District (FVRD), east of Mission, British Columbia. Two site locations were included for this contract, S-CR 34 and S-CR 37.

Site ID: S-CR-34
Location: 49.208806°, -122.230723°
Site Description: South Herford Creek, Hatzic, BC
Local Government Agency: Fraser Valley Regional District (FVRD)
Waterbody: South Herford Creek

Site ID: S-CR-37
Location: 49.209358°, -122.231182°
Site Description: North Herford Creek, Hatzic, BC
Local Government Agency: Fraser Valley Regional District (FVRD)
Waterbody: North Herford Creek

1.4 Scope

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

- Sediment and debris removal;
- Bank repairs at select locations within the watercourses; and
- Bank Protection.

Sediment removal was conducted along approximately 560 m of North Herford Creek and 280 m of South Herford Creek. Refer to **Figure 1-1** for a site overview. The red outline indicates the sediment removal area for North Herford Creek, while the green outline represents the sediment removal area for South Herford Creek.

Figure 1-1 Herford Creeks Overview



1.5 Project Team

The Associated project team included:

- Program Manager – Paul Hague, RPF
- Senior Technical Advisor – Andrew Wiens, P.Eng.
- Engineer of Record – Lisbeth Medina, P.Eng. (Concept Design and IFT documents)
- Engineer of Record – Andrew Wiens, P.Eng. (IFC drawings and record documents)
- Project Coordinator – Dianna Christopoulos
- Contract Administrator – Brad Winchell, P.Eng.
- Site Inspector – Joon Kwak, EIT

Subconsultant support was provided by Leq'a':mel First Nation, from Deroche, B.C. for Archaeological/Cultural Resource Management with the following staff:

- Rick McKamey
- Tina Pederson

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

- Adam Wodzianek
- Jon Murphy
- Scott Roberge

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

- Thyren Garde-Jacobs, Flood Debris Management Secretariat, ENV

2 DESIGN

2.1 Site Condition

Prior to the commencement of work, North and South Herford Creeks exhibited signs of reduced hydraulic capacity due to sediment deposition and bank failures. The aftermath of the November 2021 ARE resulted in substantial sediment and debris accumulation within both creeks, particularly around the Sylvester Road culverts. This blockage contributed to flooding and the formation of standing water in adjacent drainage ditches.

At North Herford Creek, sediment deposition within and downstream of the culvert has significantly lowered the flow capacity, increasing the risk of flooding. Bank failures upstream of the culvert has been observed, likely exacerbated by high-flow events. The middle reach of the creek is characterized by steep, sheer banks and a dry channel with large cobbles and boulders. Further upstream, the creek transitions into a densely forested area where deep pools provide overwintering habitat for salmonids.

Similarly, South Herford Creek has experienced extensive sediment accumulation, particularly downstream of the Sylvester Road culvert, where thick vegetation and deposited materials have filled approximately 90% of the culvert's downstream end. This has created stagnant pools in the west roadside drainage ditch. Bank failures has been noted both upstream and downstream of the culvert. The middle reach of the creek has deeply incised banks and large boulders, with evidence of scour and erosion. The upper reach, densely vegetated with mature conifers, contains small, shallow pools that provide limited rearing habitat due to low summer flow conditions.

In response to these conditions, the low-flow channel will be realigned to restore the channel's capacity and reduce erosion risks. Sediment removal and bank protection measures will be implemented to stabilize the banks and improve flow conveyance.

Prior to restoration, both creeks exhibited:

- Significant sediment deposition, reducing flow capacity;
- Bank failures upstream and downstream of culverts at Sylvester Road;
- Restricted culvert capacity due to sediment and debris accumulation;
- Habitat degradation impacting aquatic ecosystems; and
- Safety hazards for nearby infrastructure and residents.

2.2 Conceptual Design

The conceptual design for the S-CR-34 and S-CR-37 sites consisted of sediment removal and bank restoration. The design process incorporated site-specific hydraulic assessments to restore the creek system to its pre-event condition. A Conceptual Design Report outlining the approach, methodology, and findings is provided in **Appendix B**.

2.2.1 Key Design Considerations

- **Hydraulic System Conveyance and Bank Restoration:** The design aimed to re-establish channel capacity by removing accumulated sediment and reinforcing eroded banks to improve flow efficiency and reduce flood risks.
- **10-Year Site-Specific Design Flows:** Hydrological modelling was conducted to assess flow conditions and restore the channel. A sediment bulking factor was included to estimate design flows.

- **Hydraulic Modelling:** One-dimensional hydraulic models were developed for S-CR-35 and 37 to evaluate the capacity of existing and proposed hydraulic structures.
- **Sediment Removal Depth:** The depth of sediment removal was determined based on existing data, aiming to restore the channel to pre-ARE conditions by estimating the volume of deposited sediment.

2.3 Design Objective

The design objective was to restore the site/location/works to pre-flood conditions as nearly as practical. This involved the following:

- Restoring hydraulic capacity to pre-ARE conditions;
- Providing erosion protection using riprap at critical locations; and
- Confirming works met environmental and regulatory requirements.

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.

Monitors were on site to observe and report the reconstruction of the creeks as per Associated Engineering's drawings and field fits as per the design engineer.

The First Nations Cultural monitors did not identify any archaeological finds.

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 Fisheries Act, an authorization is required for any activity that may result in the 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 (Habitat Alteration, Destruction or Disruption) of habitat for fish in North and South Herford Creeks, and an emergency *Fisheries Act* Authorization was issued by DFO on October 27, 2022, for all impacted sites under the Hatzic Emergency Works Program (22-HPAC-01308; Appendix Xi). The authorization was further amended on November 23, 2023, and September 17, 2024, to extend the project completion date and allow dredging in the wet under certain conditions, respectively. The Environmental Approvals are included in **Appendix C.**

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 *Water Sustainability* 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 North and South Herford Creeks was granted by WLRS on July 17, 2024 (2011076; Appendix Xii). An amendment was issued on August 20, 2024, to address an administrative error.

All instream works were to be conducted under the oversight of a Qualified Professional and in accordance with regulatory authorizations and approvals, the North and South Herford Creeks (S-CR-37 and 34) – Bank Protection and Sediment Removal Environmental Management Plan (Associated Environmental, 2024), 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).

AquaTerra Environmental Ltd. (AquaTerra) was the Qualified Professional engaged by the Contractor, Mission Contractors Ltd., to conduct environmental monitoring during construction. AquaTerra prepared a Construction Environmental Management Plan for each of North and South Herford Creeks in July and August 2024, respectively. Fieldwork was completed 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. The archeological permit is included in **Appendix D.**

3.4 Other Approvals

The contractor was responsible for obtaining other permits, including road use permits.

4 CONSTRUCTION

4.1 Contract Award

The RFP package with project drawings and specifications was prepared by Associated and presented to ENV. ENV's procurement group submitted the RFP documents for bids. Bids were collected and evaluated based on pre-determined selection criteria and ranking methodology. Associated is aware that two bidders provided the required bid responses and pricing for evaluation.

The province set the requirements for contractor evaluation. The results of the bid evaluation were reviewed with ENV, and a contractor was selected for award. The contractor was informed of the award and requirements for the agreement were then submitted prior to executing the agreement and issuing a Notice to Proceed. The bid evaluation is included in **Appendix E.** Mission Contractors Ltd. was selected with the highest ranking from the evaluation process.

The contract with Mission Contractors Ltd. was awarded under WK25EPFLOOD0004 – Mission Contractors, Mission, BC (see **Appendix F**).

4.2 Approach to Construction

Activities along North and South Herford Creeks occurred on both private land, for which permission from the landowner was obtained (see **Appendix G**), and crown land. A *Permit over Crown Land* was included in the provincial Change Approval application for instream works and access to the south extent of the project area.

A temporary laydown area was established within private property on the east side of Sylvester Road and the north side of North Herford Creek. This area was used to temporarily stockpile sediment from both North and South Herford Creeks.

The main goals of the project were to remove sediment and increase the capacity of the lower sections of both North and South Herford Creeks. Construction equipment worked from the top of the bank, along both creeks, to:

1. Remove sediment;
2. Restore channel banks;
3. Install bank protection; and
4. Install habitat features.

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 (see **Appendix H**).

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 the Construction Environmental Management Plan including a spill response plan.
- Designed environmental measures for protecting aquatic life, including erosion and sediment control, and managing spills.
- Guided the management of invasive species as required.
- Conducted routine environmental monitoring to verify the success of mitigation measures.
- Kept periodic records of work completed and pertinent information, summarized in a daily monitoring report (see **Appendix H**).

Leq'a:mel First Nation

- Provided cultural and environmental monitors to review the work daily, keeping records and submitting daily reports (see **Appendix H**).

4.4 Changes During Construction

The following design changes were implemented during construction:

4.4.1 Design Modifications (*FM-01, August 1, 2024*)

North Herford Creek

- Adjusted sediment excavation, channel bottom width, and side slopes.
- **STA. 0+000 to 0+640**: Selective sediment removal was directed, with large boulders along bends retained to maintain stability.

South Herford Creek

- Similar sediment excavation and side slope adjustments were made, with a focus on preserving existing boulders and rocks.

Riprap Adjustments

- Removed 50 kg class riprap where existing boulders were larger than specified. Planned for possible size revisions after field review.

Habitat Features

- Suggested additional habitat features such as pools, boulder clusters, and root wads to enhance ecological value.

4.4.2 Riprap Adjustment (*FM-02, August 8, 2024*)

North Herford Creek

- Added 250 kg riprap along two sections:
  - STA. 0+400 to 0+420 (south bank); and
  - STA. 0+540 to 0+555 (north bank).
- Included filter fabric below riprap and adjusted riprap extents in the field to suit conditions.

South Herford Creek

- Retained riprap scope only at the Sylvester Road culvert crossing.

4.4.3 Habitat Additions (*FM-03, August 16, 2024*)

Riffle-Pool Features:

- Proposed at specified stations for both North and South Herford Creeks to enhance fish habitat.

Planting:

- Recommended hydroseeding and planting of 10 pockets of native shrubs above the high-water mark for bank stabilization.

Culvert Works:

- Directed the construction of a boulder riffle weir downstream of the Sylvester Road culvert to stabilize the stream bed.

4.4.4 Habitat Materials Clarification (*FM-04, August 14, 2024*)

- Specified that riffles must be constructed using rounded stone (not angular riprap).
- The Contractor's Environmental Monitor was tasked with identifying suitable materials proportional to the watercourse.

4.4.5 Bank Protection and Missing Design Profile (*FM-05, August 22, 2024*)

South Herford Creek:

- Installed **50 kg** riprap with filter fabric on the right bank, extending downstream of the culvert.

North Herford Creek:

- Addressed a missing design profile and provided channel excavation instructions:
  - Implemented a 1.0% grade downstream of the Sylvester Road culvert; and
  - Constructed a riffle at STA. 0+000 matching an elevation of 8.9 m (existing condition).

4.4.6 Scope Update and Planting Replacement (*FM-06, September 10, 2024*)

- Deleted the planting of native shrubs outlined in FM-03.
- Required the Contractor to submit a site restoration plan as per the CEMP guidelines.
- Revised the scope for North Herford Creek, excluding all work between STA. 0+560 and STA. 0+640 as it now falls outside the construction limits.

4.5 Construction Monitoring

Routine 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.

Key environmental activities included:

- Fish Salvage: the capture and relocation of fish from active work zones prior to instream works, conducted by Leq'á:mel First Nation under the direction of AquaTerra.
- Watercourse Bypass Pumping: diversion of water around active work zones, installed and operated by the Contractor under the oversight of AquaTerra.
- Erosion and Sediment Control: implementation of temporary measures to intercept and manage surface water runoff (e.g. covering slopes and stockpiles, installing sediment traps), as directed by AquaTerra.
- Water Quality Monitoring: routine sampling by AquaTerra during site inspections to ensure compliance with water quality standards for offsite discharge.

Environmental Monitoring Memos were prepared by AquaTerra daily when onsite and submitted to Associated weekly / bi-weekly. In addition, Leq'á:mel provided Daily Environmental Monitoring Reports when onsite.

Refer to the reports located in **Appendix H.**

4.6 Project Completion

A final walkthrough was completed on November 21, 2024, by representatives of Mission Contractors Ltd. and Associated.

Substantial completion of the contract occurred on November 15, 2024, for Mission Contractors Ltd. Certificate of completion was issued on December 13, 2024, and notices were posted to the site in accordance with the BC Builder's Lien Act on December 16, 2024. These documents are included in **Appendix I.**

Construction survey data was provided by Pro-Tech Surveys Ltd. and used to prepare the record drawings. The record drawings are in **Appendix J.** Before and after photos are included in **Appendix K.** The environmental monitoring report is in **Appendix L.**

4.7 Summary of Key Dates

Key project dates are summarized in **Table 4-1.**

Table 4-1 Key Project Dates

	Date
Contract Signed	July 26, 2024
Pre-Construction Meeting	July 24, 2024
Mobilization	August 6, 2024
Final Walkthrough	November 21, 2024

	Date
Certificate of Completion Issued	December 13, 2024
Lien Holdback Release	February 18, 2025

6 FUTURE CONSIDERATIONS

6.1 Operation and Maintenance

The Fraser Valley Regional District should incorporate the record drawings and this completion report into its project records. Some additional operation and maintenance considerations relating to the works are as follows:

- Remediate damaged channel banks and bank protection, and implement bank protection where erosion is observed or anticipated by a qualified professional; and
- Remove sediment and debris from the watercourse as needed.

6.2 Monitoring

The following monitoring procedures should be adopted:

- Perform annual survey to monitor sediment deposition and the resulting channel bed aggradation; and
- Perform visual inspections for channel bank erosion, degradation and potential avulsion locations annually, as well as following severe storms, high water events and debris flow events.

CERTIFICATION PAGE

This report presents our findings regarding the Ministry of Environment and Parks Hatzic Emergency Works Program Post Construction Report for Herford Creek - Sites S-CR-34/37.

Respectfully submitted,

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

Prepared by:

Joon Kwak

Joon Kwak, EIT
Water Resources Engineer-in-Training

Reviewed by:



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

JK/AW/nhd

APPENDIX A – AIC SITE ASSESSMENT TECH MEMO

APPENDIX B – CONCEPT DESIGN REPORT

APPENDIX C – ENVIRONMENTAL APPROVAL DOCUMENTS

APPENDIX D – ARCHEOLOGICAL PERMITS

APPENDIX E – BID EVALUATION

APPENDIX F – CONTRACT DOCUMENT

APPENDIX G – ACCESS AGREEMENTS

APPENDIX H – FIELD REVIEW REPORTS

APPENDIX I – SUBSTANTIAL PERFORMANCE

APPENDIX J – RECORD DRAWINGS

APPENDIX K – BEFORE AND AFTER CONSTRUCTION PHOTOGRAPHS AND PARAGRAPH OF WORKS FOR ENV

APPENDIX L – FINAL PROGRESS PAYMENT AND CLOSEOUT DOCUMENTS

APPENDIX M – PROGRESS PAYMENTS

APPENDIX N – ENVIRONMENTAL MONITORING REPORT

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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
PWC SITE ID: S-CR-34 - SOUTH HERFORD 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-34
Location: 49.208806°, -122.230723°
Site Description: South Herford Creek, Hatzic, BC
Local Government Agency: Fraser Valley Regional District (FVRD)
Waterbody: South Herford 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.

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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 South Herford Creek, sediment and debris from the steeper upstream areas was mobilized and transported west towards Sylvester Road. The existing culvert at Sylvester Road was blocked and the roadway was flooded during the November 2021 event. This resulted in sediment and debris being washed across Sylvester Road, into the east and west roadway ditches and downstream creek channel.

Notably, this location is closely related to flooding at S-CR-37 (North Herford Creek). During the November 2021 rainfall event, the overland flooding areas of the two (2) watercourses merged in the vicinity of Sylvester Road along the east roadway ditch.

Based on previous assessments completed by Stirling Geoscience Ltd. (December 2021), deposition of sediment occurred along the South Herford Creek channel approximately 40 m upstream and 90 m downstream of the culvert crossing Sylvester Road. 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 South Herford Creek at Sylvester Road, we noted the following:

1. Hydraulic capacity of the South Herford Creek culvert at Sylvester Road appears to be insufficient;
2. Creek bank erosion was observed upstream and downstream of the South Herford Creek culvert. Bank erosion is likely due to high flow volume, velocities, and sediment deposition;
3. Downstream of the South Herford Creek culvert, the channel has significant sediment accumulation and vegetation growth. The deposited material has not only created standing water in the west roadway ditch, but it also has impacted the hydraulic capacity of the culvert. The downstream end of the culvert is about 90% filled with sediment;
4. The east ditch of Sylvester Road between South Herford Creek and North Herford Creek has sediment accumulation and has resulted in standing water on private property; and
5. Deposited material has been removed on South Herford Creek upstream of the culvert on private property. As per discussion with the Landowner, this material has been used to create a berm along the north creek bank and culvert inlet to contain the flows within the creek channel. It appears that this work was completed as part of emergency repairs.

We anticipate that runoff will continue to flood Sylvester Road during significant rainfall events. This is due to inadequate culvert capacity and deposited material upstream and downstream of the culvert. AE believes that there is a history of sediment accumulation at this site. The Landowner reported a history

of drainage issues stemming back to the 1990s when they stated South Herford Creek was re-aligned to its present course.

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 anticipate continued short-term inundation of Sylvester Road during significant rainfall events.
River Capacity	Medium	We anticipate South Herford Creek to temporarily inundate adjacent low-lying private property during significant rainfall events. The downstream channel has significant sediment accumulation and is compromising the hydraulic capacity of the upstream culvert under Sylvester Road.
Environmental	Low	We believe that hydraulic issues have been present for some time and thus anticipate low environmental risk.
Infrastructure	Medium	We anticipate minor damage to the shoulders of Sylvester Road during significant rainfall events. 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:

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;
3. Google Satellite Imagery; and
4. Discussions with the Landowner at 11426 Sylvester Road and review of landowner flood event photos (see Enclosure C).

4 SITE OPINION AND ADVICE

Based on the hazard and risk assessment, it is our opinion that Site S-CR-34 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. N/A.

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

1. Remove sediment and debris in the east ditch along Sylvester Road between South Herford Creek and North Herford Creek;
2. Complete a hydraulic capacity assessment for both North and South Herford Creeks. Evaluate options for restoring the capacity of the culvert and channel;
3. 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 culvert on South Herford 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

Reviewed by:

PROFESSIONAL ENGINEER
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Jun. 24 2022

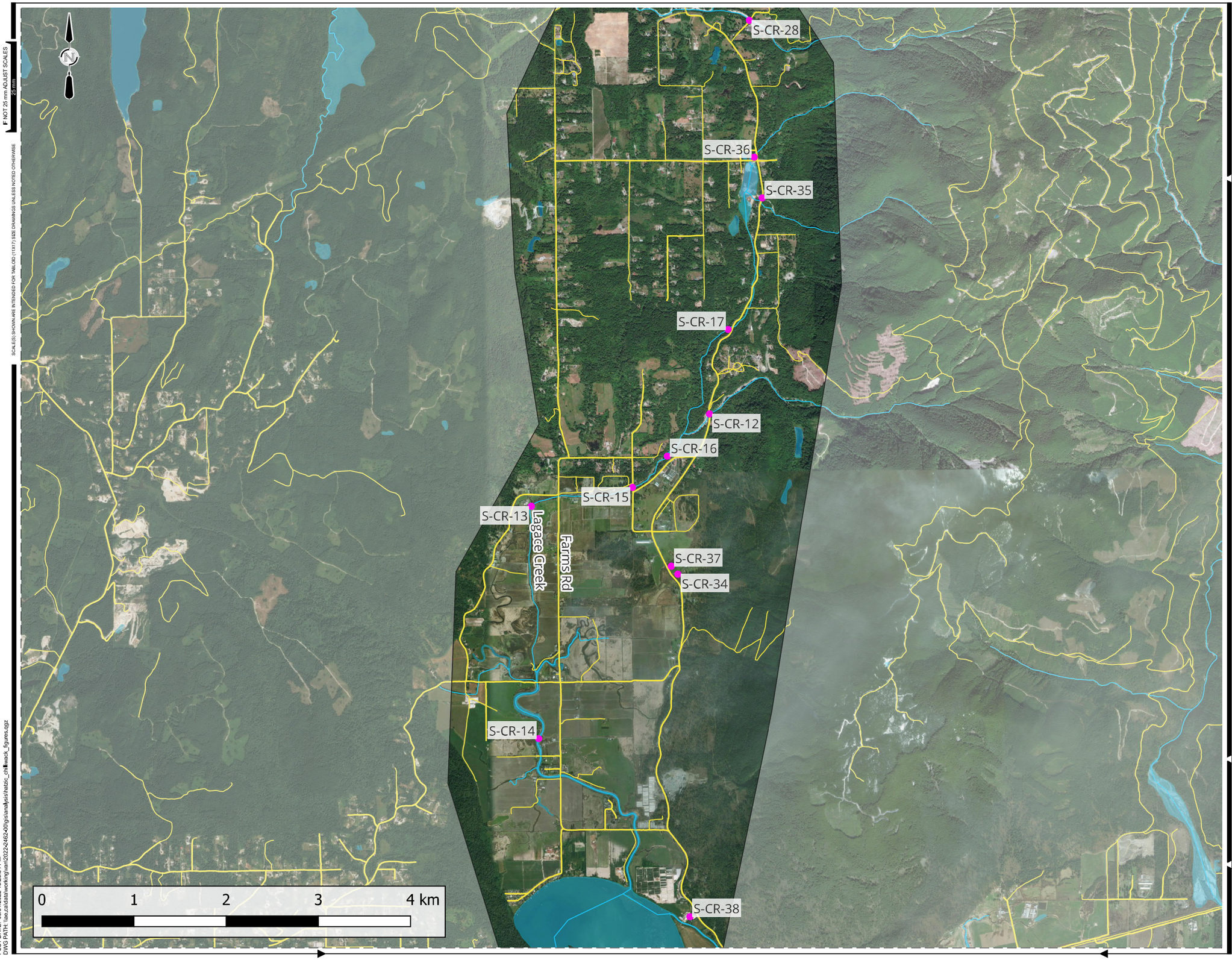
Andrew Wiens, P.Eng. (BC)
Senior Water Resources Engineer

AR/AW/fd

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IF NOT 25 mm ADJUST SCALES
25 mm

SCALE(S) SHOWN ARE INTENDED FOR TABLOID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



Associated Engineering

BEST MANAGED COMPANIES
Platinum member

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



pwc

FIGURE 1

PRICEWATERHOUSE COOPERS
BC MINISTRY OF ENVIRONMENT

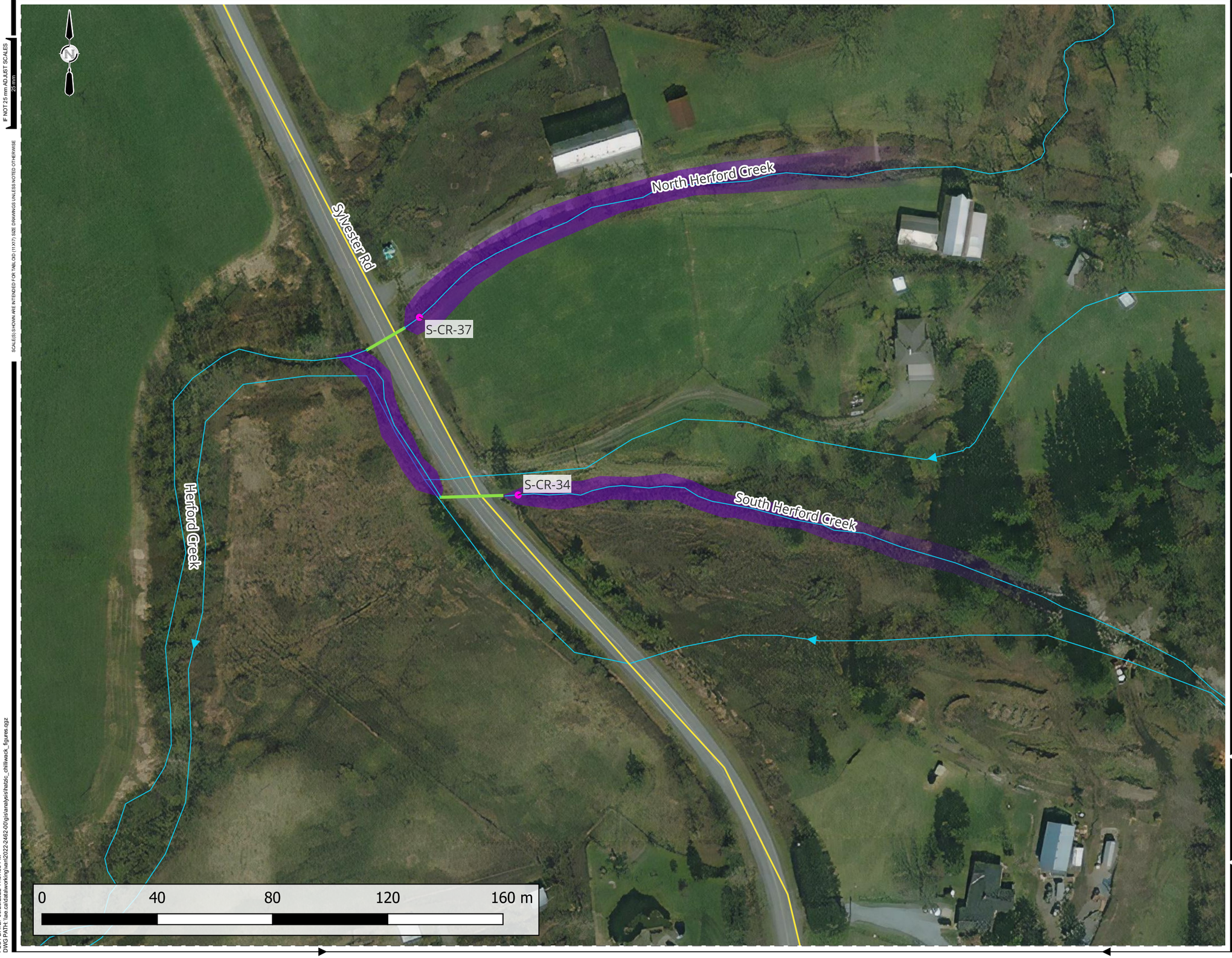
WATERWAY SEDIMENT ASSESSMENT
PWC HATZIC PRARIE SITE OVERVIEW

AE PROJECT No.	20222462-00
SCALE	AS SHOWN
APPROVED	A. WIENS
DATE	20220531
REV	A
DESCRIPTION	ISSUED FOR FINAL

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IF NOT 25 mm ADJUST SCALES
25 mm

SCALE(S) SHOWN ARE INTENDED FOR TABLOID (11 X 17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



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Associated Engineering

BEST MANAGED COMPANIES
Platinum member

Legend

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

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

PROJECT LOCATION



pwc

FIGURE 2

PRICEWATERHOUSE COOPERS
BC MINISTRY OF ENVIRONMENT

WATERWAY SEDIMENT ASSESSMENT
PWC SITE: S-CR-34
SOUTH HERFORD CREEK AT SYLVESTER RD

AE PROJECT No.	20222462-00
SCALE	AS SHOWN
APPROVED	A. WIENS
DATE	20220623
REV	A
DESCRIPTION	ISSUED FOR FINAL

Enclosure A – Risk Matrix

CANADA BEST MANAGED COMPANIES Platinum member

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
Likelihood	**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)



South Herford Creek
Sylvester Road Culvert Downstream End– Looking East



South Herford Creek
Sylvester Road Culvert Upstream End– Looking West



South Herford Creek
West of Sylvester Road - Looking Upstream



South Herford Creek
West of Sylvester Road - Looking Downstream



South Herford Creek
East of Sylvester Road – Looking Upstream



South Herford Creek
Temporary berm at Culvert Inlet – Looking South

Enclosure C – Landowner Photos – November 2021 Storm event



South Herford Creek
Sylvester Road Culvert Upstream End– Looking South



South Herford Creek
Sylvester Road East Ditch - Looking North



South Herford Creek
Sylvester Road - Looking West



South Herford Creek
Upstream Creek Channel - Looking Upstream

Associated Engineering (B.C.) Ltd.
#500 - 2889 East 12th Avenue
Vancouver, BC, Canada, V5M 4T5

TEL: 604.293.1411
FAX: 604.291.6163
www.ae.ca

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
PWC SITE ID: S-CR-37 - NORTH HERFORD 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-37
Location: 49.209358°, -122.231182°
Site Description: North Herford Creek, Hatzic, BC
Local Government Agency: Fraser Valley Regional District (FVRD)
Waterbody: North Herford 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.
3. Identification and advice on prioritized and appropriate mitigation measures (if any), their required timing, and further work required to validate such advice.

A Carbon Neutral Company

CANADA BEST MANAGED COMPANIES Platinum member

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 North Herford Creek, sediment and debris from the steeper upstream areas was mobilized and transported west towards Sylvester Road. The roadway was flooded during the November 2021 event which resulted in sediment and debris being washed across Sylvester Road, into the east and west roadway ditches and downstream creek channel.

Notably, this location is closely related to flooding at S-CR-34 (South Herford Creek). During the November 2021 rainfall event, the overland flooding areas of the two (2) watercourses merged in the vicinity of Sylvester Road along the east roadway ditch.

Based on previous assessments completed by Stirling Geoscience Ltd. (December 2021), deposition of sediment occurred along the North Herford Creek channel extending approximately 30 m upstream and downstream of the culvert crossing Sylvester Road. 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 North Herford Creek at Sylvester Road, we noted the following:

1. Hydraulic capacity of the North Herford Creek culvert appears to be insufficient. Long term deposition within the channel has reduced its capacity.
2. Creek bank erosion was observed upstream of the North Herford Creek culvert. Bank erosion is likely due to high flow volume, velocities, and sediment deposition.
3. Downstream of the North Herford Creek culvert, the channel has been filled with sediment. The deposited material likely has impacted the hydraulic capacity of the existing culvert. The downstream end of the culvert is about 20% filled with sediment.
4. The east ditch of Sylvester Road between South Herford Creek and North Herford Creek has sediment accumulation and has resulted in standing water on private property.

We anticipate that runoff will continue to flood Sylvester Road during significant rainfall events. This is due to inadequate culvert capacity and deposited material upstream and downstream of the culvert. AE believes that there is a history of sediment accumulation at this site.

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 anticipate continued short-term inundation of Sylvester Road during significant rainfall events. This presents a hazard to the public. The roadway would be flooded resulting in vehicles potentially entering adjacent roadway ditches.
River Capacity	Low	We anticipate North Herford Creek to temporarily inundate adjacent low-lying private property during significant rainfall events.
Environmental	Low	We believe that hydraulic issues have been present for some time and thus anticipate low environmental risk.
Infrastructure	Medium	We anticipate minor damage to the shoulders of Sylvester Road during significant rainfall events. 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 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;
3. Google Satellite Imagery; and
4. Discussions with the Landowner at 11426 Sylvester Road.

4 SITE OPINION AND ADVICE

Based on the hazard and risk assessment, it is our opinion that Site S-CR-37 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. N/A

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

1. Remove sediment and debris in the east ditch along Sylvester Road between South Herford Creek and North Herford Creek;
2. Complete a hydraulic capacity assessment for both North and South Herford Creeks. Evaluate options for restoring the capacity of the culvert and channel;
3. Restore the channel's capacity by:
   a. Coordination 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 culvert on North Herford Creek (if required).

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:

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
A.J. WIENS
32790

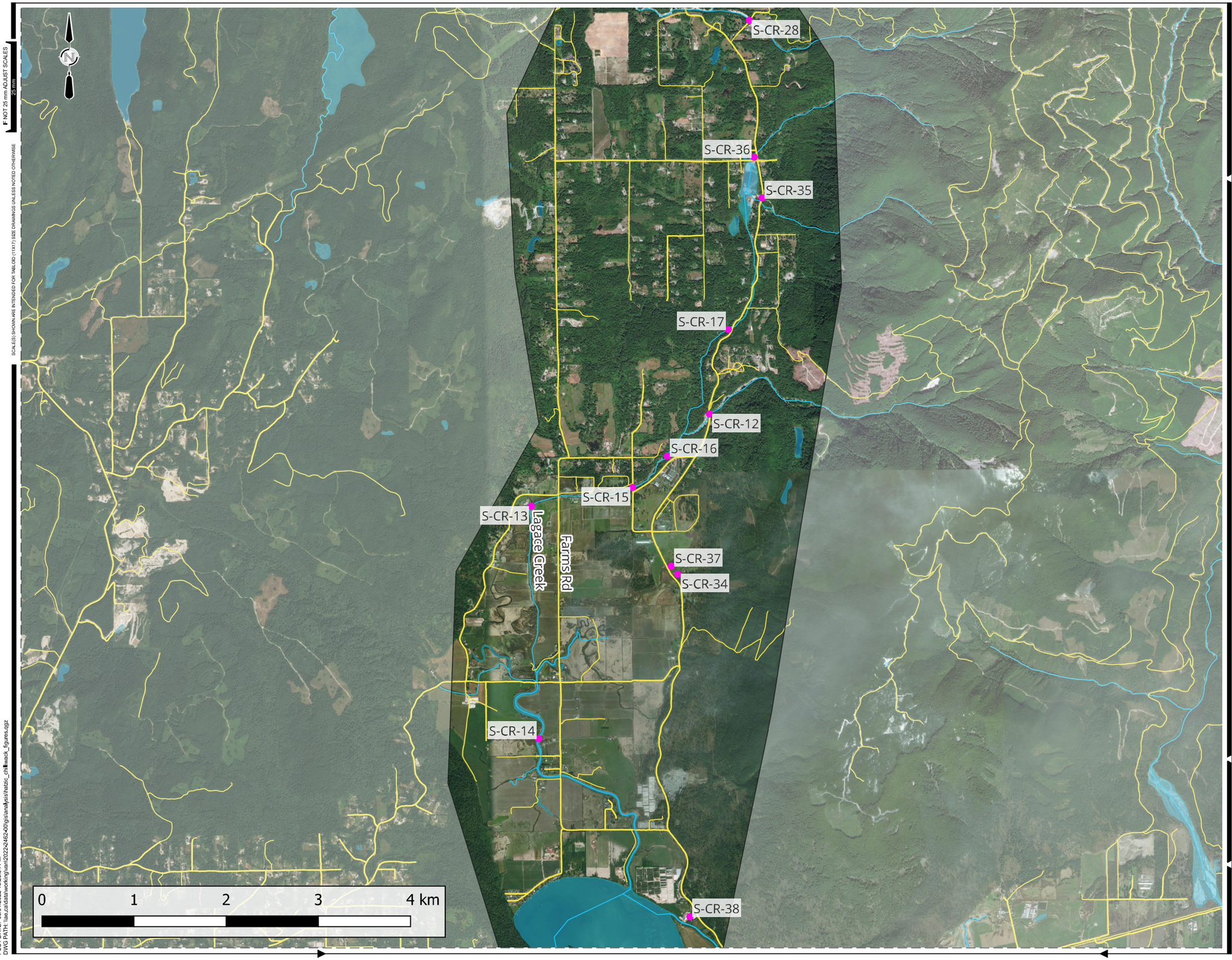
Jun. 24 2022

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

CANADA BEST MANAGED COMPANIES Platinum member

IF NOT 25 mm ADJUST SCALES
25 mm

SCALE(S) SHOWN ARE INTENDED FOR TABLOID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



Associated Engineering

BEST MANAGED COMPANIES
Platinum member

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



pwc

FIGURE 1

PRICEWATERHOUSE COOPERS
BC MINISTRY OF ENVIRONMENT

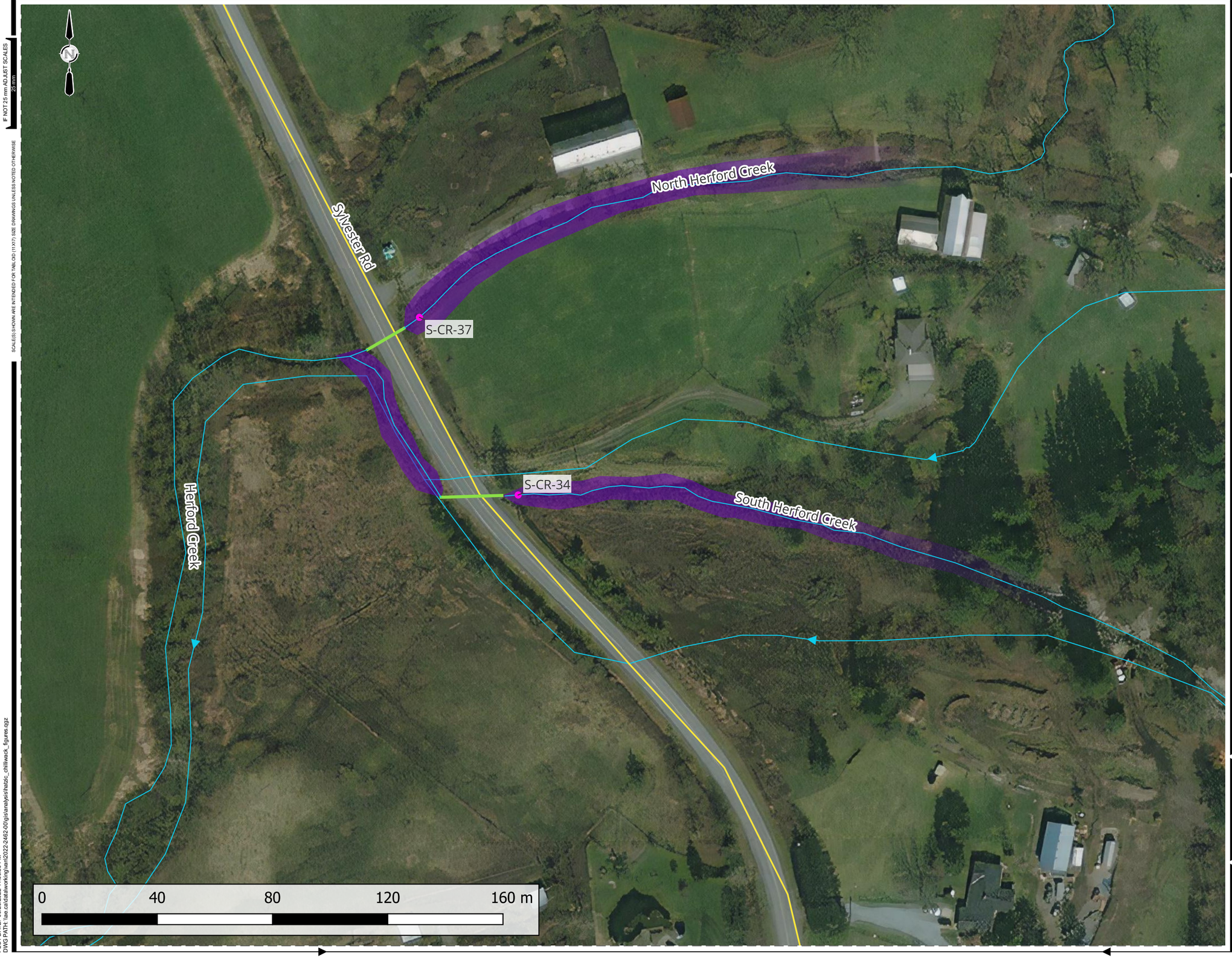
WATERWAY SEDIMENT ASSESSMENT
PWC HATZIC PRARIE SITE OVERVIEW

AE PROJECT No.	20222462-00
SCALE	AS SHOWN
APPROVED	A. WIENS
DATE	20220531
REV	A
DESCRIPTION	ISSUED FOR FINAL

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IF NOT 25 mm ADJUST SCALES
25 mm

SCALE(S) SHOWN ARE INTENDED FOR TABLOID (11 X 17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



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Associated Engineering

BEST MANAGED COMPANIES
Platinum member

Legend

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

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

PROJECT LOCATION



pwc

FIGURE 2

PRICEWATERHOUSE COOPERS
BC MINISTRY OF ENVIRONMENT

WATERWAY SEDIMENT ASSESSMENT
PWC SITE: S-CR-37
NORTH HERFORD CREEK AT SYLVESTER RD

AE PROJECT No.	20222462-00
SCALE	AS SHOWN
APPROVED	A. WIENS
DATE	20220623
REV	A
DESCRIPTION	ISSUED FOR FINAL

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.
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	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
Likelihood	**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)



North Herford Creek
Upstream of Culvert – Looking East



North Herford Creek
Upstream of Culvert – Looking East



North Herford Creek
Downstream of Culvert – Looking East



North Herford Creek
Downstream of Culvert – Looking West



North Herford Creek
East Roadway Ditch – Looking North from South Herford Creek Culvert

SHEET LIST TABLE

SHEET	DRAWING NAME	REVISION	DRAWING TITLE	DRAWING DESCRIPTION
GENERAL				
1	2632-08-G-001	0	COVER	
2	2632-08-G-002	0	LEGEND	
3	2632-08-G-003	0	LOCATION PLAN	SCR34 AND SCR37
4	2632-08-G-004	0	SCR 37 PLAN	ACCESS AND LAYDOWN AREA
5	2632-08-G-005	0	SCR 34 PLAN	ACCESS AND LAYDOWN AREA
CIVIL				
6	2632-08-C-101	0	SCR37 PLAN	STA 0+000 TO STA 0+210
7	2632-08-C-102	0	SCR37 PLAN	STA 0+210 TO STA 0+450
8	2632-08-C-103	0	SCR37 PLAN	STA 0+450 TO STA 0+640
9	2632-08-C-104	0	SCR37 PLAN / PROFILE	STA 0+000 TO STA 0+640
10	2632-08-C-110	0	SCR34 PLAN	STA 0+000 TO STA 0+210
11	2632-08-C-111	0	SCR34 PLAN	STA 0+210 TO STA 0+400
12	2632-08-C-112	0	SCR34 PLAN	STA 0+400 TO STA 0+610
13	2632-08-C-113	0	SCR34 PLAN / PROFILE	STA 0+000 TO STA 0+340
14	2632-08-C-301	0	SECTIONS	SCR34 AND SCR37
15	2632-08-C-501	0	DETAILS	

BC MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY HATZIC EMERGENCY WORKS PROGRAM

SCR34 SOUTH HERFORD CREEK AND SCR37 NORTH HERFORD CREEK

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Associated Engineering

BEST MANAGED COMPANIES CANADA
Platinum member

BRITISH COLUMBIA

BC MINISTRY OF ENVIRONMENT
AND CLIMATE CHANGE STRATEGY
HATZIC EMERGENCY
WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

REV	DATE	DESIGN	DRAWN	DESCRIPTION
0	2023DEC15	L. MEDINA	M. LEZON	ISSUED FOR REGULATORY PERMITTING

DRAWING	REVISION	SHEET
2632-08-G-001	0	1

IF NOT 50 mm ADJUST SCALES
50 mm

SCALE(S) SHOWN ARE INTENDED FOR ANSI D (22X34) SIZE DRAWINGS, TABLOID (11X17) SIZE DRAWINGS ARE 1/2 OF SCALE(S) SHOWN UNLESS NOTED OTHERWISE

ROAD

EXISTING	DESIGN	
	100+000	CONTROL LINE
		GRAVEL ROAD
		EDGE OF PAVEMENT
		CURB (ACTUAL WIDTH)
		SIDEWALK (ACTUAL WIDTH)
		CURB DEPRESSION
		GUIDE RAIL

PROFILE VIEW

EXISTING	DESIGN	
		GROUND
		WATER MAIN
		SANITARY SEWER
		STORM SEWER

SURVEY

EXISTING	DESIGN	
HUB		SURVEY HUB
MON		MONUMENT
IP		IRON PIN
IPF		IRON PIN (FOUND)
LP		LEAD PLUG
U		UNIDENTIFIED MANHOLE
MW		MONITORING WELL
PZ		PIEZOMETER
OW		OBSERVATION WELL

CONTOUR

EXISTING	DESIGN	
		MAJOR
		MINOR

PROPERTY

EXISTING	DESIGN	
		PARCEL / LOT LINE
		EASEMENT
		STATUTORY ROW
		ROAD ROW

GAS / OIL

EXISTING	DESIGN	
G	G	GAS
OIL	OIL	OIL
F	F	VAULT BOX
G	G	VALVE BOX
G	G	MANHOLE
G	G	METER

WATER

EXISTING	DESIGN	
W	W	WATER MAIN
F	F	FIRE SUPPRESSION
IR	IR	IRRIGATION
RW	RW	RAW WATER
PW	PW	POTABLE WATER
VB	VB	VAULT BOX
FH	FH	FIRE HYDRANT
W	W	MANHOLE
W	W	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
W	W	WELL
CS	CS	CURB STOP / CURB BOX

SANITARY SEWER

EXISTING	DESIGN	
SS	SS	SANITARY SEWER
FM	FM	SANITARY FORCEMAIN
COMB	COMB	SANITARY COMBINED SEWER
S	S	MANHOLE
CS	CS	COMBINED MANHOLE
VC	VC	VALVE CHAMBER
CO	CO	CLEANOUT
S	S	VALVE BOX
		FLOW DIRECTION
LS	LS	LIFT / PUMP STATION

COMMUNICATIONS / TELEPHONE

EXISTING	DESIGN	
CATV	CATV	CABLE
FO	FO	FIBRE OPTIC CABLE
T	T	TELEPHONE / LINE
UT	UT	UNDERGROUND TELEPHONE
C	C	COMMUNICATIONS VAULT BOX
T	T	TELEPHONE MANHOLE
T	T	TELEPHONE VAULT BOX
C	C	COMMUNICATIONS MANHOLE
T	T	TELEPHONE PEDESTAL

STORM DRAINAGE

EXISTING	DESIGN	
CP	CP	CULVERT (Ø AND TYPE)
D	D	STORM SEWER
CB	CB	CATCH BASIN
DCB	DCB	DOUBLE CATCH BASIN
DICB	DICB	DITCH INLET CATCH BASIN
CB	CB	CATCH BASIN / MANHOLE
LB	LB	LAWN BASIN
D	D	MANHOLE
STC	STC	STORMCEPTOR
OI	OI	OIL INTERCEPTOR
D	D	VALVE BOX
CI	CI	CULVERT INLET
CO	CO	CULVERT OUTLET
		HEADWALL
		DITCH FLOW

ELECTRICAL / POWER

EXISTING	DESIGN	
P	P	POWER / COMM / CONDUIT
OP	OP	OVERHEAD POWER
UP	UP	UNDERGROUND POWER
E	E	VAULT / HYDRO BOX
PB	PB	PULL BOX
J	J	JUNCTION BOX
TM	TM	TRANSFORMER VAULT MANHOLE
TP	TP	TRANSFORMER PAD
M	M	METER
E	E	MANHOLE
		LIGHT / LAMP STANDARD
		HYDRO / UTILITY POLE
		GUY WIRE
SIG	SIG	SIGNAL
SIG	SIG	SIGNAL WITH OVERHEAD ARM

MISCELLANEOUS

EXISTING	DESIGN	
X	X	FENCE
O	O	SILT FENCE
ABN		ABANDONED PIPE
		RAILWAY
		BOTTOM OF BANK
		TOP OF BANK
EW		EDGE OF WATER
		HEDGE
		BUILDING
		DITCH
		200 YEAR FLOOD EXTENTS
		ACCESS AND LAYDOWN AREA
		PROJECT EXTENTS
		PROJECT FOOTPRINT

MISCELLANEOUS

EXISTING	DESIGN	
MAXIMUS CREEK		CREEK (OVER 3 m WIDE) (WIDTH OF CREEK SHOWN TO SCALE)
TP	TP	TEST PIT
BH	BH	BORE HOLE
FP	FP	FLAG POLE
PM	PM	PARKING METER
MB	MB	MAILBOX
		BOULDER
		RAILWAY SIGNAL LIGHT
BO	BO	POST/BOLLARD (ANNOTATE AS REQUIRED)
		NO POST BARRIER / JERSEY BARRIER (SCALE AS REQUIRED)
		SIGN
		GATE
		BUSH
		TREE (DECIDUOUS) (SCALE AS REQUIRED)
		TREE (CONIFEROUS) (SCALE AS REQUIRED)
EL1000	100.000	SPOT ELEVATION
% 2 1	% 2 1	SLOPE
2121E 2WEN		GRID, CO-ORDINATE REGISTRATION

HATCH PATTERNS

- SEDIMENT REMOVAL
- BERM REPAIR
- EROSION PROTECTION
- DEBRIS REMOVAL
- CONSTRUCTION AREA
- EMBANKMENT REMOVAL

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Associated Engineering

CANADA BEST MANAGED COMPANIES
Platinum member

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
C. MEDINA ESCOBAR
39169
2023-12-15

PERMIT TO PRACTICE
ASSOCIATED ENGINEERING (B.C.) LTD.
PERMIT NUMBER: 1000163
Engineers & Geoscientists BC

REV	DATE	DESIGN	DRAWN	DESCRIPTION
0	2023DEC15	L. MEDINA	M. LEZON	ISSUED FOR REGULATORY PERMITTING

BC MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY

HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

SCALE: AS SHOWN

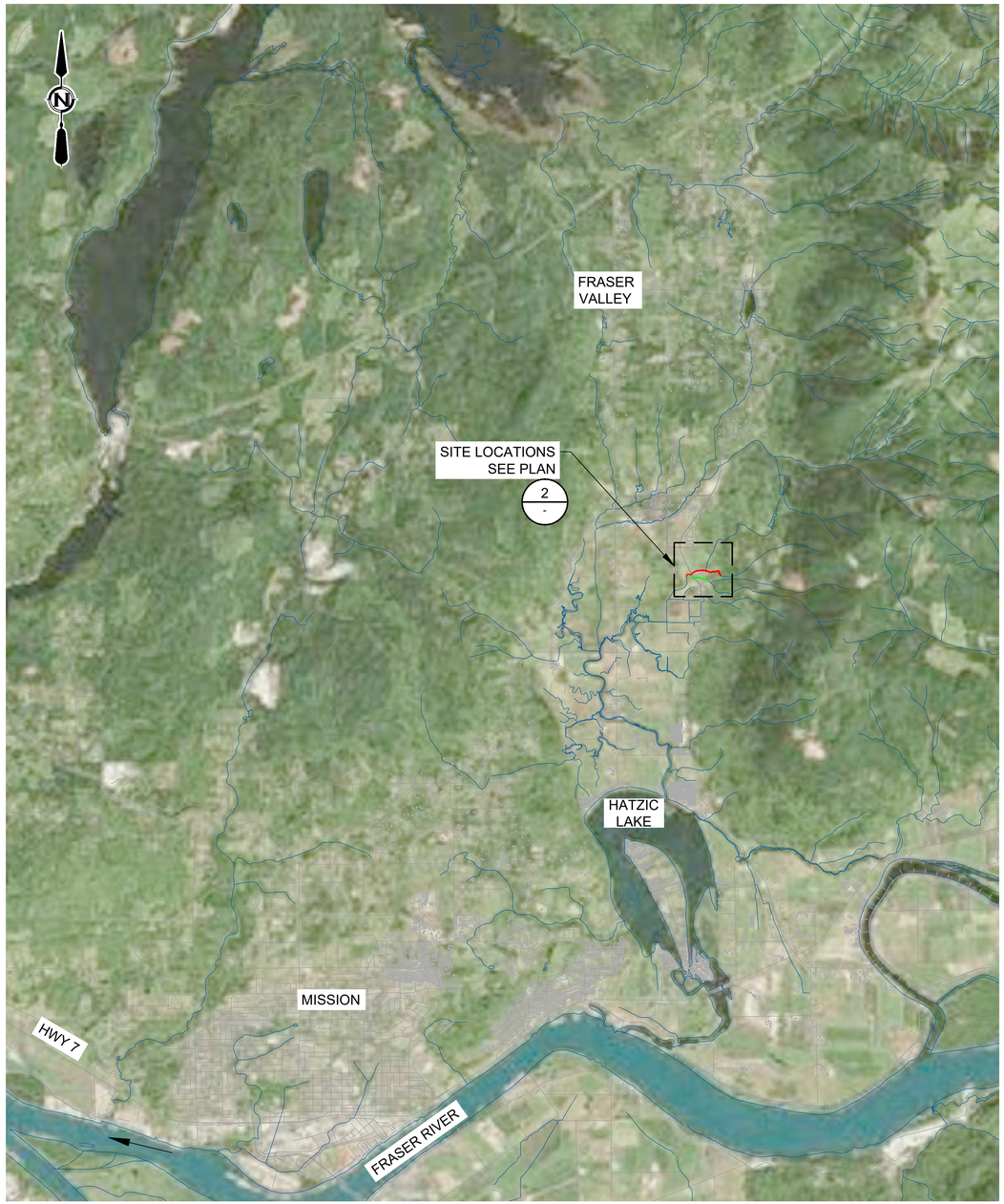
BRITISH COLUMBIA

GENERAL LEGEND

DRAWING	REVISION	SHEET
2632-08-G-002	0	2

IF NOT 50 mm ADJUST SCALES
50 mm

SCALE(S) SHOWN ARE INTENDED FOR ANSI D (22X34) SIZE DRAWINGS, TABLOID (11X17) SIZE DRAWINGS ARE 1/2 OF SCALE(S) SHOWN UNLESS NOTED OTHERWISE



1 - PLAN NTS



2 - PLAN 1:2000

PLOT DATE: 12/15/2023, 8:21:59 AM
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REV	DATE	DESIGN	DRAWN	DESCRIPTION
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BC MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY

HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

SCALE: AS SHOWN

BRITISH COLUMBIA

GENERAL LOCATION PLAN
SCR34 AND SCR37

DRAWING	REVISION	SHEET
2632-08-G-003	0	3

IF NOT 50 mm ADJUST SCALES
50 mm

SCALE(S) SHOWN ARE INTENDED FOR ANSI D (22X34) SIZE DRAWINGS, TABLOID (11X17) SIZE DRAWINGS ARE 1/2 OF SCALE(S) SHOWN UNLESS NOTED OTHERWISE



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PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
L. C. MEDINA ESCOBAR
59169
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REV	DATE	DESIGN	DRAWN	DESCRIPTION
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BC MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY

HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

SCALE: 1:750

BRITISH COLUMBIA

GENERAL
SCR 37 PLAN
ACCESS AND LAYDOWN AREA

DRAWING	REVISION	SHEET
2632-08-G-004	0	4

IF NOT 50 mm ADJUST SCALES
50 mm

SCALE(S) SHOWN ARE INTENDED FOR ANSI D (22X34) SIZE DRAWINGS, TABLOID (11X17) SIZE DRAWINGS ARE 1/2 OF SCALE(S) SHOWN UNLESS NOTED OTHERWISE



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Associated Engineering

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Platinum member

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PROVINCE OF BRITISH COLUMBIA
L. C. MEDINA ESCOBAR
59169
2023-12-15

PERMIT TO PRACTICE
ASSOCIATED ENGINEERING (B.C.) LTD.
PERMIT NUMBER: 1000163
Engineers & Geoscientists BC

REV	DATE	DESIGN	DRAWN	DESCRIPTION
0	2023DEC15	L. MEDINA	M. LEZON	ISSUED FOR REGULATORY PERMITTING

BC MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY

HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

SCALE: 1:750

BRITISH COLUMBIA

GENERAL
SCR 34 PLAN
ACCESS AND LAYDOWN AREA

DRAWING	REVISION	SHEET
2632-08-G-005	0	5

IF NOT 50 mm ADJUST SCALES
50 mm

SCALE(S) SHOWN ARE INTENDED FOR ANSI D (22X34) SIZE DRAWINGS, TABLOID (11X17) SIZE DRAWINGS ARE 1/2 OF SCALE(S) SHOWN UNLESS NOTED OTHERWISE



NOTES:

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5. REMOVE EXISTING VEGETATION AS REQUIRED TO FACILITATE CONSTRUCTION.
6. CONTRACTOR TO MAINTAIN NATURAL FLOW OF THE CREEK FOR THE DURATION OF CONSTRUCTION VIA TEMPORARY DIVERSION OR VIA OTHER APPROVED METHODS.

PLOT DATE: 12/15/2023 8:59:07 AM
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BEST MANAGED COMPANIES
Platinum member

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
L. C. MEDINA ESCOBAR
59169
2023-12-15

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ASSOCIATED ENGINEERING (B.C.) LTD.
PERMIT NUMBER: 1000163
Engineers & Geoscientists BC

REV	DATE	DESIGN	DRAWN	DESCRIPTION
0	2023DEC15	L. MEDINA	M. LEZON	ISSUED FOR REGULATORY PERMITTING

BC MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY

HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

SCALE: 1:300

BRITISH COLUMBIA

CIVIL
SCR37 PLAN
STA 0+000 TO STA 0+230

DRAWING	REVISION	SHEET
2632-08-C-101	0	6

IF NOT 50 mm ADJUST SCALES
50 mm

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Associated Engineering

BEST MANAGED COMPANIES
Platinum member

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PROVINCE OF BRITISH COLUMBIA
L. C. MEDINA ESCOBAR
59169
2023-12-15

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PERMIT NUMBER: 1000163
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0	2023DEC15	L. MEDINA	M. LEZON	ISSUED FOR REGULATORY PERMITTING

BC MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY

HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

SCALE: 1:300

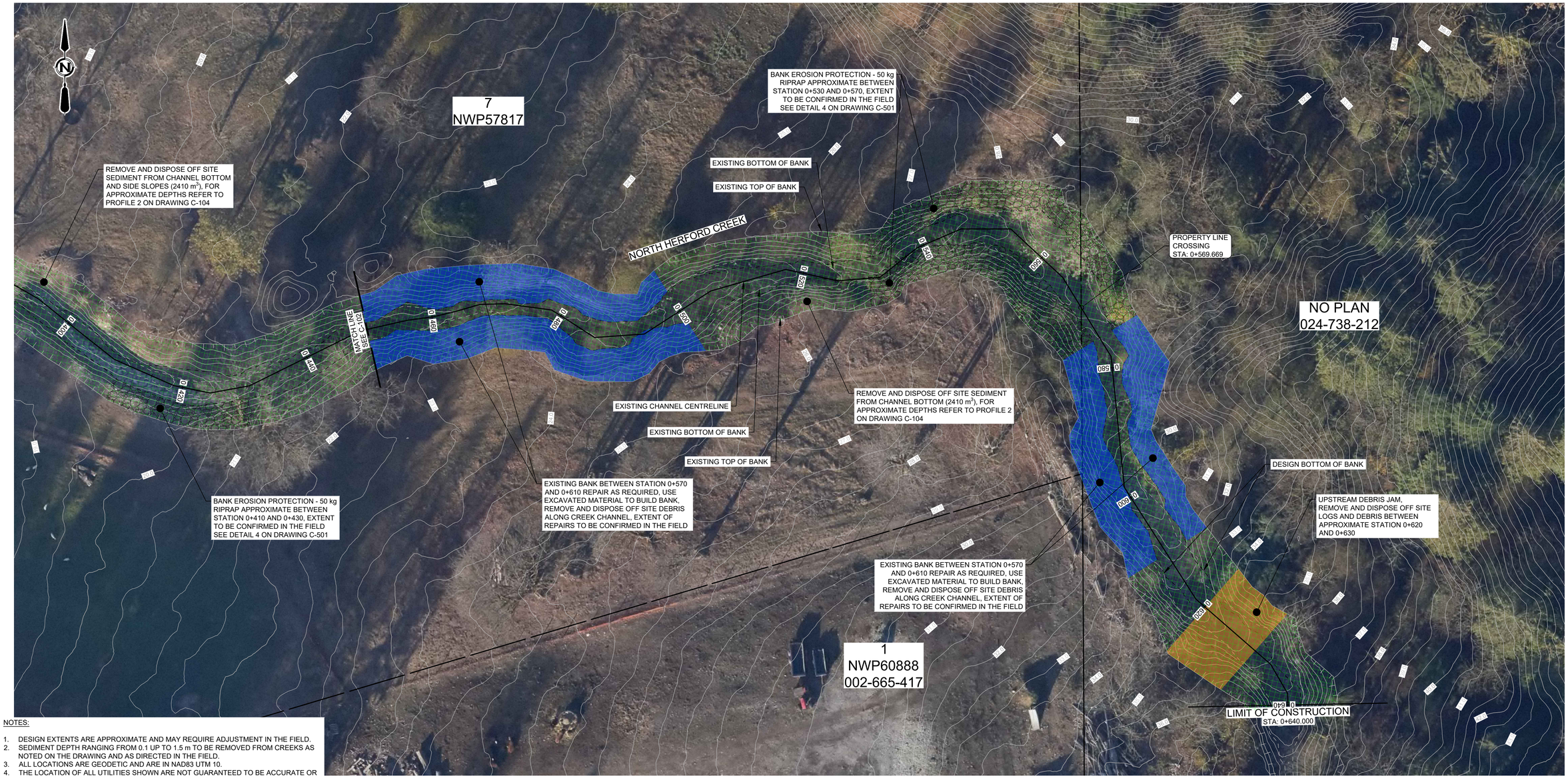
BRITISH COLUMBIA

CIVIL
SCR37 PLAN
STA 0+230 TO STA 0+450

DRAWING	REVISION	SHEET
2632-08-C-102	0	7

IF NOT 50 mm ADJUST SCALES
50 mm

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Associated Engineering

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Platinum member

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PROVINCE OF BRITISH COLUMBIA
L. C. MEDINA ESCOBAR
59169
2023-12-15

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BC MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY

HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

SCALE: 1:300

BRITISH COLUMBIA

CIVIL
SCR37 PLAN
STA 0+450 TO STA 0+640

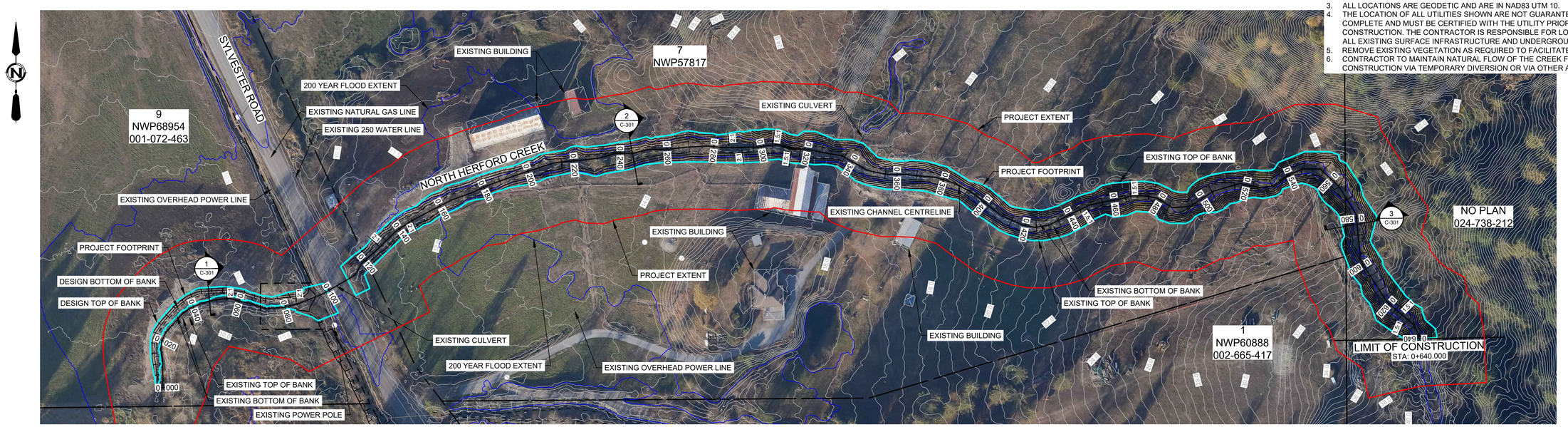
DRAWING	REVISION	SHEET
2632-08-C-103	0	8

IF NOT 50 mm ADJUST SCALES
50 mm

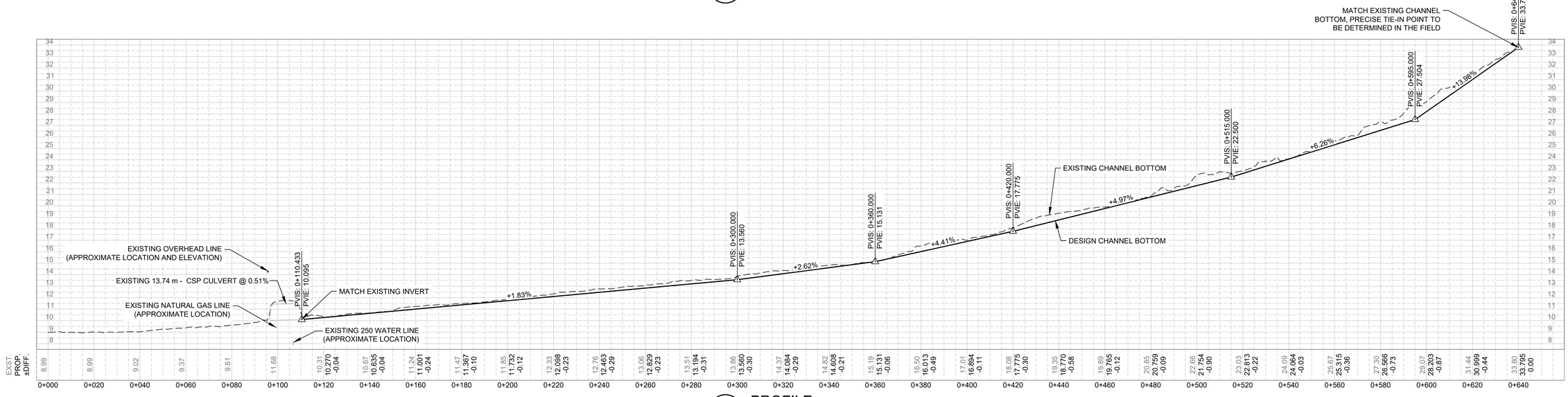
SCALE(S) SHOWN ARE INTENDED FOR ANSI D (22X34) SIZE DRAWINGS, TABLOID (11X17) SIZE DRAWINGS ARE 1/2 OF SCALE(S) SHOWN UNLESS NOTED OTHERWISE

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1 - PLAN 1:900



2 - PROFILE H 1:900, V 1:180

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Associated Engineering

BEST MANAGED COMPANIES
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PROVINCE OF BRITISH COLUMBIA
L. C. MEDINA ESCOBAR
59169
2023-12-15

PERMIT TO PRACTICE
ASSOCIATED ENGINEERING (B.C.) LTD.
PERMIT NUMBER: 1000163
Engineers & Geoscientists BC

REV	DATE	DESIGN	DRAWN	DESCRIPTION
0	2023DEC15	L. MEDINA	M. LEZON	ISSUED FOR REGULATORY PERMITTING

BC MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY

HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

SCALE: AS SHOWN

BRITISH COLUMBIA

CIVIL
SCR37 PLAN / PROFILE
STA 0+000 TO STA 0+640

DRAWING	REVISION	SHEET
2632-08-C-104	0	9

IF NOT 50 mm ADJUST SCALES
50 mm

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PROVINCE OF BRITISH COLUMBIA
L. C. MEDINA ESCOBAR
59169
2023-12-15

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BC MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY

HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

SCALE: 1:300

BRITISH COLUMBIA

CIVIL
SCR34 PLAN
STA 0+000 TO STA 0+210

DRAWING	REVISION	SHEET
2632-08-C-110	0	10

IF NOT 50 mm ADJUST SCALES
50 mm

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Associated Engineering

BEST MANAGED COMPANIES Platinum member

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — L. C. MEDINA ESCOBAR # 59169
2023-12-15

PERMIT TO PRACTICE
ASSOCIATED ENGINEERING (B.C.) LTD.
PERMIT NUMBER: 1000163
Engineers & Geoscientists BC

REV	DATE	DESIGN	DRAWN	DESCRIPTION
0	2023DEC15	L. MEDINA	M. LEZON	ISSUED FOR REGULATORY PERMITTING

BC MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY

HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

SCALE: 1:300

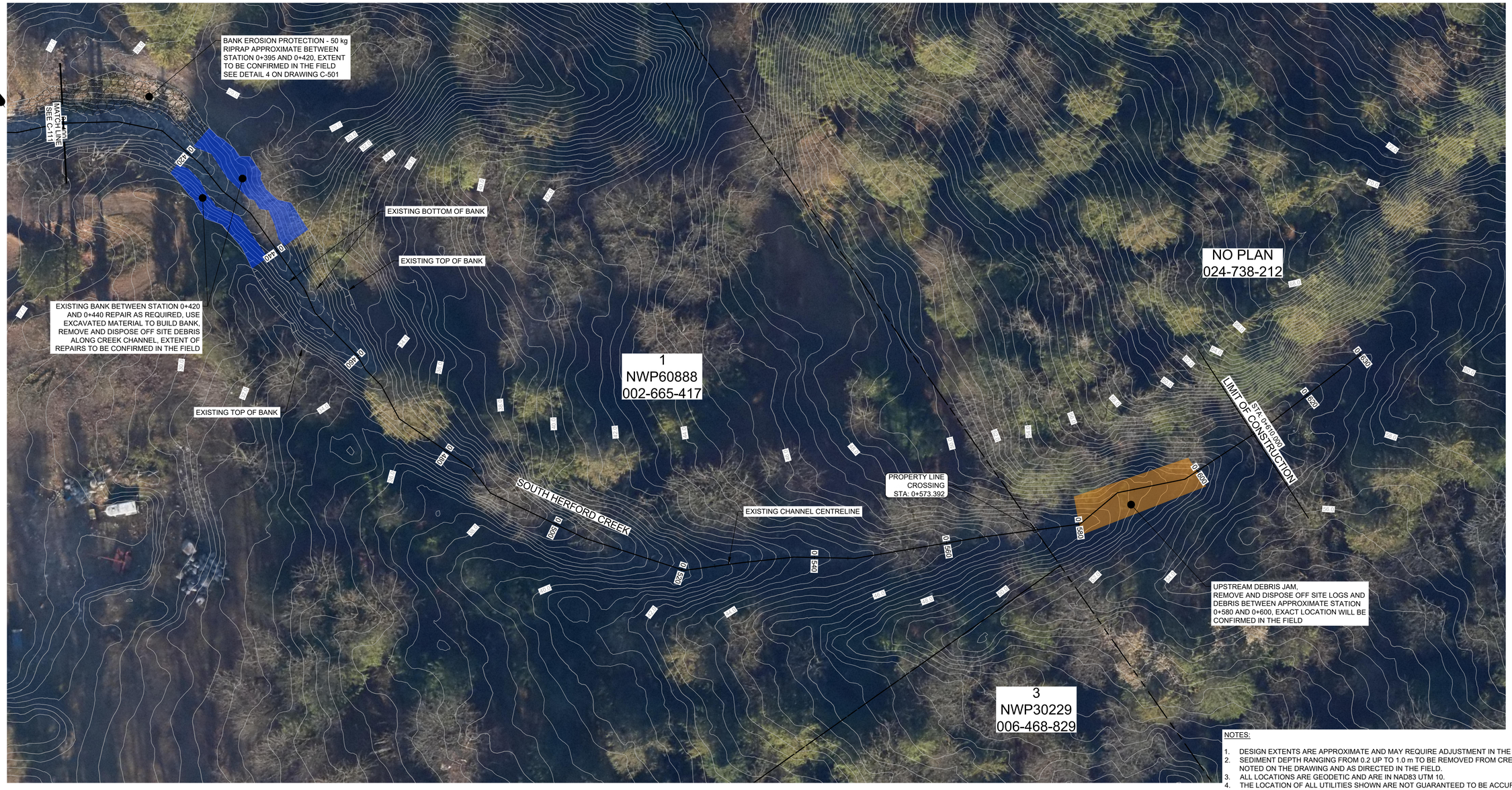
BRITISH COLUMBIA

CIVIL
SCR34 PLAN
STA 0+210 TO STA 0+400

DRAWING	REVISION	SHEET
2632-08-C-111	0	11

IF NOT 50 mm ADJUST SCALES
50 mm

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PLOT DATE: 12/15/2023, 10:21:52 AM
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Associated Engineering

BEST MANAGED COMPANIES
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PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
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HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

SCALE: 1:300

BRITISH COLUMBIA

CIVIL
SCR34 PLAN
STA 0+400 TO STA 0+610

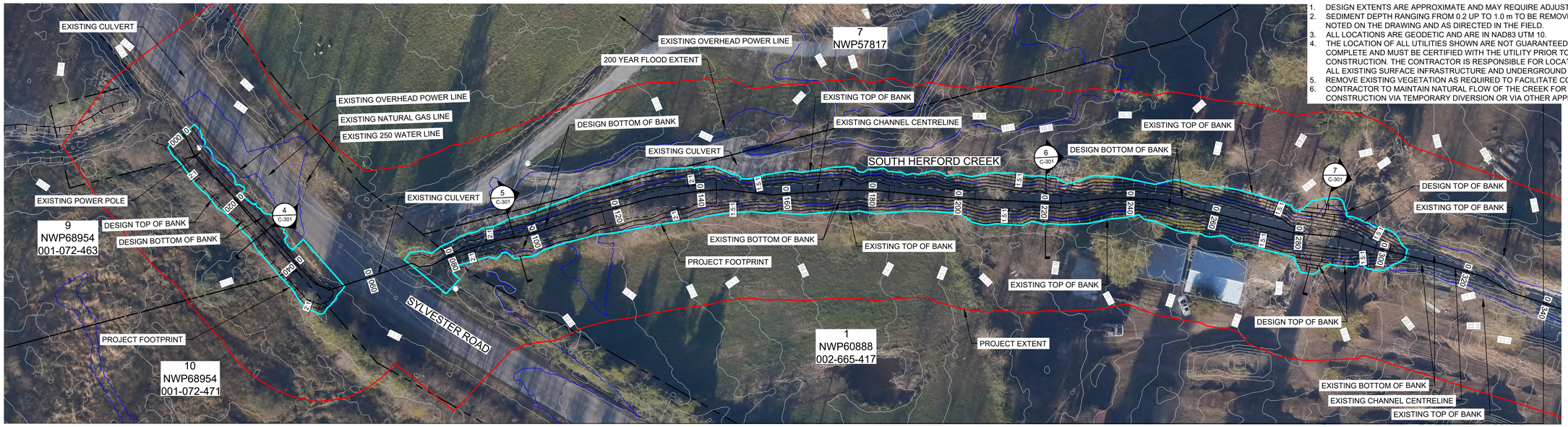
DRAWING	REVISION	SHEET
2632-08-C-112	0	12

IF NOT 50 mm ADJUST SCALES
50 mm

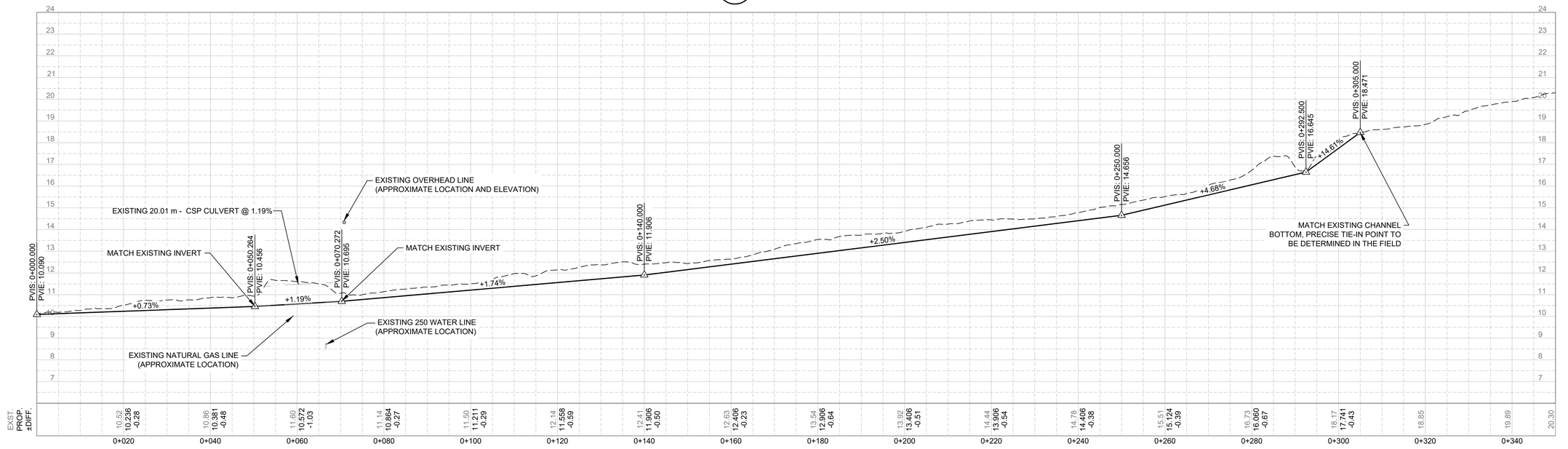
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1 - PLAN 1:500



2 - PROFILE H 1:500, V 1:100

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PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA
L. C. MEDINA ESCOBAR
59169
2023-12-15

PERMIT TO PRACTICE
ASSOCIATED ENGINEERING (B.C.) LTD.
PERMIT NUMBER: 1000163
Engineers & Geoscientists BC

REV	DATE	DESIGN	DRAWN	DESCRIPTION
0	2023DEC15	L. MEDINA	M. LEZON	ISSUED FOR REGULATORY PERMITTING

BC MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY

HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

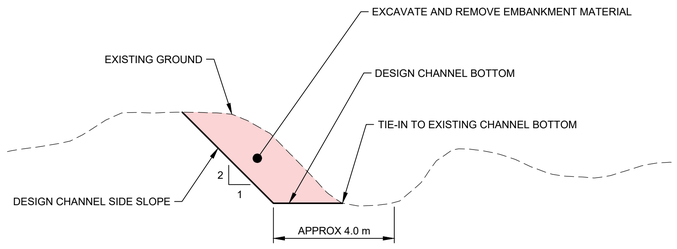
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BRITISH COLUMBIA

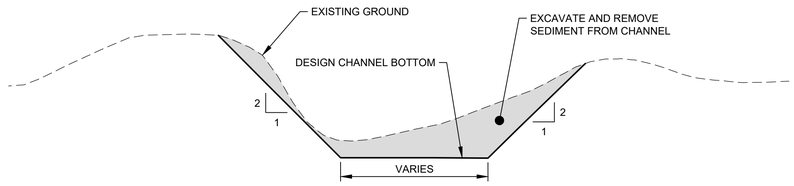
CIVIL
SCR34 PLAN / PROFILE
STA 0+000 TO STA 0+340

DRAWING	REVISION	SHEET
2632-08-C-113	0	13

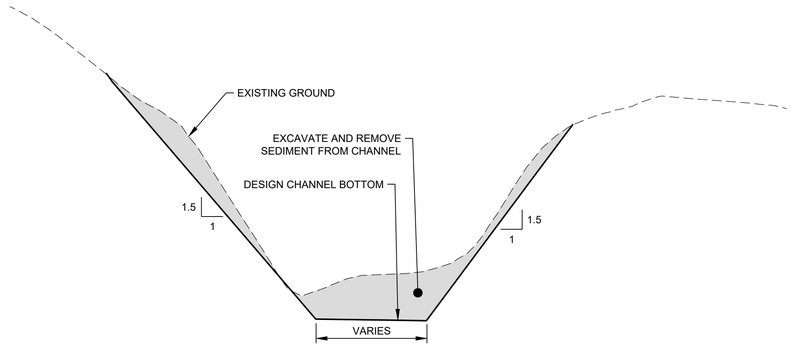
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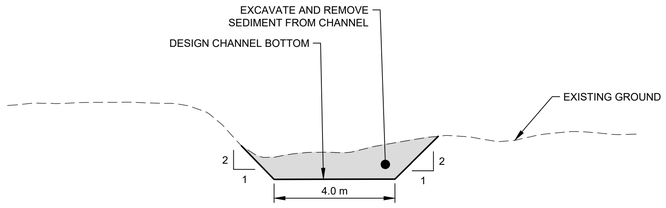
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SCR37 BETWEEN STA 0+000 AND 0+080



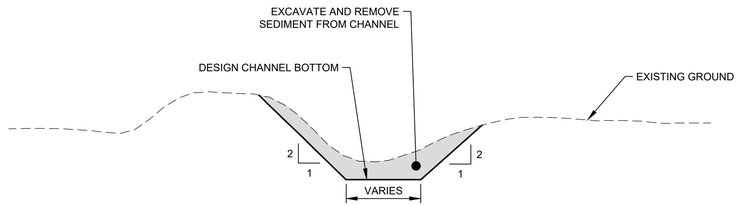
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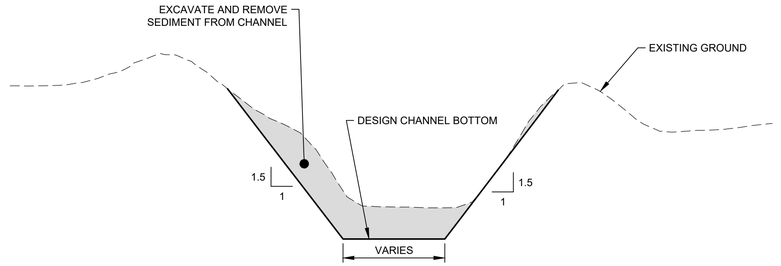
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SCR37 BETWEEN STA 0+300 AND 0+640



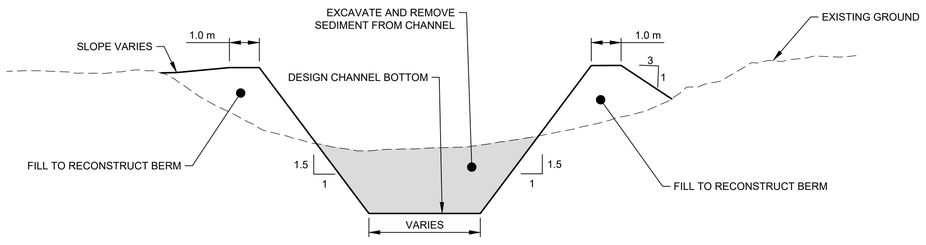
4 TYPICAL SECTION H 1:100, V 1:50
SCR34 BETWEEN STA 0+000 AND 0+050



5 TYPICAL SECTION H 1:100, V 1:50
SCR34 BETWEEN STA 0+070 AND 0+140



6 TYPICAL SECTION H 1:100, V 1:50
SCR34 BETWEEN STA 0+140 TO 0+280 AND 0+290 TO 0+305



7 TYPICAL SECTION H 1:100, V 1:50
SCR34 BETWEEN APPROXIMATELY STA 0+280 AND 0+290 - REMOVING TEMPORARY CROSSING

NOTES:

1. SEDIMENT REMOVAL AND CHANNEL ALTERATIONS TO HAVE FIELD-OVERSIGHT BY QUALIFIED ENGINEER AND QUALIFIED ENVIRONMENTAL PROFESSIONAL.
2. SEDIMENT DEPTH RANGING FROM 0.1 UP TO 1.5 m TO BE REMOVED FROM CREEKS AS NOTED ON THE DRAWING AND AS DIRECTED IN THE FIELD.

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PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA
L. C. MEDINA ESCOBAR
59169
2023-12-15

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BC MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY

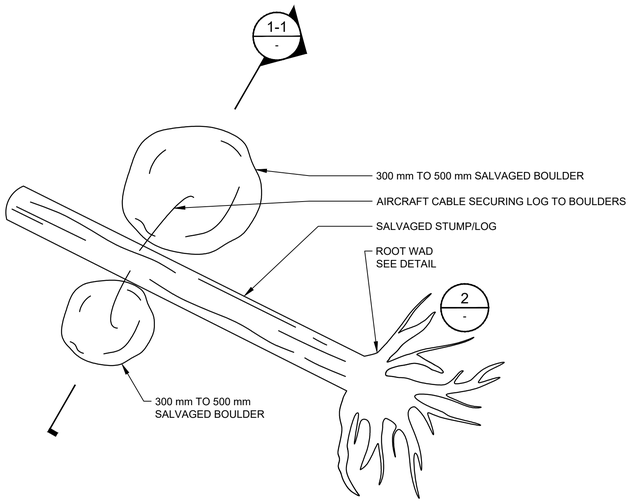
HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

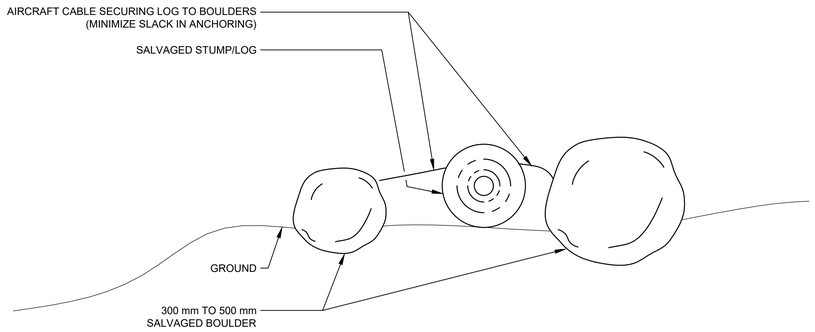
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BRITISH COLUMBIA

CIVIL
SECTIONS
SCR34 AND SCR37

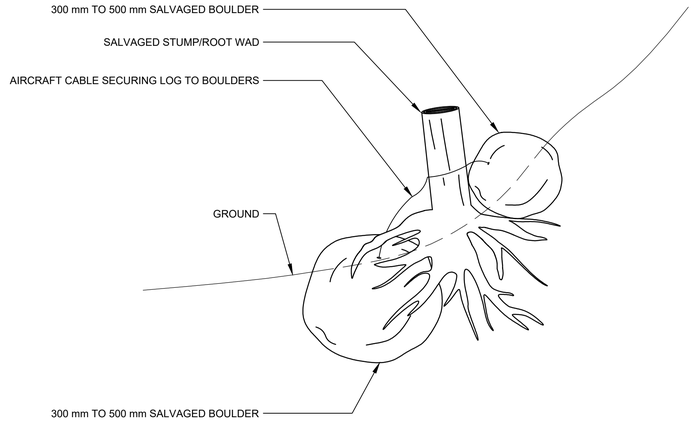
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2632-08-C-301	0	14





SECTION 1-1

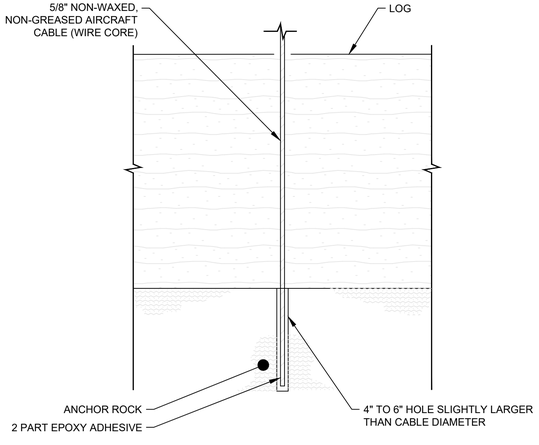
1 TYPICAL DETAIL NTS
BOULDER CLUSTER



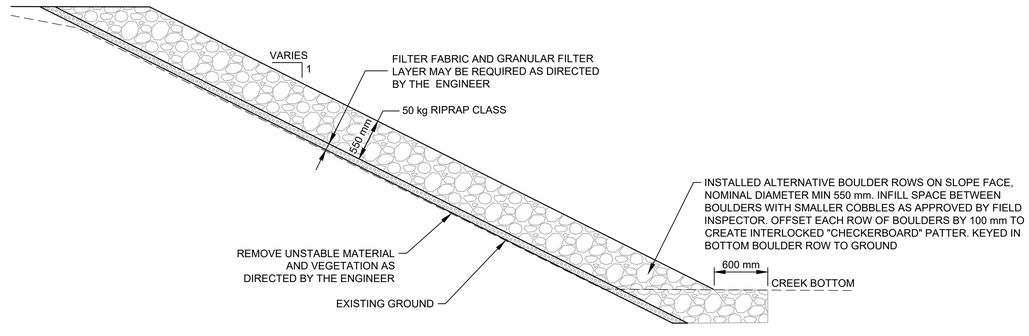
2 TYPICAL DETAIL NTS
ROOT WAD

NOTES FOR TYPICAL DETAILS:

1. PLACEMENT OF HABITAT FEATURES:
   1.1. BOULDER CLUSTERS OR ROOT WAD SHOULD BE PLACED ADJACENT TO, OR PARTIALLY WITHIN, THE THALWEG. BOULDER CLUSTER OR ROOT WAD LOCATIONS TO BE CONFIRMED IN THE FIELD.
2. LARGE WOODY DEBRIS:
   2.1. LARGE WOODY DEBRIS SHALL BE COMPRISED OF MINIMUM 450 mm DIAMETER DOUGLAS-FIR OR SPRUCE LOG WITH BARK LEFT LARGELY INTACT AND ROOT WAD ATTACHED.
   2.2. LOGS SHALL BE 2.0 m TO 4.0 m IN LENGTH.
   2.3. ANGLE WOOD DOWNSTREAM AND ANCHOR ONE END TO CHANNEL BED AND THE OTHER TO CHANNEL BANK (SEE ANCHORING DETAIL). LOGS SHALL NOT EXTEND MORE THAN 1/3 OF THE CHANNEL WIDTH.
   2.4. ANCHOR TOP AND BOTTOM OF EACH LOG.
3. ROOT WAD:
   3.1. ROOT WADS SHALL PREFERABLY CONSIST OF DOUGLAS-FIR OR SPRUCE.
   3.2. ROOT WADS SHALL HAVE A MINIMUM ROOT MASS DIAMETER OF 2.0 m, WITH THE TRUNK CENTERED ON THE ROOT MASS.
   3.3. 20-30% OF THE ROOT MASS SHALL BE BURIED IN THE CHANNEL.
   3.4. ANCHOR ROOT WAD USING MINIMUM 1/4" STAINLESS STEEL AIRCRAFT CABLE WRAPPED AROUND TREE TRUNK. ANCHOR ONE END OF CABLE TO SHORE AND OTHER END TO STREAM BOTTOM, ACCORDING TO ANCHORING DETAIL.
   3.5. ROOT WAD SHALL NOT EXTEND GREATER THAN 1/3 THE WIDTH OF THE STREAM CHANNEL.
4. ANCHORING NOTES:
   4.1. ANCHOR LOGS WITH MINIMUM 5/8" NON-WAXED, NON-GREASED AIRCRAFT CABLE (WIRE CORE).
   4.2. RUN CABLE THOUGH AXIS OF LOGS INTO TWO 300 mm TO 500 mm BOULDERS, SECURING CABLE TO BOULDERS VIA ROCK DRILLING. ENSURE THE HOLE FACES PERPENDICULAR TO THE SHEAR STRESS OF THE LOAD.
   4.3. DRILL HOLES MINIMUM 4" TO 6" DEEP INTO BOULDERS AND SECURE CABLE IN HOLES USING 2 PART EPOXY ADHESIVE IN HOLES DRILLED SLIGHTLY LARGER THAN CABLE DIAMETERS (HOLES TO BE CLEANED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS).
   4.4. FOR ALL ANCHORS, CABLE LENGTH (SLACK) SHOULD BE MINIMIZED TO THE EXTENT POSSIBLE TO PREVENT MOVEMENT OF LOGS AND ROOT WADS.



3 TYPICAL DETAIL NTS
ANCHOR



4 TYPICAL SECTION NTS
EROSION PROTECTION

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SITES SCR34 AND SCR37
20222632-08 AND 11

SCALE: AS SHOWN

BRITISH COLUMBIA

CIVIL
DETAILS

DRAWING	REVISION	SHEET
2632-08-C-501	0	15

Fisheries and Oceans Canada | Pêches et Océans Canada

Paragraphs 34.4(2)(b) and 35(2)(b) *Fisheries Act* Authorization
EMERGENCY AUTHORIZATION

November 2023 Amendment[1]

Authorization issued to
BC Ministry of Environment and Climate Change Strategy (MoECCS)

Attention to:
Thyren Jacobs
PO Box 9337 Stn Prov Govt
Victoria, B.C.
V8W 9M1 *(hereafter referred to as the "Proponent")*

Location of Proposed Project

Nearest community: Mission
District: Fraser Valley Regional District
Province: British Columbia
Name of watercourses and coordinates:

Priority sites:

1. CR-12 - Pattison Creek (near Sylvester Road): 49.224318°, -122.225164°
2. CR-28 - Carratt Creek (at Carratt Road bridge): 49.262427°, -122.217317°
3. CR-38 - Davies Creek: 49.175456°, -122.227440°

Remaining nine (lower priority) sites:

4. CR-13 - Legace Creek (near 11744 Stave Lake Road): 49.215732°, -122.251508°
5. CR-14 - Legace Creek (at 10491 Farms Road): 49.191343°, -122.250592°
6. CR-15 - Legace Creek (at Seux Road): 49.217294°, -122.236456°
7. CR-16 - Legace Creek (from confluence with Pattison Creek to Seux Road Bridge): 49.131411°, -122.135081°
8. CR-17 - Legace Creek (between Pattison Creek and Allan Lake)
   Site 1 - Failed Driveway: 49.235909°, -122.218453°
   Site 2 - Legace Creek Tributary: 49.240045°, -122.217729°
9. CR-34 - South Herford Creek: 49.208806°, -122.230723°
10. CR-35 - McNab Creek: 49.245478°, -122.216991°
11. CR-36 - Eng Creek: 49.249415°, -122.217877°
12. CR-37 - North Herford Creek: 49.209358°, -122.231182°

Valid Authorization Period

This Authorization remains in force from the **Date of Issuance** until **December 31, 2030**.

[1] This is the first amendment to *Fisheries Act* Authorization 22-HPAC-01308 originally issued on October 27, 2022. Amendments to this Authorization will be highlighted in footnotes.

Please note that this Authorization may contain more specific timing requirements and limitations. These are set out in the Conditions of Authorization section.

Description of Proposed Project

The proposed project of which the work, undertaking or activity authorized is a part of involves:

- Emergency works to remove accumulations of sediment, organic debris or anthropogenic debris ("debris") in locations where it poses a risk to downstream infrastructure (e.g., bridges or homes) under high flow conditions between 2022 and 2024[2], and/or
- Completing emergency works to stabilize bank slopes and implement erosion protection measures.

The project is described in the following documents, hereafter referred to collectively as the "Project Plan":

- Application Form and supporting documents for the Issuance of an Authorization under Paragraphs 34.4(2)(b) and 35(2)(b) of the *Fisheries Act* (Emergency Situation) received on October 13, 2022.
- *The Ministry of Environment and Climate Change Strategy: Pattison, Carratt and Davies Creeks – Sediment Removal and Bank Protection Environmental Management Plan* report produced by Associated Environmental Consultants Inc. dated October 2022.

Description of Authorized work(s), undertaking(s) or activity(ies) likely to result in the death of fish by means other than fishing and/or the harmful alteration, disruption or destruction of fish habitat:

- Site isolation using either pumps or temporary diversion channels;
- Removal of watercourse substrate (including sediment or debris) using excavators, large trucks, and hand tools;
- Relocation and/or removal of large woody debris from the watercourses using excavators, large trucks, and hand tools;
- Bank repairs and installation of erosion protection measures; and
- Removal of riparian vegetation for site access.

The authorized work(s), undertaking(s), or activity(ies) are likely to result in the following impacts to fish and fish habitat:

- Alteration and disruption of aquatic habitat including substrate removal and replacement likely to result in a reduction in habitat availability and complexity, and cause sedimentation.
- Site isolation leading to a temporary disruption to fish passage which may impact life history stages including spawning, migration, overwintering and rearing.

[2] November 2023 Amendment: Changed from "in the 2022 fall and 2023 spring periods" to "between 2022 and 2024".

- Alteration and disruption to stream bank habitat likely to result in a reduction in habitat function of both the aquatic and riparian habitat.
- Alteration, disruption and destruction of riparian habitat for site access.

Riparian and aquatic footprints of the above WUAs for Pattison, Carratt and Davies Creeks shall not exceed what is described in the Project Plan. For the nine lower-priority sites, riparian and aquatic footprints shall not exceed what is required to alleviate flood risk based on the Risk Assessment Methodology of the Project Plan.

Conditions of Authorization

The above-described work, undertaking or activity must be carried on in accordance with the following conditions.

1. **Conditions that relate to the period during which the work, undertaking or activity can be carried on**

   The work, undertaking or activity that is/are authorized to be carried on during the following period:

   FROM: Date or Issuance TO: December 31, 2024[3]

   If the Proponent cannot complete the work, undertaking or activity during this period, Fisheries and Oceans Canada (DFO) must be notified in advance of the expiration of the above time period. An application for amendment, suspension or cancellation of the authorization should be submitted to DFO.

   The periods during which other conditions of this authorization must be complied with are provided in their respective sections below.

2. **Conditions that relate to measures and standards to avoid and mitigate impacts to fish and fish habitat**

2.1 Works, undertakings, and activities shall be conducted in a manner that avoids the death of fish.

2.2 A Qualified Environmental Professional will be onsite during high-risk instream and riparian works (e.g., substrate removal, riparian vegetation removal) to oversee/direct avoidance and mitigation measures to reduce impacts to fish and fish habitat and avoid unauthorized death of fish by means other than fishing and harmful alteration, disruption and destruction of fish habitat.

2.2.1 Conduct full time observations for all fish species that may be present near and within the project footprint and modify or direct works to the extent possible to avoid or minimize potential injury and death of fish;

2.2.2 Prior to sediment removal and other instream disturbances, isolate work site(s) and salvage fish;

[3] November 2023 Amendment: Changed from December 31, 2023 to December, 31, 2024.

2.2.3 Fish salvage methodologies should consider the winter nocturnal activity of juvenile salmonids (e.g. Pacific salmon and trout species) that may spend the day concealed in the stream substrates. Where isolation occurs, conduct fish salvage between dusk and dawn (sunset/sunrise) when fish emerge to forage, to avoid and mitigate against the death of juvenile fish;

2.2.4 Relocate all salvaged fish species from the work area, or those holding below a work area, back to the same watercourse in a nearby area that is not impacted by construction or removal works or its zone of influence (i.e., areas of higher turbidity due to instream works);

2.2.5 Conduct full time monitoring for deleterious substance released during the removal of sediment and direct avoidance and mitigation measures to reduce impacts to fish and fish habitat and avoid unauthorized death of fish by means other than fishing and harmful alteration, disruption and destruction of fish habitat and to prevent their further movement into the watercourse; and

2.2.6 Monitor implementation of the conditions of this authorization.

2.3 Sediment and erosion control: Sediment and erosion control measures must be in place and shall be upgraded and maintained, such that release of sediment is avoided at the location of the authorized work, undertaking, or activity. Monitor the watercourse for signs of sedimentation resulting from the works, undertakings or activities and take corrective action if required.

2.3.1 Areas of streambank disturbed during the works shall be rehabilitated to a stable condition (e.g. re-sloped and contoured) and protected from erosion.

2.4 List of measures and standards to avoid and mitigate impacts to fish and fish habitat:

2.4.1 Every reasonable effort should be made to minimize the frequency and duration of instream works, including excavation. Work from established infrastructure, above the high water mark (i.e., top of bank), or at a minimum above the water line when possible. Restrict instream disturbance to the area(s) required to access and remove accumulations of sediment;

2.4.2 Fish passage is to be maintained around the isolated work zones through the implementation of a diversion channel where practicable. Sites with expected adult salmon presence with spawning and/or overwintering habitat upstream should be prioritized for a diversion channel. If a diversion channel is not practicable and fish are observed holding below the work zone, ongoing fish salvage is required to relocate fish around the work zone;

2.4.3 Large woody debris can only be removed from the floodplain if it poses imminent risk to downstream infrastructure and property. Where possible, stockpile the natural debris removed from the floodplain to an area that can be accessed for future restoration work. Reinstall root wads or large woody debris below the high water mark where practicable;

2.4.4 Do not stockpile materials such as rock, riprap, or dirt in areas where the material has the potential to enter fish-bearing waters;

2.4.5 Maintain all machinery on site in a clean condition and free of fluid leaks. All heavy equipment should use environmentally friendly oil ("enviro-oil");

2.4.6 Fuel should be stored a minimum of 30 m from any watercourse. Wash, refuel and service machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the watercourse;

2.4.7 Have spill containment and clean-up materials within operating machinery and vehicles and on site in case of leaking deleterious substances (e.g., fuel, oil, grease) from extracted anthropogenic debris. Report leaks or spills of deleterious substances that have caused, or are about to cause, the unauthorized death of fish by means other than fishing and/or the harmful alteration, disruption or destruction of fish habitat to DFO.PACViolations-infractionsPAC.MPO@dfo-mpo.gc.ca and to Observe, Record, Report at 1-800-465-4336 or DFO.ORR-ONS.MPO@dfo-mpo.gc.ca;

2.4.8 Dispose of all anthropogenic debris removed at an appropriate waste management facility as required; and

2.4.9 Works must be conducted in the dry. Follow DFO's interim Standard for In-Water Site Isolation: (https://www.dfo-mpo.gc.ca/pnw-ppe/codes/interim-provisoire/site-isolation-confinement-aire-travail-eng.html); DFO's interim Code of Practice for End-of-Pipe Fish Protection Screens for Small Water Intakes in Freshwater: (https://www.dfo-mpo.gc.ca/pnw-ppe/codes/screen-ecran-eng.html); and follow DFO's Code of Practice for Temporary Fords: (https://www.dfo-mpo.gc.ca/pnw-ppe/codes/temporary-fords-traversees-temporaires-eng.html)[4]. If works cannot be conducted in the dry due to high flow conditions, the work area must be decommissioned and fish passage reinitiated until conditions allow for site isolation.

2.5 Avoid removal of riparian vegetation, particularly mature trees, as much as possible. Where removal of riparian vegetation is not avoidable:

2.5.1 Prune or top the vegetation instead of grubbing/uprooting;

2.5.2 Construct access points and approaches perpendicular to the watercourse;

2.5.3 Rehabilitate areas of the streambank disturbed during the works to a stable condition (e.g., sloped and contoured and protected from erosion);

2.5.4 Re-vegetate disturbed areas with native trees, shrubs and grasses species suitable for the site; and

2.5.5 Where possible, incorporate bioengineering (i.e., pocket planting, live staking, root wad placement, etc.) within the bank restoration and erosion protection designs.

[4] November 2023 Amendment: Changed from "DFO's Interim Code of Practice for Temporary Cofferdams and Diversion Channels" to "DFO's interim Standard for In-Water Site Isolation". Also changed from "DFO's Interim Code of Practice for Temporary Stream Crossings" to "DFO's Code of Practice for Temporary Fords".

2.6 Avoid the installation of riprap bank slopes to the extent practicable.

2.7 Avoid works, undertakings or activities in Critical Habitat (as defined under the *Species at Risk Act*), or the handling or harm of species listed as Threatened or Endangered under the *Species at Risk Act*. If these aforementioned works, undertakings, or activities are required, works must stop and Proponent shall contact DFO for additional guidance and/or permitting.

2.8 Contingency measures shall be put in place if monitoring required in section 3 below indicates that the measures and standards to avoid and mitigate impacts to fish and fish habitat are not successful.

2.9 Dates by which these measures and standards shall be implemented: Measures and standards to avoid and mitigate impacts to fish and fish habitat shall be implemented prior to the initiation of works, undertakings or activities.

3. Conditions that relate to monitoring and reporting of measures and standards to avoid and mitigate impacts to fish and fish habitat.

3.1 Monitoring of avoidance and mitigation measures: The Proponent shall monitor the implementation of avoidance and mitigation measures referred to in section 2 of this authorization and report to DFO, within 30 days post-construction, and indicate whether the measures and standards to avoid and mitigate impacts to fish and fish habitat were conducted according to the conditions of this authorization. This shall be done by:

3.1.1 Demonstration of effective implementation and functioning: Providing dated photographs and inspection reports to demonstrate effective implementation and functioning of mitigation measures and standards described above to limit the impacts to fish and fish habitat to what is covered by this authorization; and

3.1.2 Contingency measures: Providing details of any contingency measures that were followed, to prevent impacts greater than those covered by this authorization in the event that mitigation measures did not function as described.

3.2 Other monitoring and reporting conditions:

3.2.1 Providing dated photographs of each debris removal, inspection reports and details outlining how each condition of this Authorization was met, and whether avoidance and mitigation measures were effective in reducing or limiting serious harm to fish to what is authorized herein;

3.2.2 Providing a geospatial polygon that accurately represents the completed HADD footprint(s). Geospatial polygon data should be collected using WGS 1984 to four (4) decimal places (e.g., 28.5234ºN, 80.6830ºW). Geospatial polygon data must be supplied in Shape File (.shp) format to ReferralsPacific@dfo-mpo.gc.ca with reference to DFO file: 22-HPAC-01308. In addition to the geospatial polygon, the following data must also be supplied in an Excel file (i.e., metadata):

- The date of sediment/debris removal, the type of debris removed (e.g., log jam, boulders etc.), the watercourse of removal, the coordinates of removal, if leaks or spills of deleterious substances were documented and mitigation measures to contain and clean leaks and spills;

- The type of HADD (e.g., riparian removal, aquatic footprint, etc.), the date of the HADD, and HADD area per habitat type (based on depth during high and low water seasons, high water mark); and

- Brand name and model of GPS unit, the coordinate system used, and guaranteed accuracy of GPS unit.

3.2.3 Providing a summary of observational mortality for the death of fish (e.g., eggs, alevins, fry) by means other than fishing related to the works, undertakings or activities.

3.2.4 Providing a summary of the fish salvaged. The information summarized shall include dates, the number of individuals salvaged, the location of salvage and relocation, and the nature of any effects to fish salvaged (capture, death, sub-lethal harm, etc.).

3.2.5 Providing details of any contingency measures that were followed, should prescribed mitigations not function as intended, to contain the impacts to fish and fish habitat to that which is authorized herein.

4. Conditions that relate to offsetting

4.1 Upon receipt and review of the monitoring results and supporting documentation outlined in section 3 above, DFO will determine whether offsetting is required.

4.2 If offsetting is required, the Proponent shall prepare a draft offsetting plan, consistent with the DFO's *Policy for Applying Measures to Offset Adverse Effects on Fish and Fish Habitat Under the Fisheries Act* and *Applicant's Guide Supporting the "Authorizations Concerning Fish and Fish Habitat Protection Regulations"* and provide it to DFO within 45 days of receipt that an Offsetting Plan is required.

4.3 If offsetting is required, the offsetting plan shall include the information identified in Schedule 1, Section 16 of the *Authorizations Concerning Fish and Fish Habitat Protection Regulations*, including an offsetting effectiveness monitoring plan.

4.4 Once acceptable to DFO, the offsetting plan shall be implemented with any additional requirements from DFO.

Authorization Limitations and Application Conditions

The Proponent is solely responsible for plans and specifications relating to this authorization and for all design, safety and workmanship aspects of all the works associated with this authorization.

The holder of this authorization is hereby authorized under the authority of Paragraphs 34.4(2)(b) and 35(2)(b) of the *Fisheries Act*. R.S.C., 1985, c.F-14, to carry on the work(s), undertaking(s) and/or activity(ies) that are likely to result in impacts to fish and fish habitat as described herein.

This authorization does not purport to release the applicant from any obligation to obtain permission from or to comply with the requirements of any other regulatory agencies.

This authorization does not permit the deposit of a deleterious substance in water frequented by fish. Subsection 36(3) of the *Fisheries Act* prohibits the deposit of any deleterious substances into waters frequented by fish unless authorized by regulations made by Governor in Council.

It is also your *Duty to Notify* DFO if you have caused, or are about to cause, the unauthorized death of fish by means other than fishing and/or the harmful alteration, disruption or destruction of fish habitat. Such notifications should be directed to DFO.PACViolations-InfractionsPAC.MPO@dfo-mpo.gc.ca **and** to Observe, Record, Report at 1-800-465-4336 or DFO.ORR-ONS.MPO@dfo-mpo.gc.ca.

The failure to comply with any condition of this authorization constitutes an offence under Paragraph 40(3)(a) of the *Fisheries Act*, and may result in charges being laid under said Act.

A copy of this authorization should be kept on site while the work is in progress and upon request be provided to relevant federal or provincial officials. The authorization holder is responsible for ensuring work crews are familiar with, and able to adhere to, the conditions.

This authorization cannot be transferred or assigned to another party. If the work(s), undertaking(s) or activity(ies) authorized to be conducted pursuant to this authorization are expected to be sold or transferred, or other circumstances arise that are expected to result in a new Proponent taking over the work(s), undertaking(s) or activity(ies), the Proponent named in this authorization shall advise DFO in advance.

Date of Issuance: November 23, 2023

Approved by: Rotinsky, Brenda
Digitally signed by Rotinsky, Brenda
Date: 2023.11.23 12:41:22 -08'00'
Foxit PDF Editor Version: 13.0.0

Brenda Rotinsky
Watershed Operations Regulatory Manager
Fish and Fish Habitat Protection Program, Pacific Region
Fisheries and Oceans Canada

July 17, 2024 File Number: 2011076

Attention: Thyren Jacobs
Ministry of Environment and Climate Change Strategy
PO BOX 9047 STN PROV GOVT
VICTORIA, BC V8W 9E2
Sent via email: Thyren.Jacobs@gov.bc.ca

Dear Thyren Jacobs,

Re: Application for approval to make changes in South Herford Creek and North Herford Creek Within Sylvester Road Right of Way and Lots 1, 3, 7, 9 and 10, Sections 13 and The South West ¼ of Section 18 and 21, New Westminster District, Plans 60888, 30229, 68954, 57817, Except Part Subdivided by Plan 60888 and Together With Crown Land Covered By Water Being Part of the Beds of North and South Herford Creek held under PCL# 29840.

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 the 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.

You must advise Water Authorizations at SouthCoastWSAReporting@gov.bc.ca, with the Approval number in the subject line, five working days prior to commencement and five working days following completion of the authorized work.

Ministry of Water, Land and Resource Stewardship
Stream Management Authorizations – South Coast
Website: www.gov.bc.ca/water
Suite 200, 10428 - 153 St
Surrey, BC V3R 1E1
Phone: (604) 586-4400
Fax: (604) 586-4444

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.

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,



Michael Currie
Assistant Water Manager

cc: Naomi Sands, Environmental Scientist, Associated Engineering, Email: sandsn@ae.ca
Pradeep Poudel, Authorizations Specialist, Ministry of Water, Land and Resource Stewardship, Email: Pradeep.1.Poudel@gov.bc.ca
Kwantlen First Nation
Leq'a:mel First Nation
Matsqui First Nation
Peters First Nation
Semiahmoo First Nation

The People of the River Referrals Office (PRRO)

July 17, 2024 File Number: 2011076

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 name of the streams are South Herford Creek and North Herford Creek, herein referred to as "the stream".

(b) The changes to be made in and about the stream are:

SCR-34 site (South Herford Creek)

1. Remove sediment and debris from the channels for over 925 square meters/3010 cubic meters to improve hydraulic capacity with varying depths of maximum of 1 m for over 300 m of creek length.
2. Bank erosion repairs at two locations over 122 square meters to mitigate the risk of channel avulsion for approximately 20 meters of creek length.
3. Remove debris jam for over 100 square meters approximately 20 meters of creek length.
4. Riprap placement along channel banks protects against erosion for approximately 450 square meters for over 78 meters of creek length.
5. Post-sediment removal restoration through habitat complexing. Installation of root wads and boulders back within the creek where feasible (at three location) for habitat restoration.

SCR-37 site (North Herford Creek)

1. Remove sediment and debris from the channels and culverts over 7610 square meters/2605 cubic meters to improve hydraulic capacity with varying depths of maximum of 1.5 meters for over 300 m of creek length.
2. Bank erosion repairs at two locations for over 808 square meters to mitigate the risk of channel avulsion for approximately 80 meters of creek length.

Ministry of Water, Land and Resource Stewardship
Stream Management Authorizations – South Coast
Website: www.gov.bc.ca/water
Suite 200, 10428 - 153 St
Surrey, BC V3R 1E1
Phone: (604) 586-4400
Fax: (604) 586-4444

3. Remove debris jam over 150 square meters for over 10 meters of creek length.
4. Riprap placement along channel banks and culvert inlet/outlet for protection against erosion over 1172 square meters for approximately 133 meters.
5. Post-sediment removal restoration through habitat complexing. Installation of root wads and boulders back within the creek where feasible (at three location) for habitat restoration.

All works shall occur Within Sylvester Road Right of Way and Lots 1, 3, 7, 9 and 10, Sections 13 and The Southwest ¼ of Section 18, Townships 18 and 21, New Westminster District, plans 60888, 30229, 68954, 57817, Except Part Subdivided by Plan 60888 and Together With Crown Land Covered By Water Being Part of the Beds of North and South Herford Creek held under PCL# 29840.

(c) The location of the works are at the following coordinates, as provided by the applicant: 49.2082800, -122.2279200 and 49.2093000, -122.2281800.

(d) The works authorized in this Approval shall be completed on or before December 31, 2024.

(e) The holder of this Approval must advise Water Authorizations at SouthCoastWSAReporting@gov.bc.ca with the Approval number in the subject line, five (5) working days prior to commencement of the authorized work and five (5) working days upon completion of the works authorized in this Approval.

(f) All works associated with the Effectiveness Monitoring Plan, as outlined in clause (z) below, shall be completed within three years after the works are completed, December 31, 2027.

(g) 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.

(h) 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. "North and South Herford Creeks (SCR 37 and 34) Bank Protection and Sediment Removal Environmental Management Plan", prepared by Associated Environmental for the Ministry of Environment and Climate Change Strategy, dated January 2024.
2. "Hatzic Emergency Work Program Hydrology and 2D Hydraulic Model Overview", prepared by Associated Engineering for Ministry of Environment and Climate Change Strategy, dated April, 2024.
3. Engineering Memo "Preliminary Site Assessment of Potential Areas of Immediate Concern PWC Site ID: S-CR-34- South Herford Creek Hatzic, BC", prepared by Associated Engineering for Ministry of Environment and Climate Change Strategy, dated June 23, 2022.
4. Engineering Memo "Preliminary Site Assessment of Potential Areas of Immediate Concern PWC Site ID: S-CR-37- North Herford Creek Hatzic, BC", prepared by Associated Engineering for Ministry of Environment and Climate Change Strategy, dated June 23, 2022.
5. Stamped engineering drawings, RFP for Hatzic Emergency Works Program Sites SCR34 and SCR37 -2022632-08 And 11 "2632-08-G-002 General Legend"; "2632-08-G-003 General Location Plan SCR34 and SCR37" prepared by Associated Engineering for BC Ministry of Environment and Climate Change Strategy, dated March 28, 2024.
6. Stamped engineering drawings, RFP for Hatzic Emergency Works Program Sites SCR34 and SCR37 -2022632-08 And 11 "2632-08-G-004- General SCR 37 Plan Access and Laydown Area"; " 2632-08-G-005- General SCR 37 Plan Access and Laydown Area"; " 2632-08-C-101 – Civil SCR37 Plan STA 0+000 to STA 0+230" ; "2632-08-C-102 – Civil SCR37 Plan STA 0+230 to STA 0+450"; "2632-08-C-103 – Civil SCR37 Plan STA 0+450 to STA 0+640"; "2632-08-C-104 – Civil SCR37 Plan/Profile STA 0+000 to STA 0+640", prepared by Associated Engineering for BC Ministry of Environment and Climate Change Strategy, dated March 28, 2024.
7. Stamped engineering drawings, RFP for Hatzic Emergency Works Program Sites SCR34 and SCR37 -2022632-08 And 11 "2632-08-C-110- Civil SCR 34 Plan STA 0+000 to STA 0+210"; " 2632-08-C-111- Civil SCR 34 Plan STA 0+210 to STA 0+400" ; "2632-08-C-112 – Civil SCR34 Plan STA 0+400 to STA 0+610"; "2632-08-C-113 –Civil SCR34 Plan/Profile STA 0+000 to STA 0+340", prepared by Associated Engineering for BC Ministry of Environment and Climate Change Strategy, dated March 28, 2024.
8. Stamped engineering drawings, RFP for Hatzic Emergency Works Program Sites SCR34 and SCR37 -2022632-08 And 11 "2632-08-C-301- Civil Sections"; "2632-

08-C-501 Civil Details"; prepared by Associated Engineering for BC Ministry of Environment and Climate Change Strategy, dated March 28, 2024.

(i) The holder of this Approval must provide as-built drawings post-construction within 60 days of completion of the works. The drawings must include all modifications made from the initial drawings during the construction process and include justification for the modifications. The drawings must be labelled with this Approval file number and labelled in the subject line of the email and submitted to SouthCoastWSAReporting@gov.bc.ca

(j) 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.

(k) 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.

(l) Wherever practicable, work must be carried out during favourable weather and low flow.

(m) Upon commencement of the project, the work must be pursued to completion as quickly as possible.

(n) All proposed works shall be completed in isolation of the stream flows.

(o) 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.

(p) 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).

(q) 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.

(r) 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.

(s) All excavated material and debris not being re-used on-site 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 all excavated material and debris from erosion and reintroduction into the watercourse.

(t) 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.

(u) Drought mitigation: Monitor current drought conditions as per the Provincial Drought Level Classification system (Level 0 – 5, Drought information – Province of British Columbia (gov.bc.ca)) during all instream works, undertakings and activities. Instream works shall cease if the Drought Level Classification is at Level 5. The proponent shall contact WLRS under this circumstance to evaluate current on-site conditions and additional avoidance and mitigation measures. Instream works may commence only after receiving written permission from a Water Manager.

1. If instream works are occurring during a period of drought or the dry summer period when the Drought Level Classification is below Level 5, and works involve the loss of habitat that provides cold water refugia for fish (e.g., deep pools), the QEP must ensure salvaged fish are relocated to an area that provides similar habitat conditions (e.g., well-shaded habitat, habitat with known ground-water upwelling, pools, or undercut banks).

2. Site isolation and fish salvage(s): Instream works, undertakings and activities where there is potential for fish presence shall only be carried out within previously isolated and salvaged areas. Incorporate applicable measures and standards from DFO's Interim standard: in-water site isolation and ensure pumps are screened to prevent entrainment or impingement of fish according to DFO's Interim Code of Practice for End-of-pipe Fish Protection Screens for Small Water Intakes. It is the Proponent's responsibility to obtain the necessary Federal and Provincial fish

collection permits for fish salvage and follow the conditions therein. The isolation areas shall be inspected regularly and maintained throughout the project.

(v) All temporary works (including, but not limited to, 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.

(w) 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.

(x) Rock used as riprap must be clean of any substances deleterious to aquatic life and must be durable, angular in shape and suitably graded and sized to resist movement by stream flow. Any other engineering material required for the construction of the works must be clean of any substances deleterious to aquatic life.

(y) 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.

(z) 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,



Michael Currie
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 (29840), whose Change Approval authorizes changes in and about a stream (North Herford Creek, South Herford Creek), is hereby authorized to occupy Crown Land by constructing, maintaining and operating the works as authorized in the Change Approval (2011076).

(a) The Crown land which is authorized to be occupied under this permit is a portion of Crown Land Covered By Water Being Part of the Beds of North and South Herford Creek., the location of which is shown approximately on the plans listed in said Change Approval.

(b) The approximate dimensions of the Crown Land authorized to be occupied under this permit, are approximately 1.0157 hectares.

(c) Prior to cutting, destroying or clearing of any timber necessary to construct, maintain and operate the said works or the clearing of the said lands which may be flooded, the permittee shall apply for and obtain a licence to cut timber from the Ministry of Forests, District Manager. The amount of stumpage, royalty and/or compensation payable to the Crown in respect of trees, including merchantable or young growth, cut, removed, damaged, or destroyed by the permittee, shall be the sum or sums fixed by the Forest Service of the Province of British Columbia.

(d) This permit is appurtenant to the land, mine, or undertaking to which the aforesaid Change Approval is appurtenant.

(e) This permit shall become void if the Change Approval with respect to which the permit is issued should terminate, be abandoned or cancelled, or amended so as to render this permit unnecessary.

(f) This permit is issued and accepted on the understanding that the permittee shall indemnify and save harmless the Government of the Province of British Columbia for all loss, damage to works, cost or expense suffered by the permittee by reason of the Crown land or any portion thereof being submerged or damaged by erosion or otherwise affected by flooding.

(g) The holder of this permit shall not be entitled to compensation if the Crown grants permits to other persons to occupy the land affected by this permit.

(h) In the event of a dispute at any time with respect to the area or boundaries of the land affected by this permit, the holder shall, at his own expense, have the said land surveyed by a duly authorized surveyor.



Michael Currie
Assistant Water Manager

August 20, 2024 File Number: 2011076

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

Sent via email: Thyren.Jacobs@gov.bc.ca

Dear Thyren Jacobs,

Amending Order for Change Approval# 2011076

For reasons set out in the enclosed order, the Ministry of Water, Land & Resource Stewardship, Surface Water Authorizations, has deemed it appropriate to amend clauses (b) of the Approval under Section 26(1) of the *Water Sustainability Act*.

This new documentation should be attached to your copy of Approval # 2011076

All other conditions of the original Approval dated July 17, 2024, still apply.

The *Water Sustainability Act* gives the recipient of this notice the right to appeal my decision. Any appeal from this decision must be filed within 30 days of delivery of this notice to you. Information on filing an appeal can be found on the Environmental Appeal Board Website at: http://www.eab.gov.bc.ca/.

Sincerely,

Michael Currie
Assistant Water Manager

Cc: Naomi Sands, Environmental Scientist, Associated Engineering, Email: sandsn@ae.ca
Pradeep Poudel, Authorizations Specialist, Ministry of Water, Land and Resource

Ministry of Water, Land and Resource Stewardship
Stream Management Authorizations – South Coast
Website: www.gov.bc.ca/water
Suite 200, 10428 - 153 St
Surrey, BC V3R 1E1
Phone: (604) 586-4400
Fax: (604) 586-4444

Stewardship, Email: Pradeep.1.Poudel@gov.bc.ca

Ministry of Water, Land and Resource Stewardship

Mailing Address: 200-10428 153 Street, Surrey BC V3R1E1

Location: 200-10428 153 Street, Surrey BC V3R1E1

Phone: (604) 586-4400
Fax: (604) 586-4444
Web: https://www2.gov.bc.ca/gov/content/environment/air-land-water/water

August 20, 2024

O R D E R

WATER SUSTAINABILITY ACT
Section 26 (1)

Approval File Number: 2011076

The Province of British Columbia *Water Sustainability Act* having determined that an administrative error was made in the Approval for changes in and about North Herford Creek and being satisfied that no person's rights will be injuriously affected, I hereby amend Clause (b) of Approval 2011076 to read as follows:

(b) The changes to be made in and about the stream are:

SCR-34 site (South Herford Creek)

1. Remove sediment and debris from the channels for over 925 square meters/3010 cubic meters to improve hydraulic capacity with varying depths of maximum of 1 m for over 300 m of creek length.
2. Bank erosion repairs at two locations over 122 square meters to mitigate the risk of channel avulsion for approximately 20 meters of creek length.
3. Remove debris jam for over 100 square meters approximately 20 meters of creek length.
4. Riprap placement along channel banks protects against erosion for approximately 450 square meters for over 78 meters of creek length.
5. Post-sediment removal restoration through habitat complexing. Installation of root wads and boulders back within the creek where feasible (at three location) for habitat restoration.

SCR-37 site (North Herford Creek)

Ministry of Water, Land and Resource Stewardship

Stream Management
Authorizations – South Coast
Website: www.gov.bc.ca/water

Suite 200, 10428 - 153 St
Surrey, BC V3R 1E1
Phone: (604) 586-4400
Fax: (604) 586-4444

1. Remove sediment and debris from the channels and culverts over 7610 square meters/2605 cubic meters to improve hydraulic capacity with varying depths of maximum of 1.5 meters for over 640 m of creek length.
2. Bank erosion repairs at two locations for over 808 square meters to mitigate the risk of channel avulsion for approximately 80 meters of creek length.
3. Remove debris jam over 150 square meters for over 10 meters of creek length.
4. Riprap placement along channel banks and culvert inlet/outlet for protection against erosion over 1172 square meters for approximately 133 meters.
5. Post-sediment removal restoration through habitat complexing. Installation of root wads and boulders back within the creek where feasible (at three location) for habitat restoration.

All works shall occur Within Sylvester Road Right of Way and Lots 1, 3, 7, 9 and 10, Sections 13 and The Southwest ¼ of Section 18, Townships 18 and 21, New Westminster District, plans 60888, 30229, 68954, 57817, Except Part Subdivided by Plan 60888 and Together With Crown Land Covered By Water Being Part of the Beds of North and South Herford Creek held under PCL# 29840.

All other conditions of Approval 2011076 remain unchanged.

Dated at Surrey, BC this 19 day of August, 2024.

Sincerely,



Michael Currie
Assistant Water Manager

Fisheries and Oceans Canada | Pêches et Océans Canada

Licence Number: XHAB 456 2024
Valid From: 15-Aug-2024
Expiry Date: 30-Sep-2024

This licence and/or permit is issued under the authority of SECTION 52 OF THE FISHERY (GENERAL) REGULATIONS.

This licence and/or permit authorizes the person(s) listed below, subject to the following terms and conditions, to collect the species and quantity of fish identified below for: Scientific purposes. Non-compliance with any condition of this licence and/or permit may result in the cancellation of this licence and/or permit.

Licence/Permit Activity Description:
Fish salvage in for sediment removal project as approved under DFO Authorization 22-HPAC-01308.

This licence authorizes fishing for the purpose of fish salvage in the waterbodies listed in this licence. Fish salvage is required to remove fish using non-lethal methods from construction areas.

No fish may be retained under the authority of this licence.

Licence Holder:
FIN: 151673
2840 LOUGHEED HWY
AGASSIZ BC V0M 1A1

PEARSON, MIKE

Contact Number: 604-785-7246

Individuals or groups assisting with the authorized activity:

Employees of Pearson Ecological are authorized to fish under this licence. Employees, members and volunteers of the following groups and organizations are authorized to fish with Pearson Ecological under this licence:

- Leqamel First Nation

Species, Quantity of Fish, Area(s) and Gear:

Species:	COHO SALMON (Oncorhynchus kisutch); CHUM SALMON (Oncorhynchus keta); PRICKLY SCULPIN (Cottus asper);
Gear:	Dip Net Seine Net Electroshocker Trap, Gee/Minnow
Licence Area:	Lagace Creek; North Herford Creek; South Herford Creek
To be Retained:	0
Additional Descriptions:	**Area Description:** Legace Creek Salvage Area - Lagace Creek Farm Road to upstream of Seaux Road Herford Creeks Salvage Area - See Appendix for map **Life Stages:** Salmon species: juvenile Sculpin species - juvenile; adult

Reporting Requirements:

XHAB 429 2024 **Due Date** 31-Oct-2024
Submit report to: DFO.FIALicense-LicenseSFI.MPO@dfo-mpo.gc.ca

Terms and Conditions:

Licence authority: This licence authorizes fishing activities and sample collections to be undertaken by the Licence Holder and members, employees, volunteers and students of the Licence Holder and designated iindividuals or groups assisting the Licence Holder provided that all persons (other than minors who are engaged in activities under the authority of this licence) are carrying suitable photo identification to be produced upon request of a Fishery Officer or Fishery Guardian.

The Licence Holder/Operator must carry a copy of the licence while conducting fishing activities and while in possession of fish caught or fishing gear used for fishing under the authority of this licence and must produce this licence upon request by a Fishery Officer or Fishery Guardian.

Species permitted to be fished: This licence authorizes fishing for Coho salmon (*Oncorhynchus kisutch*), Chum Salmon (*Oncorhynchus keta*), and PRICKLY sculpin (*Cottus asper*)

This licence does not authorize fishing for non-anadromous (freshwater) species or Steelhead or Cutthroat trout. Approval to fish for these species must be obtained from the Province of British Columbia (BC) prior to the commencement of fishing.

Species at Risk: The Licence Holder/Operator is prohibited from fishing for species at risk or engaging in an activity affecting a species that is listed as “endangered” or “threatened” under Schedule 1 of the *Species at Risk Act* (SARA), including those identified anywhere in the Species, Quantity of Fish, Area(s) and Gear part of this licence, unless authorized under a separate permit issued in accordance with the *Species at Risk Act*.

Nothing in this licence shall be construed as authority to contravene Sections 32 (1), 32 (2), 33 or 58 of the *Species at Risk Act*, with respect to any species listed under SARA as extirpated, endangered, or threatened. If the activity may affect a listed wildlife species, any part of its critical habitat or its residences, a Section 73 SARA permit may be required in addition to this licence. For more information on SARA Section 73 permits, please visit: https://www.dfo-mpo.gc.ca/species-especes/sara-lep/permits-permis/index-eng.html or contact DFO.PACSAR-LEPPAC.MPO@dfo-mpo.gc.ca. A list of SARA protected species can be found at: https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html.

Fish and fish habitat: Projects in or near water must avoid causing ‘serious harm’ to fish unless authorized by the Minister of Fisheries & Oceans Canada (Applications for a Fisheries Act Authorization (normal or emergency) may be found at the following link: www.dfo-mpo.gc.ca/pnw-ppe/reviews-revues/authorization-autorisation-eng.html). This applies to any work being conducted in or near waterbodies that support fish that are a part of a commercial, recreational, or Aboriginal fishery, or to fish that support such a fishery.

Any person who causes or contributes to the death of fish, or causes any permanent alteration or destruction of fish habitat, that is not authorized, is required to report the occurrence to DFO. As well, that person must counteract, mitigate, or remedy the adverse effects that resulted from the occurrence, or that might have reasonably been

expected to result from it.

Area(s) permitted to be fished: Fishing for the purposes of fish salvage shall only take place in isolated in-water work areas, within the Licence Area(s) and the locations specified in this licence.

Reporting prior to fishing: The Licence Holder/Operator must call, and if not answered, leave a message at the Conservation and Protection Detachment closest to the fishing area, as specified in the Species, Quantity of Fish, Area(s) and Gear part of this licence. Notification must take place at least 24 hours prior to conducting activities and include the details and locations of fishing. See below for a list of Conservation and Protection Detachments and their respective contact numbers:

- Chilliwack: 604-824-3300
- Langley: 604-607-4150
- Squamish: 604-892-3230
- Steveston: 604-664-9250

Fishing gear: Notwithstanding s. 27 of the Fishery (General) Regulation, SOR/93-53, the Licence Holder/Operator must ensure that unattended gear is clearly marked with either the Vessel Registration Number, the Licence Number, or the name and phone number of the person who owns the gear. All gear left unattended must not interfere with the public right of navigation.

The Licence Holder/Operator is prohibited from discarding in Canadian fisheries waters any item that may be harmful to fish or fish habitat including but not limited to plastics, ropes, fishing gear, garbage bags, fuel, oil, rags, glass, bottles, metal, extruded polystyrene foam (e.g. Styrofoam), and tires.

While fishing under the authority of this licence, the Licence Holder/Operator is prohibited from interfering with lawful fishing activities by tampering with traps, nets, bait or any other thing used for fishing, and is prohibited from otherwise interfering with the conduct of the fishing activities by another person.

Manner in which fishing gear is permitted to be used: It is the responsibility of the Licence Holder/Operator to ensure that the authorized persons fishing under this licence are experienced and competent in the fish collection methods and gear authorized in this licence.

The Licence Holder/Operator must ensure that when setting non-tended gear (i.e., minnow traps, fyke nets) permitted under this licence, that non-tended gear must be tended at least once every 24 hours. If mortalities are observed the Licence Holder/Operator must reduce the set interval of the non-tended gear.

"Electrofishing" means using an electric current to attract and temporarily immobilize a fish to allow capture.

If electrofishing is to be used:
(a) A person trained and certified in the use of electrofishers must be a part of the electrofishing crew.
(b) Electrofishing must not be conducted in the vicinity of spawning gravel, redds or spawning fish, or around gravels which are capable of supporting eggs or developing embryos of any species of salmonid at a time of year when such eggs or embryos may be present. Electrofishing can be severely damaging to eggs and alevins and must be avoided where eggs and alevins may be present.
(c) Electrofishing is only permitted after extensive use of other gear during sampling activity indicates no presence of juvenile salmon. This condition does not apply in those areas and water conditions where the use of other gear may

cause more harm to fish then electrofishing.
(d) When water temperatures are less than 5 degrees Celsius (°C) or greater than 20 °C, all other permitted methodologies will be employed prior to the use of electrofishing wherever feasible during the salvage operation. Electroshocking is authorized as a last method of collection.

Fish sampling: The Licence Holder/Operator must ensure that sampling is completed by persons trained in proper fish handling techniques. The Licence Holder/Operator must ensure measurements of body condition, such as weight and length, which involve hands-on manipulation, are conducted quickly and in a manner that is minimally stressful.

No biological sampling (e.g., length or weight measurements) of salmon shall take place in waters having a temperature greater than 20 °C at the surface.

Release of fish: The Licence Holder/Operator must ensure that all species captured are released into the water body or course from which they originated, and as near as possible to the location from which they were sampled. Fish must be released in a manner that causes the least harm.

Introductions and transfers: Other than releasing live fish immediately into waters in which they were caught, the Licence Holder/Operator is prohibited from releasing live fish into fish habitat and/or transferring live fish to any fish rearing facility unless in possession of a licence issued pursuant to Section 56 of the Fishery (General) Regulations.

If the fishing activity, permitted in this licence, requires the release of live fish into fish habitat (other than releasing live fish immediately into waters in which they were caught) or the transfer of live fish into a fish rearing facility, the Licence Holder/Operator must contact the Introductions and Transfers Committee of the province representing the aquatic organisms' final destination to discuss whether an Introductions and Transfers Licence may be required. For more information regarding the review process for the movement of live fish, visit: https://www.dfo-mpo.gc.ca/aquaculture/management-gestion/it-code-eng.htm, or you may also contact:

- British Columbia Introductions and Transfers Committee by email at: DFO.BCITC-CITCB.MPO@dfo-mpo.gc.ca or DFO.salmonITC-CITsaumon.MPO@dfo-mpo.gc.ca

Aquatic Invasive Species (AIS): Nothing in this licence shall be construed as authority to import, possess, transport, release or introduce into a particular region or body of water frequented by fish where it is not indigenous, any aquatic invasive species listed in Parts 2 and 3 of the Schedule of the Aquatic Invasive Species Regulations (SOR/2015-121). The Aquatic Invasive Species Regulations can be found online at: https://laws-lois.justice.gc.ca/eng/regulations/SOR-2015-121/FullText.html.

To prevent the introduction of aquatic invasive species the Licence Holder/Operator must: a) Before leaving an area: Drain water from boat, trailer and gear, remove all plant parts and mud; and b) Before entering another water body: Wash all equipment and gear (including waders and boots) with soapy water and dry.

For further Information:

https://www.dfo-mpo.gc.ca/species-especes/ais-eae/index-eng.html

https://www.dfo-mpo.gc.ca/species-especes/ais-eae/prevention/index-eng.html

Clean, drain, dry and decontaminate: The Licence Holder/Operator must clean, disinfect and decontaminate all gear and equipment including waders, nets, electrofishing cathodes and anodes and buckets, boats and trailers that were used in any freshwater and coastal waters before transferring to another body of water.

Reporting upon expiry of the licence: The Licence Holder/Operator must submit a final report to the Department. The report shall be emailed to DFO.FIALicense-LicenseSFI.MPO@dfo-mpo.gc.ca within 30 days of the expiry date printed on this licence.

The report must contain at minimum:
1. License number;
2. Sampling date(s), time(s), crew, stream name, watershed name;
3. GPS position of site(s);
4. Number of captured aquatic organisms by species;
5. If conducted, bio-sampling data (lengths, weights); and
6. Any mortalities associated with sampling activities.

In the event that the licence holder does not fish under the authority of this licence, the licence holder is responsible for submitting a nil report. A nil report shall consist of the licence number and a statement indicating that no fishing took place.

Licence validity: The use of the licence(s) is subject to any conditions which are issued by Fisheries and Oceans Canada. The issuance of this licence implies no commitment by the Minister of Fisheries and Oceans Canada (DFO) to reissue the licence in subsequent years. This licence may be amended or revoked by DFO prior to the expiry date if deemed necessary.

Compliance with the *Fisheries Act*: Pursuant to subsection 22(6) of the Fishery (General) Regulations, compliance with the *Fisheries Act* and the regulations made under the Act is a condition of this licence.

By signing on this document, the person(s) listed below, agree to be bound by the terms and conditions that pertain to each person as an individual and to the group as a whole.

151673

FIN	Licence Holder - Print Name	Signature	Date

Licence Issued: 07 August 2024

Licence Printed: 07 August 2024
Licence Issued By: THOMAS POWELL, Fisheries and Oceans Canada



Associated Engineering

BEST MANAGED COMPANIES Platinum member

PROFESSIONAL ENGINEER C. MEDINA ESCOBAR # 58169 BRITISH COLUMBIA 2024.03.26

PERMIT TO PRACTICE
ASSOCIATED ENGINEERING (B.C.) LTD.
PERMIT NUMBER: 1000163
Engineers & Geoscientists BC

REV	DATE	DESIGN	DRAWN	DESCRIPTION
1	2024MAR20	L. MEDINA	M. LEZON	ISSUED FOR RFP
0	2023DEC15	L. MEDINA	M. LEZON	ISSUED FOR REGULATORY PERMITTING

BC MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY

HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

SCALE: AS SHOWN

BRITISH COLUMBIA

GENERAL LOCATION PLAN
SCR34 AND SCR37

DRAWING	REVISION	SHEET
2632-08-G-003	1	3

Figure 1: Map of proposed fish salvage sites.

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 deliverables[1] 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:	*Permit Applicant Name and title:*	*Signature:*
December 14, 2021	**Sarah Fraser** **A/Associate Deputy Minister,** **FLNRORD**	

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	*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*

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 _bookmark7to 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 PFR[2]. 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 archeological 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 form[4] 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 m^2 (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 boundary[5] 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 3m^3 sediments will be excavated by hand. **Additional details regarding approach:** Where deposits are in excess of 3 m^3, manual excavation should be conducted on a sampling basis with 100% of excess mechanically excavated site material screened or raked.

☒ When greater than 3 m^3 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 standards[7]. Rationale and details regarding a sampling strategy[8] 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).

SAMPLE

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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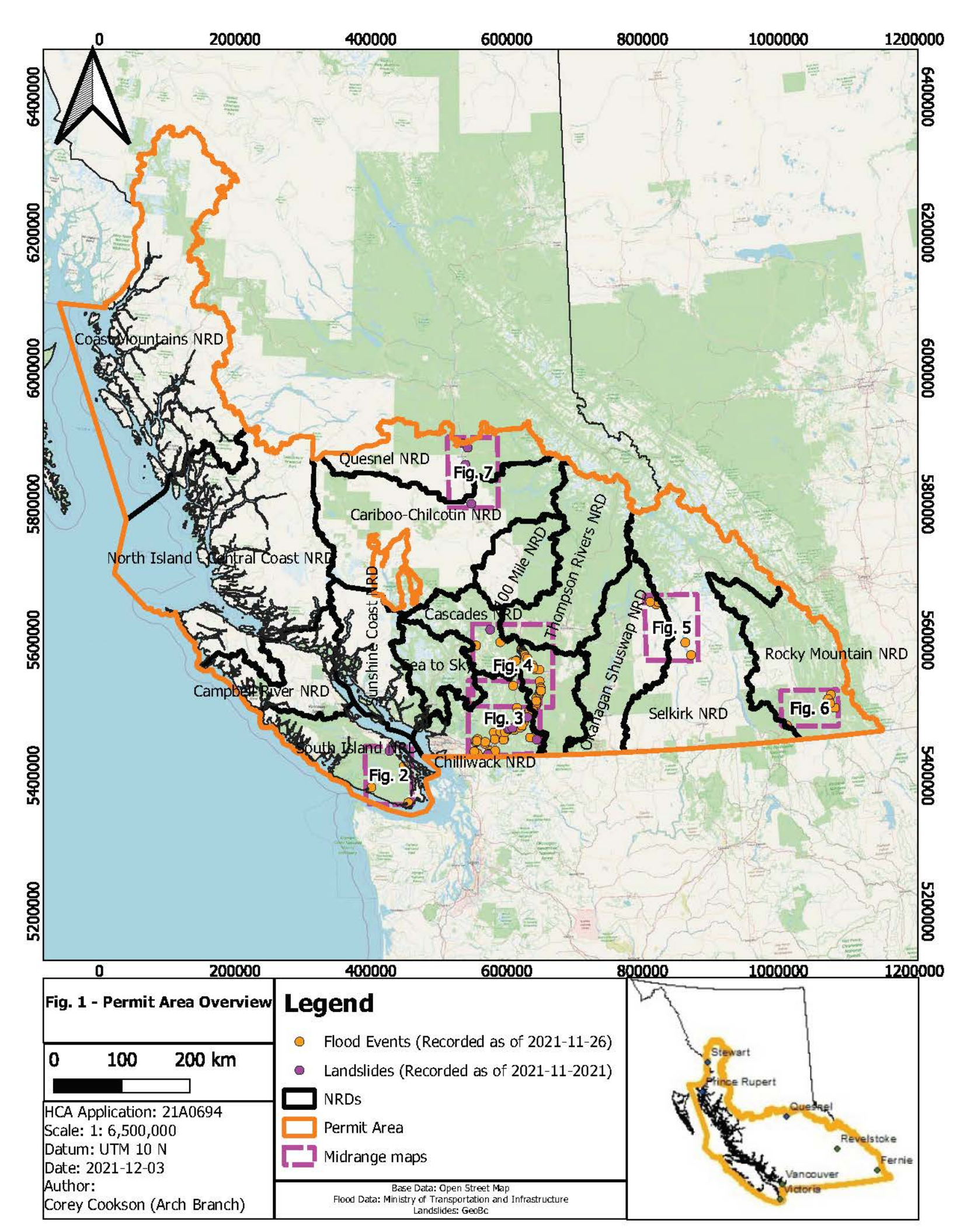
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GENERAL TERMS AND CONDITIONS OF PERMIT

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.


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5200000
Coast Mountains NRD
Quesnel NRD
Fig. 7
Cariboo-Chilcotin NRD
North Island - Central Coast NRD
Sunshine Coast NRD
100 Mile NRD
Thompson Rivers NRD
Okanagan Shuswap NRD
Cascades NRD
Sea to Sk
Fig. 4
Fig. 5
Rocky Mountain NRD
Campbell River NRD
Fig. 3
Selkirk NRD
Fig. 6
South Island NRD
Chilliwack NRD
Fig. 2
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
Stewart
Prince Rupert
Quesnel
Revelstoke
Fernie
Vancouver
Victoria

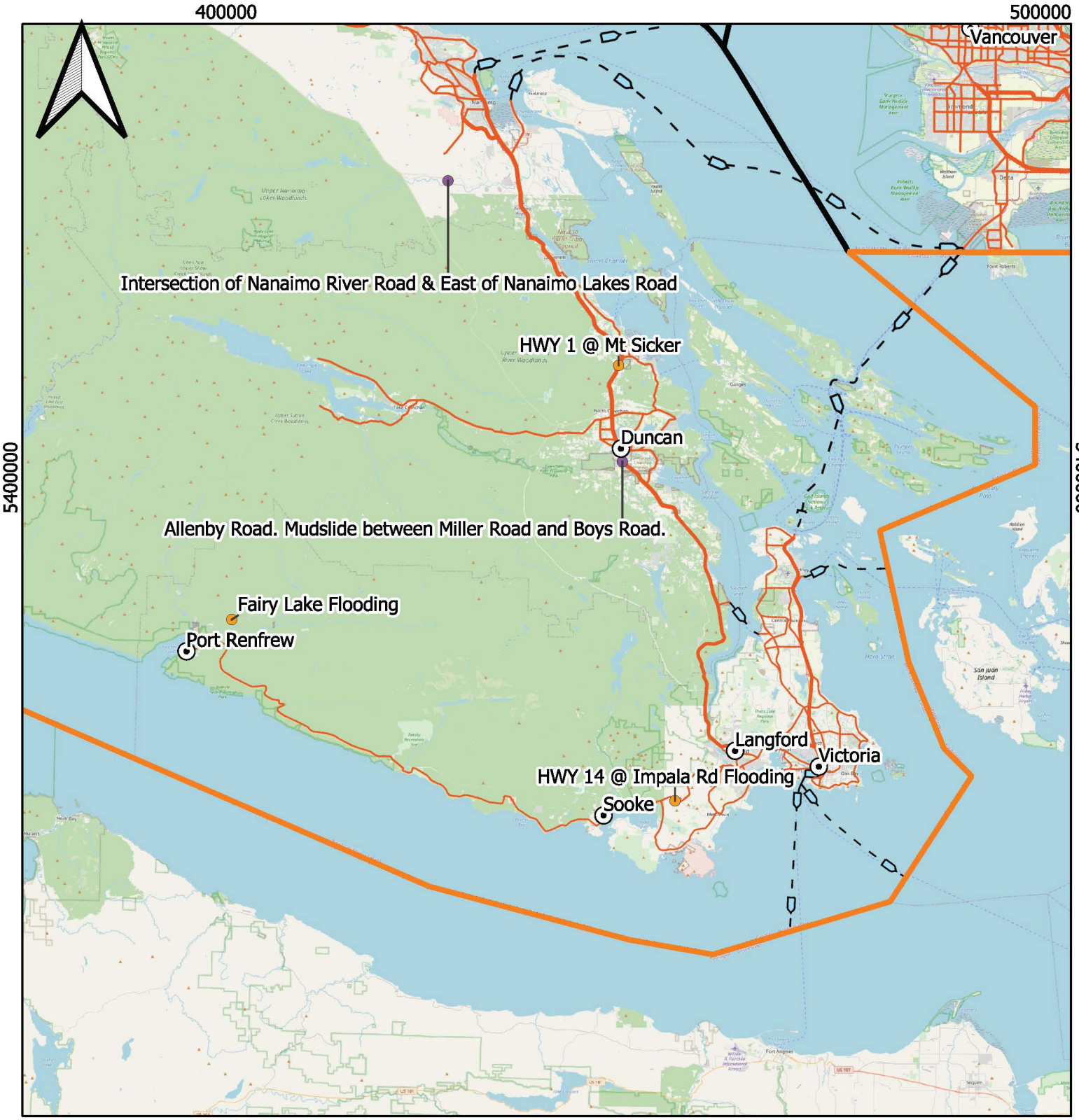


Fig. 2 Midrange - South Island

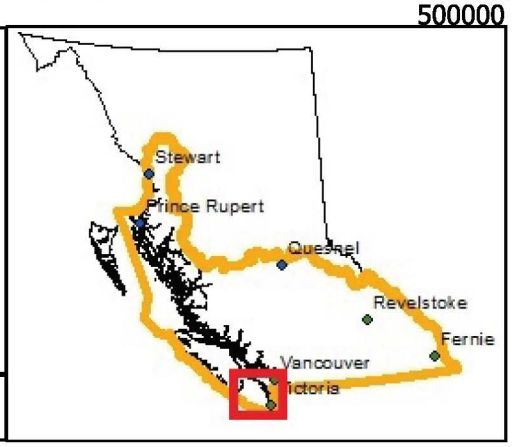
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HCA Application: 21A0694
Scale: 1: 650,000
Datum: UTM 10 N
Date: 2021-11-26
Author:
Corey Cookson (Arch Branch)

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



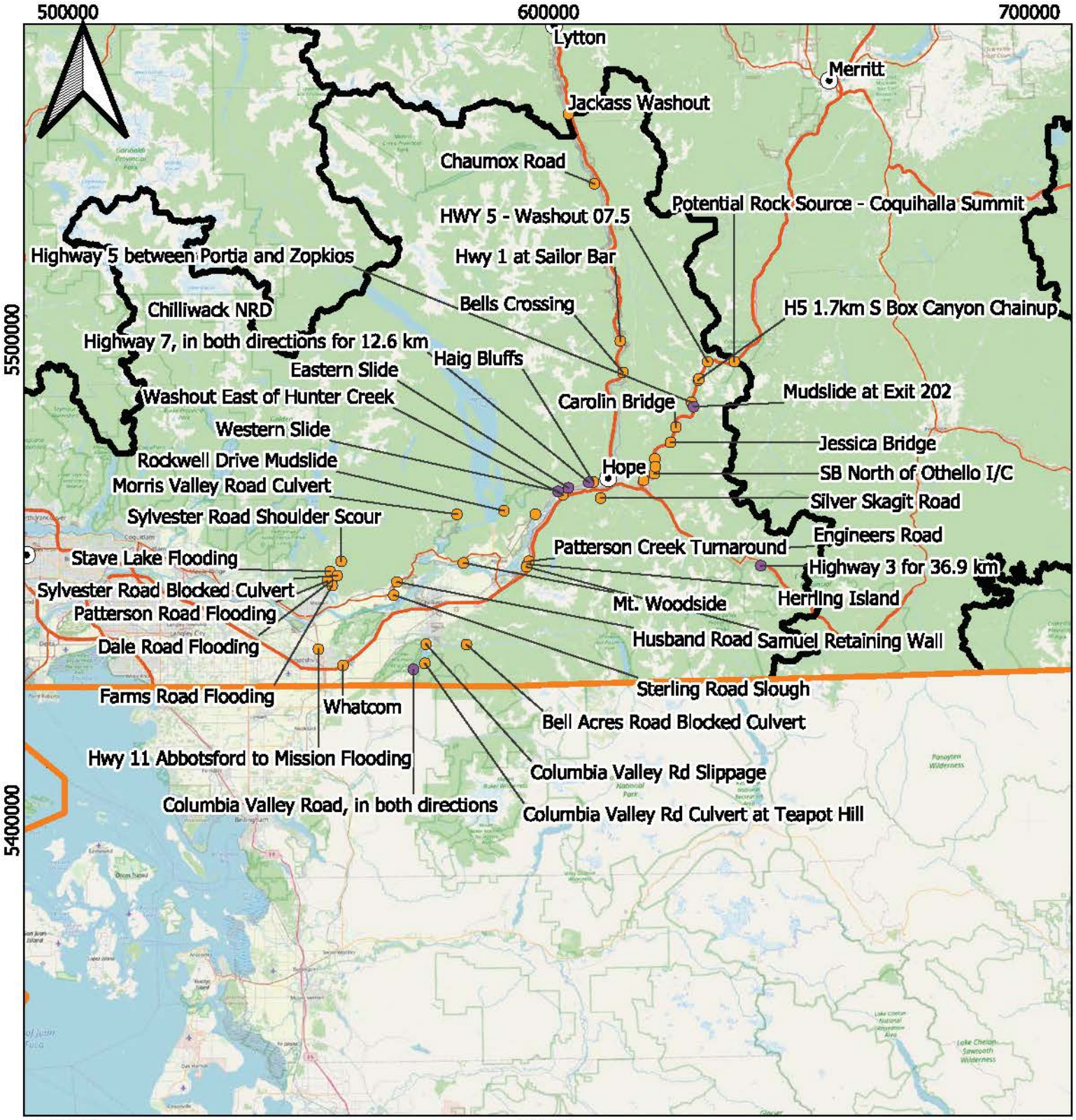


Fig. 3 Midrange - Chilliwack

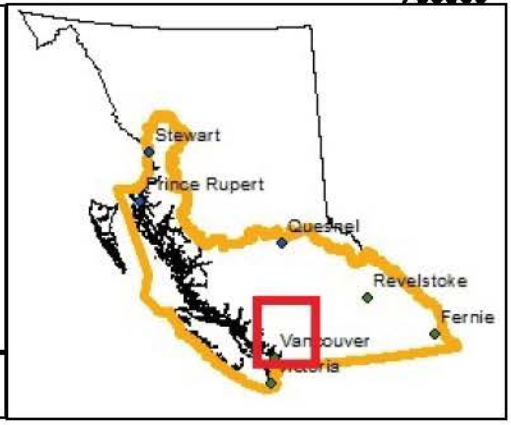
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HCA Application: 21A0694
Scale: 1: 1,100,000
Datum: UTM 10 N
Date: 2021-11-26
Author:
Corey Cookson (Arch Branch)

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



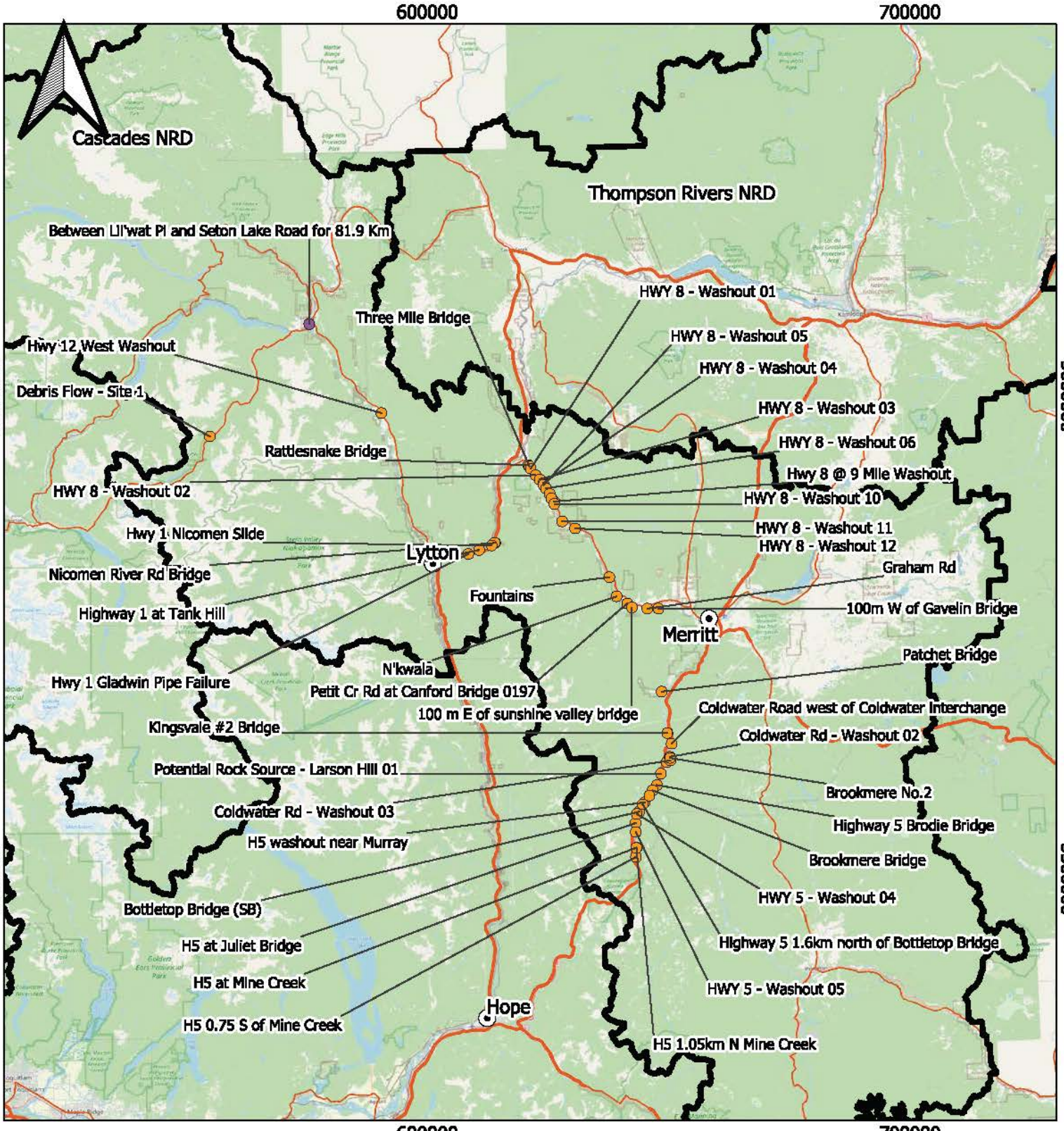


Fig. 4 Midrange - Cascades

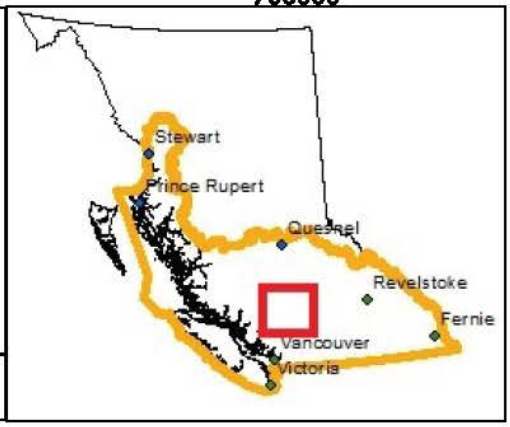
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HCA Application: 21A0694
Scale: 1: 1,100,000
Datum: UTM 10 N
Date: 2021-11-26
Author:
Corey Cookson (Arch Branch)

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



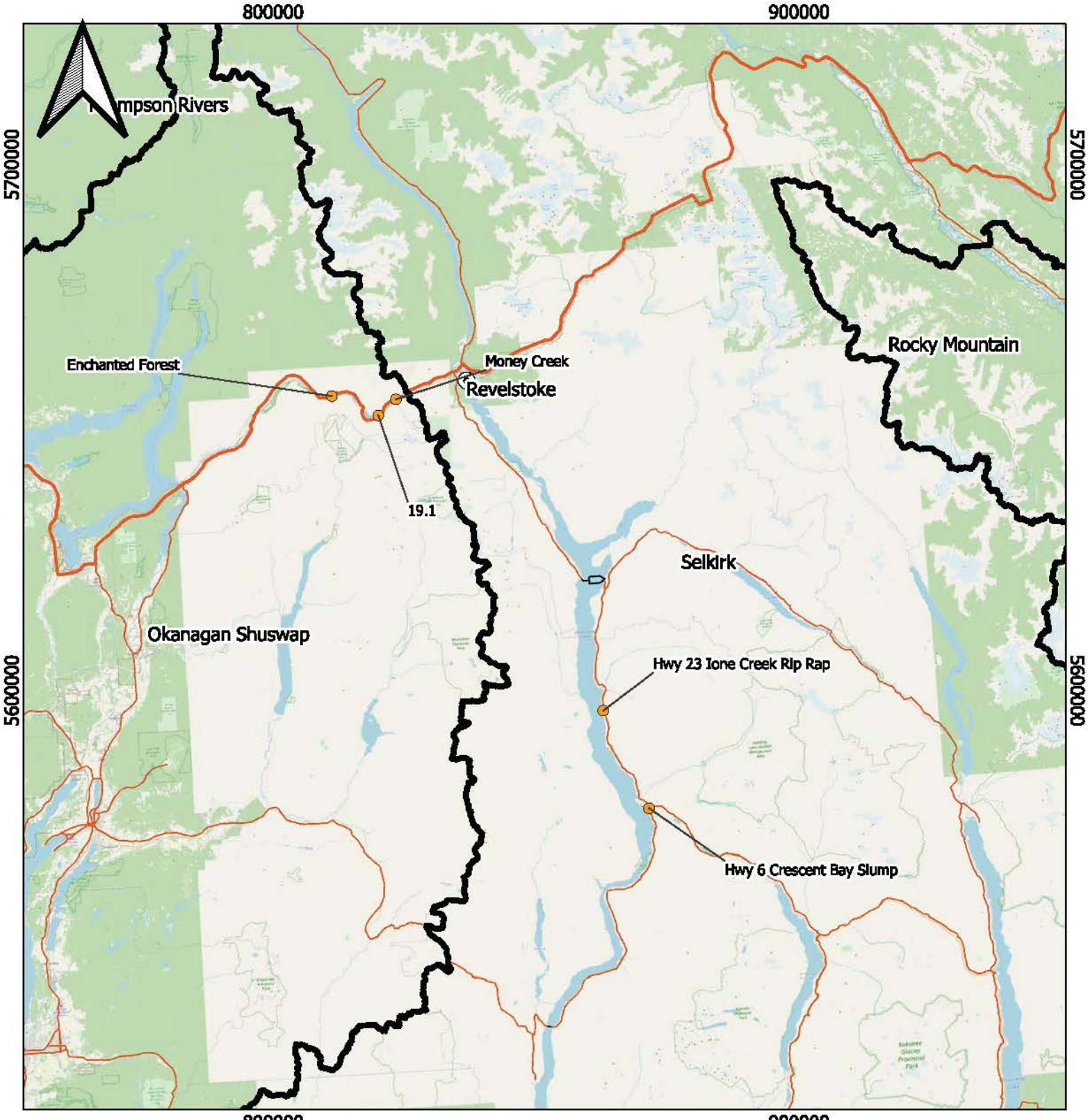


Fig. 5 Midrange - Okanagan Shuswap & Selkirk

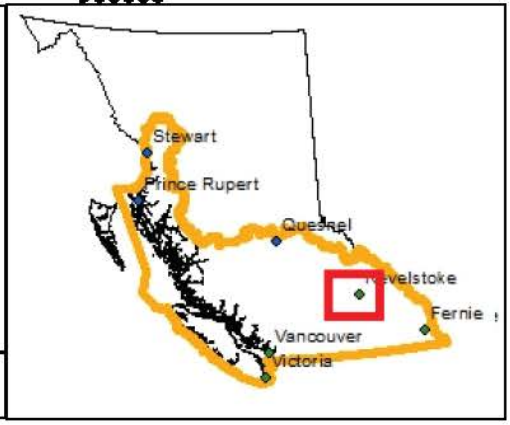
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HCA Application: 21A0694
Scale: 1: 1,000,000
Datum: UTM 10 N
Date: 2021-11-24
Author:
Corey Cookson (Arch Branch)

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



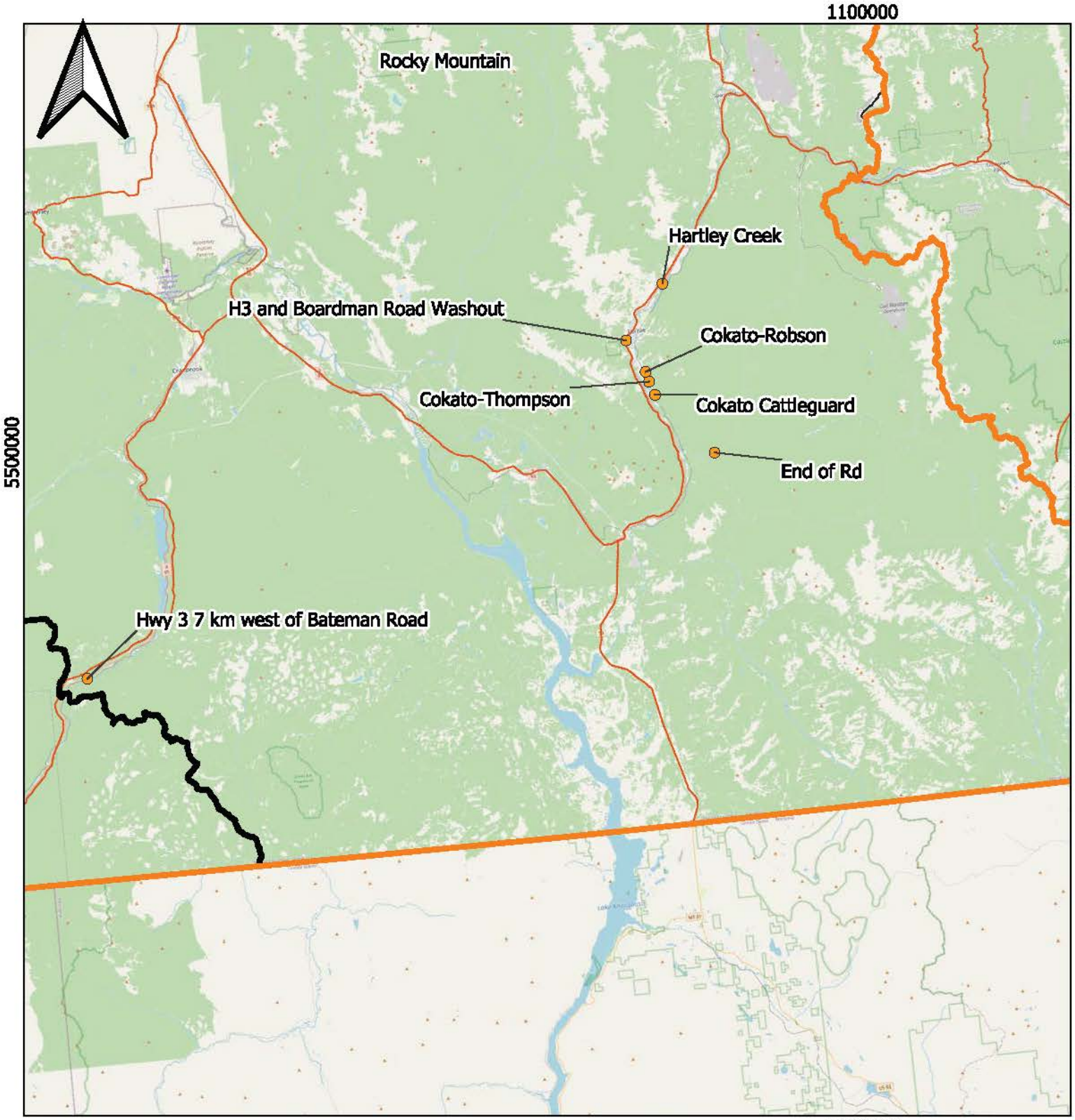


Fig. 6 Midrange - Rocky Mountain

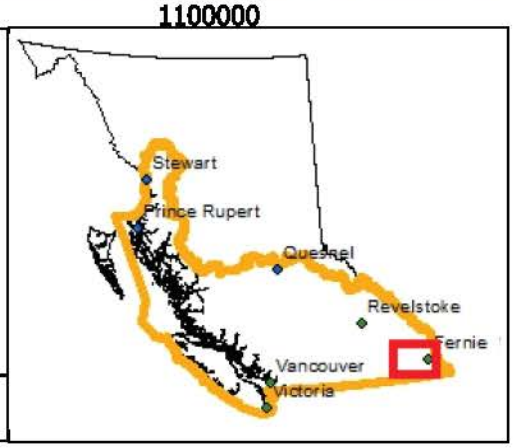
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HCA Application: 21A0694
Scale: 1: 600,000
Datum: UTM 10 N
Date: 2021-11-24
Author:
Corey Cookson (Arch Branch)

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



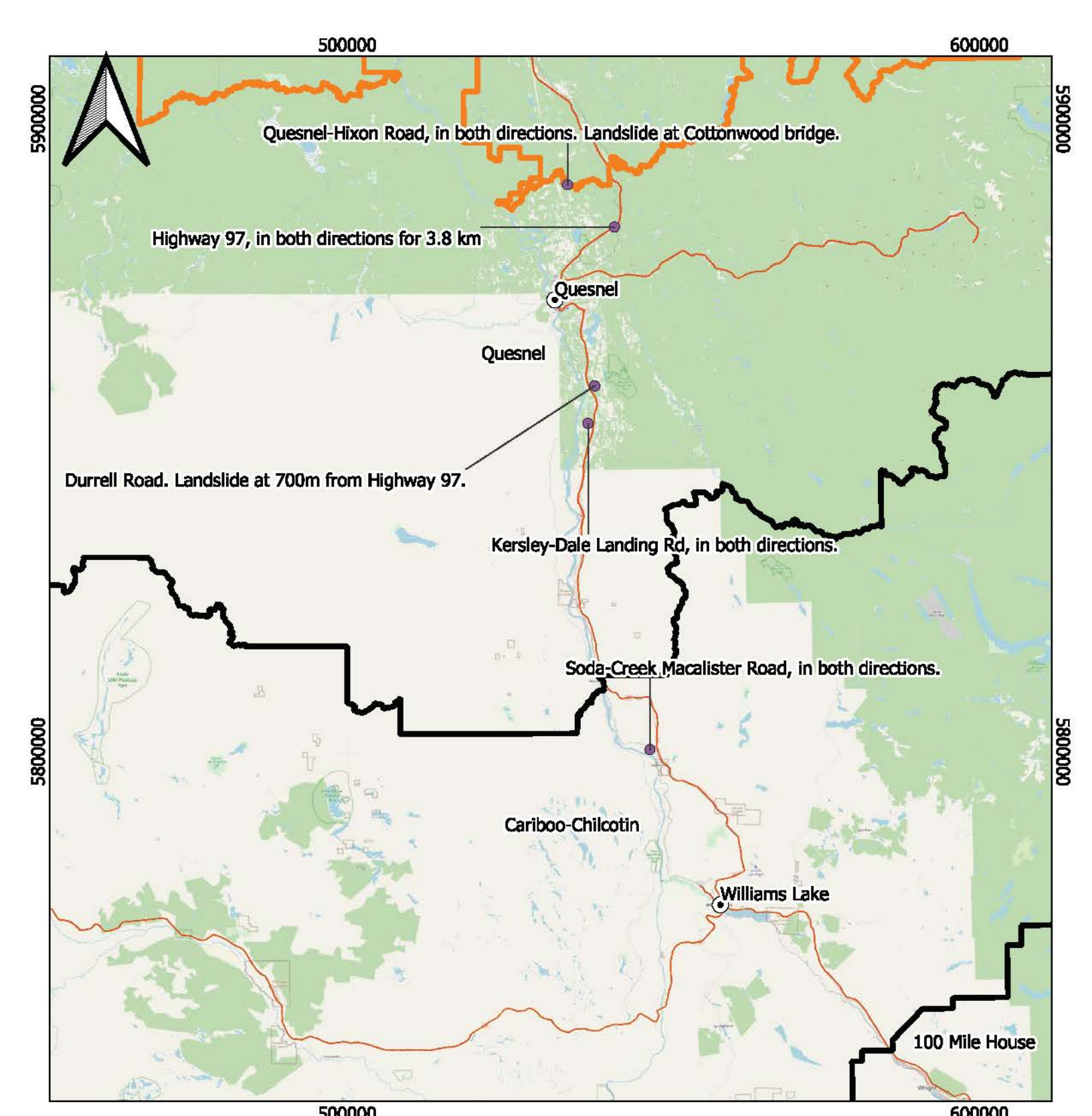


Fig. 7 Midrange - Quesnel & Cariboo-Chilcotin

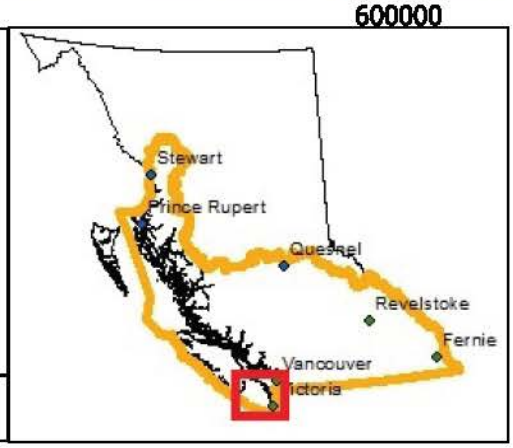
0 10 20 km

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 Pl 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 Ione 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 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	Carolin 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	DhRl-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	DlRi-11	Cultural Depression, Cache Pit	625 m NE
Flood		DlRi-14	Cultural Depression, undefined; Historic Building	625 m NE
Flood		DlRi-15	Cultural Depression, Cache Pit	625 m NE
Flood		DlRi-32	Historic Building	Direct overlap
Flood		DlRi-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 Pl and Seton Lake Road for 81.9 Km	EeRl-120	Cultural Depression, Housepit; Surface, lithics	Direct overlap
Landslide		EeRl-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	DlRf-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

BRITISH COLUMBIA

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

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:* 

BRITISH COLUMBIA

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

CERTIFICATION AND CONSENT

CLIENT'S CERTIFICATION

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

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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:* 

BRITISH COLUMBIA

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

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:* Brent.Persello@gov.bc.ca
Date: December 8, 2021	*Client Signature:*

TECHNICAL MEMORANDUM

Issue Date:	August 30, 2024	**File:**	Audit No. 3
To:	**Thyren Jacobs, Flood Debris Management Secretariat**	**Previous Issue Date:**	
From:	Dave Muhlert, R.B.Tech. and Naomi Sands, R.P.Bio.		
Client:	Ministry of Environment and Climate Change Strategy		
Project Name:	North and South Herford Creek Bank Protection and Sediment Removal - SCR34 and SCR37	**Project No.:**	2022-2632-08/11
Subject:	Environmental Compliance Audit		
Monitoring Period:	August 23 to 29, 2024		
Contractor:	Mission Contractors Ltd.		
Environmental Monitor:	AquaTerra Environmental Ltd.		

1 INTRODUCTION

Associated Environmental Consultants Inc, (Associated) is pleased to provide this environmental audit report summarizing observations of site conditions, environmental protection measures, regulatory compliance, and corrective actions as part of erosion protection works on North and South Herford creeks, Southeast of Durieu, BC in the Hatzic Valley (the Project, the Site) during the monitoring period August 23 to 29, 2024. The results presented in this audit report are based on conditions observed at the time of the audit inspection(s) and represent a snapshot of the workday. Items identified as non-compliant may have been addressed before the report(s) are submitted. The audit report(s) are submitted to the owner, their agent (Associated Engineering), the Contractor, and their EM and are not intended for further distribution.

2 ROLES AND RESPONSIBILITIES

The prime contractor for the Project is Mission Contractors Ltd. (the Contractor), and works are being monitored for environmental compliance by AquaTerra Environmental Ltd. (AquaTerra) and audited by Associated. As the environmental monitor (EM), AquaTerra is to work with the Contractor to develop measures to protect the environment and to respond to environmental incidents as they occur. Leq'á:mel First Nation (LFN) is the cultural monitor for the Site and is responsible for all fish salvages. The responsibility of the auditor is to ensure on behalf of the owner, who is ultimately the permit holder, that the EM, LFN, and the Contractor adhere to the requirements of the Construction Environmental Monitoring Plan (CEMP)[1], environmental permit conditions and any applicable regulations.

3 SITE INSPECTION

A summary of site conditions as observed during the audit inspection completed during the monitoring period is provided in Table 3-1. At the time of this report, Associated has not received any monitoring reports for this audit period.

[1] AquaTerra Environmental Ltd. 2024. Hatzic Emergency Program, South Herford Creek Project, Construction Environmental Management Plan (Rev. 1). Prepared for Mission Contractors Ltd. 65 p.

Table 3-1 Site Conditions During Audit Inspection

Date / Time	Auditor (Associated)	Weather	Construction Activities
August 29, 2024 11:10	Dave Muhlert	Sunny, clear skies. 24°C. No precipitation.[2]	No activity in South Herford Creek Contractor was placing riprap along the north bank of North Herford Creek, on the west side of Sylvester Road.

4 INSPECTION RESULTS

A checklist of required environmental protection measures and mitigative strategies for the Project is presented in Table 4-1. The checklist has been developed in accordance with terms and conditions of the environmental permits and approvals issued for the Project, environmental protection specifications and requirements as part of the construction contract for the Project, the Contractor's Construction Environmental Management Plan and environmental best management practices and guidelines.

[2] Environment Canada. 2024. Abbotsford Airport Hourly Data Report for August 29, 2024. Available at: https://climate.weather.gc.ca/historical_data/search_historic_data_e.html. Accessed August 30, 2024.

Table 4-1 Summary of Environmental Protection Measures Reviewed and Results of the Inspection

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
	Environmental Monitoring					
1	The EM will attend key site meetings where environmental mitigations and issues may be discussed.	☒Compliant ☐Non-Compliant ☐N/A	EM has been on site for key site meetings.		CEMP Section 5.1.4	
2	The EM shall supervise all instream works. If temporary diversion installed, EM is onsite daily to check pumps and flow bypasses.	☒Compliant ☐Non-Compliant ☐N/A	Per the contractor, EM is on site full time Monday, Wednesday, and Friday and part time on Tuesdays and Thursdays.		WSA (k)4, (k)5.ii CEMP Section 5.1.4	
3	The EM will submit daily and bi-weekly monitoring reports to the Contractor for distribution to MoECCS.	☐Compliant ☒Non-Compliant ☐N/A	Associated has not received any monitoring reports for this audit period.	Submit reports daily.	CEMP Section 5.1.4	
4	The EM will complete and submit an Environmental Incident Report (EIR) for non-compliances with the CEMP, reportable spills or other environmental incident.	☐Compliant ☐Non-Compliant ☒N/A	No environmental incidents have been reported to date.		CEMP Section 5.1.4	
5	EM is granted authority to stop the work if necessary	☒Compliant ☐Non-Compliant ☐N/A	EM has the authority to stop work and has worked with contractors to adjust operations as needed.		WSA (i) 7 CEMP Section 5.1.4	
	Erosion and Sediment Control					
6	Appropriate site isolation is installed as required, including silt fencing prior to instream works. Silt fences are installed properly, intact, adequate, clear of accumulated sediment and are functioning.	☐Compliant ☐Non-Compliant ☒N/A	No silt fences or areas where silt fences were required were observed during the audit visit.		WSA (p) CEMP Appendix B	
7	Riprap or any other engineering material place in channel is clean of any substances deleterious to aquatic life.	☒Compliant ☐Non-Compliant ☐N/A	Riprap being placed along the bank of North Herford Creek appeared to be clean.		WSA (x) CEMP Section7.2	Photo 1
8	Stockpiling and storage areas are located 15 m from the watercourse TOB.	☒Compliant ☐Non-Compliant ☐N/A	Stockpiles are located well away from the watercourses.		DFO LOA WSA (o) CEMP Appendix B	
9	Emergency ESC material onsite (e.g., 100 feet of silt fencing, 5 dry bales, and 100sq.m of ECBs/ Coconut matting, or polyethylene sheets)	☐Compliant ☒Non-Compliant ☐N/A	No ESC materials were observed during the audit visit.	Procure appropriate types of ESC materials in adequate quantities to respond to emergency ESC events.	CEMP Appendix B	
10	Sediment removed from the Site will be disposed of appropriately at a location approved by the EM and MoECCS.	☐Compliant ☐Non-Compliant ☒N/A	No sediment removal was in progress during the audit. Details of sediment disposal were not provided in the CEMP or monitoring reports; sediment was being stockpiled on site.	Update the CEMP and/or monitoring reports with the sediment disposal location(s).	CEMP Section 8.5	
11	Sediment removal boundaries must be clearly delineated prior to commencement of work.	☒Compliant ☐Non-Compliant ☐N/A	Sediment removal was not in progress during the audit; previous areas of sediment removal were within the banks of North Herford Creek.		WSA (q)	Photo 2
	Invasive Plant Management					

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
12	Ensure that machinery is free of invasive plant material that could potentially be transported throughout or between sites.	☒Compliant ☐Non-Compliant ☐N/A	Machinery appeared to be clean and free of plant material during the audit.		WSA (opening) CEMP Section 7.5	Photo 3
13	Ensure that invasive species removed from site are disposed of appropriately at an approved facility	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant– monitoring report from the previous audit period states that the EM recommended off-site disposal at a designated facility, but disposal site(s) were not identified in the monitoring reports.	Provide details of invasive plant disposal site(s) in monitoring reports.	WSA (opening) CEMP Section 7.5	
14	The Project site shall be regularly monitored by the EM for invasive plant infestations and these infestations will be mapped and managed according to applicable species-specific BMPs.	☐Compliant ☒Non-Compliant ☐N/A	Tansy ragwort along the banks of North Herford Creek (east of Sylvester Road) was not marked or delineated.	Map tansy ragwort and/or remove tansy ragwort infestations before beginning works in that area.	CEMP Section 7.5	Photo 4
16	Hand pull or mechanically remove tansy ragwort and wash equipment before exiting infested areas	☒Compliant ☐Non-Compliant ☐N/A	Tansy ragwort in the planned work area for North Herford creek has now gone to seed.	Take additional care during removal efforts to avoid spreading seeds.	CEMP Section 7.5	Photo 5
	Waste Management					
17	Dispose of all anthropogenic debris removed at an appropriate waste management facility.	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant- disposal details were not provided in the CEMP. Anthropogenic debris was not observed on site during the audit.	Include waste disposal location(s) in monitoring reports.	WSA (opening) CEMP Section 8.5	
18	Non-hazardous waste stored appropriately and removed offsite daily.	☒Compliant ☐Non-Compliant ☐N/A	Waste appeared to be stored appropriately. The site was clean during the audit.		CEMP Section 8.5	
19	Hazardous waste stored > 30 m of watercourses.	☒Compliant ☐Non-Compliant ☐N/A	Outhouse was within 30 m of North Herford Creek; per the contractor, the only other practical locations on site would be closer to other watercourses/ditches. No other hazardous waste was observed during the audit.		CEMP Section 8.4	
20	Secondary containment used for all stored hazardous waste.	☐Compliant ☒Non-Compliant ☐N/A	Secondary containment for large generator was still collapsed / not fully assembled; first noted on Aug 22	Contractor to install metal clips to hold the walls upright on the generator's secondary containment.	CEMP Section 8.3.1	Photo 6
	Spill Control and Emergency Response					
21	Machinery operating in channel is equipped with environmentally friendly oil	☒Compliant ☐Non-Compliant ☐N/A	Contractor reported that the excavator working in the channel is using an environmentally friendly hydraulic oil.		WSA (o) 4 CEMP Section 8.3.2	
22	Equipment and machinery are free of leaks	☒Compliant ☐Non-Compliant ☐N/A	No leaks were observed during the audit visit.		WSA (o) 1 CEMP Section 8.3.2	
23	Drip trays are available and used during refueling and equipment maintenance	☐Compliant ☐Non-Compliant ☒N/A	Equipment on site was all in active use during the audit.		CEMP Section 8.3.2	
24	Fuel is stored > 30 m from North and South Herford creeks and any connected drainages	☒Compliant ☐Non-Compliant ☐N/A	Bulk fuel was within 30 m of North Herford Creek; per the contractor, the only other practical locations on site would be closer to other watercourses/ditches. Fuel was in secondary containment.		WSA (k) 3 CEMP Section 8.3.2	Photo 7

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
25	Machinery and vehicles operating onsite are equipped with spill kit.	☒Compliant ☐Non-Compliant ☐N/A	Spill kits were available near both North and South Herford creeks.		WSA (k) 2 CEMP Section 6.6	
26	Should suspected contaminated material be encountered (i.e., soil emitting olfactory cues indicative of hydrocarbon fuel), works should temporarily halt for investigation.	☐Compliant ☐Non-Compliant ☒N/A	No suspected contaminated material has been reported to date.		CEMP Section 2.3	
27	Refuelling of machinery is conducted on level ground over a spill tray.	☒Compliant ☐Non-Compliant ☐N/A	No refuelling was observed during the audit. Per the Contractor, refueling is done on level ground in the middle of the laydown area adjacent to North Herford Creek, more than 30 m away from watercourses.		CEMP Section 8.3.2	
	Riparian Area Management					
28	Stockpile LWD and root wads removed from channel for use in site restoration	☒Compliant ☐Non-Compliant ☐N/A	One large stump was stored above the bank of North Herford Creek		CEMP Section 7.4	
29	Construct access points and approaches perpendicular to the watercourse;	☒Compliant ☐Non-Compliant ☐N/A	Access roads used by haul trucks were constructed perpendicular to the creeks, where possible.		DFO eFFA	
	Instream Works					
30	The EM shall ensure that instream works are isolated from flow and that measures are in place to protect fish and fish habitat, and to mitigate the migration of sediment downstream.	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant- Instream works were being done in the isolation of flow and bypass pumps had fish screens in place. Two smaller auxiliary bypass pumps were placed upstream of the isolation net, in the watercourse that connects South Herford Creek to North Herford Creek. Fish were observed in South Herford Creek during the audit, approximately 70 m upstream of the work area. These pumps were in a mesh box with 0.5 cm mesh which the contractor reported that the EM had inspected and approved.	Move pump intakes within the isolated work area whenever possible.	WSA (k) 1 CEMP Section 5	Photo 8
31	Pumps and flow bypasses are in proper working condition	☒Compliant ☐Non-Compliant ☐N/A	Bypass pumps appeared to be in good condition during the audit. Discharge water downstream of the work area appeared to be clear. A small amount of turbid water at the downstream end of the work area was being pumped to the adjacent field to prevent a downstream release of turbid water.		WSA (k) 5	Photo 9, Photo 10
32	Instream works conducted in the dry / isolation of flow	☒Compliant ☐Non-Compliant ☐N/A	Works were being completed in the isolation of flow during the audit. A small amount of turbid water, likely the result of a high water table in the isolated area, was being pumped to the adjacent field.		WSA (k) 2 CEMP Section 7.2.6	Photo 10
	Water Quality					
33	Water quality is routinely monitored upstream and downstream of the work	☐Compliant ☒Non-Compliant ☐N/A	No monitoring reports with water quality measurements have been received for this audit period.	Include water quality measurements in daily monitoring reports.	CEMP Section 8.1 WSA (r)	

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
	area, every day that instream works are occurring Instream water quality is compliant with provincial criteria[3]: **Turbidity**: - <8 NTU from background at any one time for a duration of 24 h in clear waters; - < 5 NTU from background when background is 8 – 50 NTU; - <10% from background when background is > 50 NTU. **pH:** 6.5-9.0					
	Fish and Wildlife Protection					
34	Full time monitoring for fish during instream works is occurring.	☐Compliant ☒Non-Compliant ☐N/A	Per the contractor, EM is only on site part time on Tuesdays and Thursdays. Instream works were occurring during the audit on Thursday, August 29, 2024.	EM to be on site full time during instream works.	WSA (k) 6	
35	Fish salvages are conducted in advance of instream works where required.	☒Compliant ☐Non-Compliant ☐N/A	Leq'á:mel First Nation are completing fish salvages in advance of instream works.		CEMP Section 7.3.1 WSA (k) 6	
36	Salvaged fish are relocated back to the same watercourse in a nearby area that is not impacted by construction or removal works or its zone of influence	☐Compliant ☒Non-Compliant ☐N/A	Environmental monitoring reports do not identify fish release sites.	Include fish release details in environmental monitoring reports.	DFO FAA Section 2.2.4	
37	Pump intakes are 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"	☒Compliant ☐Non-Compliant ☐N/A	Per the contractor, the auxiliary pump screen box observed during the audit had 0.5 cm mesh. DFO interim code of practice for fish protection recommends openings 1/10 the size of the smallest fish expected. At the time of this memo, Associated has not received salvage reports with measurements of the smallest fish observed.	Confirm that the mesh size is the appropriate size for the smallest fish observed during the fish salvage.	WSA (k) 5 CEMP Section 7.2.6	Photo 8
38	Obtain required permits prior to salvage(s).	☒Compliant ☐Non-Compliant ☐N/A	Leq'á:mel First Nation holds the appropriate permits for fish salvages		WSA (Opening) CEMP Section 5.1.4	
39	EM is on site during disturbance to riparian vegetation and conducting pre-clearing breeding bird surveys prior to clearing. Surveys for year-round protected nests are conducted as required.	☐Compliant ☐Non-Compliant ☒N/A	A raptor nest survey was conducted by the EM on Aug 23.		CEMP Section 5.1.4	
40	Instream works are conducted so as not to lead to fish stranding or other impacts to fish. The works shall not result in depressions that have the	☒Compliant ☐Non-Compliant ☐N/A	No stranding of fish noted to date, fish passage maintained.		WSA (t) WSA (k) 6 (iii) DFO FAA Section 2.4.2	

[3] British Columbia Ministry of Environment and Climate Change Strategy. 2024. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture - Guideline Summary – August 2024. Water Quality Guideline Series, WQG-20. Prov. B.C., Victoria B.C. Available at: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/wqg_summary_aquaticlife_wildlife_agri.pdf. Accessed August 2024.

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
	ability to trap fish and other aquatic life. Fish passage is maintained where practicable and in accordance with applicable permits.					
	Restoration Requirements					
41	Restoration plans prepared by EM for disturbed area and implemented with EM oversight	☐Compliant ☐Non-Compliant ☒N/A	Restoration plans have not been required yet.		WSA (w) CEMP Section 8.2	
42	All temporary works shall be removed on completion of the project, and the stream channel restored to its natural condition	☐Compliant ☐Non-Compliant ☒N/A	Work is still in progress. At the time of the audit, the contractor reported that there was some final grading to be done in South Herford Creek. This final grading is on the banks but not in the wetted channel and will be completed after the constructed road is no longer required to access North Herford Creek.		WSA (v) CEMP Section 8.2	

5 DISCUSSION

5.1 Non-Compliant Items

Environmental monitoring reports not received daily / part-time monitoring during instream works

The CEMP requires that monitoring reports are produced daily by the EM, and the *Water Sustainability Act* Section 11 Change Approval authorization requires that the EM is on site during all instream works, including while flow bypasses are operating. Monitoring reports should include details of vegetation clearing, timing and duration of instream works, fish salvages and isolation measures, water quality monitoring, invasive species management, and waste disposal. At the time of this memo, Associated had not received any monitoring reports for this audit period.

Recommended action: Submit environmental monitoring reports daily. Include details of fish salvages and release sites, as well as timing and duration of: instream works, flow bypasses, and EM visits in monitoring reports.

Erosion and sediment control materials

Emergency erosion and sediment control (ESC) materials were not observed on site during the audit visit.

Recommended action: Procure and stockpile appropriate types of ESC materials in adequate quantities to respond to emergency ESC events.

Invasive plant management

Tansy ragwort along the banks of North Herford Creek (east of Sylvester Road) was not marked or delineated at the time of the audit. The plants in these infestations had already gone to seed at the time of the audit. The abundant seeds of this species, which can be viable for up to 15 years, are the main method of reproduction.[4]

Recommended action: Map tansy ragwort and/or remove infestations before beginning works along the banks of North Herford Creek, east of Sylvester Road. Take additional care during removal efforts to avoid spreading seeds.

Generator with inadequate secondary containment

Secondary containment for a large generator was collapsed and did not have adequate structure to contain potential leaks. This was noted in last week's audit and has not yet been repaired.

Recommended action: Install metal clips to hold the walls upright on the generator's secondary containment.

5.2 Conditionally Compliant Items

Water Management

Instream work was not in progress during the audit. However, Environmental Monitoring Memo #03 reports that during instream work on August 19, 2024, the EM directed contractors to discharge turbid water to the adjacent field instead of back to the creek channel or roadside ditch.

[4] Invasive Species Council of BC. 2019. Tansy Ragwort Factsheet. Available at: https://bcinvasives.ca/invasives/tansy-ragwort/. Accessed August 30, 2024.

Recommended action: Ensure water bypass systems do not divert water away from the creek but return it to the same creek downstream of works to maintain base flows. Additional erosion and sediment control measures may be required to prevent a release of turbid water, e.g., pump turbid water to riparian vegetation, dig a settling pool to allow turbidity from pump discharges to settle out, or install sediment socks on pump outlets to filter turbid water.

Waste management

Monitoring reports state that the EM recommended off-site disposal of removed tansy ragwort at a designated facility but did not identify the specific disposal site(s). Details of disposal site(s) for anthropogenic debris and sediment removed from the creeks were also not provided in the CEMP or monitoring reports.

Recommended action: Provide details of disposal site(s) for invasive plant material, sediment, and anthropogenic debris in monitoring reports.

6 SUMMARY

A list of environmental issues outstanding to date is provided in Table 6-1, below.

Table 6-1 Tracking Table of Environmental Issues Outstanding to-Date (project commencement August 12, 2024)

Item #(s)	Issue	Date(s) Observed	Recommended Corrective Action(s)	Responsible Party
1	EM reports not received daily	August 15, 2024 August 22, 2024 August 29, 2024	Distribute daily monitoring reports to appropriate parties	EM
2	Lack of ESC materials on site	August 15, 2024 August 22, 2024 August 29, 2024	Procure appropriate ESC materials for responding to emergency ESC events.	Contractor/EM
4	Pump intake without fish-friendly screen	August 15, 2024 August 19, 2024* August 22, 2024 August 29, 2024	Avoid pumping water from fish-bearing watercourses if possible; add fish-friendly screens to pumps as per DFO guidance.	Contractor/EM
6	Tansy ragwort infestations not flagged	August 29, 2024	Delineate and/or remove tansy ragwort infestations before works begin in affected areas	EM
7	Generator with inadequate secondary containment	August 22, 2024 August 29, 2024	Repair or replace secondary containment so that it has sufficient structure and volume to contain potential leaks.	Contractor

Note: Items marked with an asterisk (*) were reported by the EM.

7 CLOSURE

We trust that the information in this memo is sufficient for your present needs. Should you have questions, please do not hesitate to contact the undersigned.

Prepared by:

for

Dave Muhlert, R.B.Tech.
Environmental Technologist

Reviewed by:

Naomi Sands, R.P.Bio.
Senior Environmental Scientist

DM/NS

Attachments:

- Site Photographs

Attachment 1: Site photographs taken during audit visit on August 22, 2024.

Photo 1: Riprap placement in progress in North Herford Creek 		**Photo 2: Sediment removal progress in isolated section of North Herford Creek** 
Photo 3: Excavator working in stream was clean and free of plant material 		**Photo 4: Tansy ragwort infestation on the bank of North Herford Creek, east of Sylvester Road** 
Photo 5: Mature seeds on tansy ragwort plants on the bank of North Herford Creek 		**Photo 6: Generator with inadequate secondary containment** 

Photo 7: Fuel storage in secondary containment. 		**Photo 8: Bypass pumps outside the isolated work area** 
Photo 9: Water appeared to be clear at the outlets of the bypass pumps 		**Photo 10: Small pumps pumping turbid water to the adjacent field (at the downstream end of the work area, looking upstream)** 

Table A2: Tracking Table of Resolved Non-Compliance Issues

Item #(s)	Issue	Date(s) Observed	Date Corrected	Corrective Action(s)	Responsible Party
3	Inappropriate water diversion	August 15, 2024 August 19, 2024*	August 22, 2024	Contractor adjusted operations so that majority of bypass flow would be returned to the creek channel.	Contractor/EM
5	Bulk fuel tank at top of bank of South Herford Creek	August 15, 2024	August 22, 2024	Fuel tank was moved to laydown area. New location is less than 30 m away from North Herford Creek; per the contractor, other locations would be closer to ditches/watercourses. The tank is in secondary containment.	Contractor

Note: Items marked with an asterisk (*) were reported by the EM.

TECHNICAL MEMORANDUMTECHNICAL MEMORANDUMTECHNICAL MEMORANDUM

Issue Date:	August 21, 2024	**File:**	Audit No. 1
To:	**Thyren Jacobs, Flood Debris Management Secretariat**	**Previous Issue Date:**	
From:	Dave Muhlert, R.B.Tech. and Naomi Sands, R.P.Bio.		
Client:	Ministry of Environment and Climate Change Strategy		
Project Name:	North and South Herford Creek Bank Protection and Sediment Removal - SCR34 and SCR37	**Project No.:**	2022-2632-08/11
Subject:	Environmental Compliance Audit		
Monitoring Period:	August 12 to 15, 2024		
Contractor:	Mission Contractors Ltd.		
Environmental Monitor:	AquaTerra Environmental Ltd.		

1 INTRODUCTION

Associated Environmental Consultants Inc, (Associated) is pleased to provide this environmental audit report summarizing observations of site conditions, environmental protection measures, regulatory compliance, and corrective actions as part of erosion protection works on North and South Herford creeks, Southeast of Durieu, BC in the Hatzic Valley (the Project, the Site) during the monitoring period August 12 to 15, 2024. The results presented in this audit report are based on conditions observed at the time of the audit inspection(s) and represent a snapshot of the workday. Items identified as non-compliant may have been addressed before the report(s) are submitted. The audit report(s) are submitted to the owner, their agent (Associated Engineering), the Contractor, and their EM and are not intended for further distribution.

2 ROLES AND RESPONSIBILITIES

The prime contractor for the Project is Mission Contractors Ltd. (the Contractor), and works are being monitored for environmental compliance by AquaTerra Environmental Ltd. (AquaTerra) and audited by Associated. As the environmental monitor (EM), AquaTerra is to work with the Contractor to develop measures to protect the environment and to respond to environmental incidents as they occur. Leq'á:mel First Nation (LFN) is the cultural monitor for the Site and is responsible for all fish salvages. The responsibility of the auditor is to ensure on behalf of the owner, who is ultimately the permit holder, that the EM, LFN, and the Contractor adhere to the requirements of the Construction Environmental Monitoring Plan (CEMP)[1], environmental permit conditions and any applicable regulations.

3 SITE INSPECTION

A summary of site conditions as observed during the audit inspection completed during the monitoring period is provided in Table 3-1. No environmental monitoring reports have been received at the time of this memo.

[1] AquaTerra Environmental Ltd. 2024. Hatzic Emergency Program, South Herford Creek Project, Construction Environmental Management Plan (Rev. 1). Prepared for Mission Contractors Ltd. 65 p.

Table 3-11111 Site Conditions During Audit Inspection

Date / Time	Auditor (Associated)	Weather	Construction Activities
August 15, 2024 13:00	Dave Muhlert	Mix of sun and cloud. No precipitation.	Sediment removal in South Herford Creek No activity on North Herford Creek.

4 INSPECTION RESULTS

A checklist of required environmental protection measures and mitigative strategies for the Project is presented in Table 4-1. The checklist has been developed in accordance with terms and conditions of the environmental permits and approvals issued for the Project, environmental protection specifications and requirements as part of the construction contract for the Project, the Contractor's Construction Environmental Management Plan and environmental best management practices and guidelines.

Table 4-11111 Summary of Environmental Protection Measures Reviewed and Results of the Inspection

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
	Environmental Monitoring					
1	The EM will attend key site meetings where environmental mitigations and issues may be discussed.	☐Compliant ☒Non-Compliant ☐N/A	No environmental monitoring reports have been received to date.	Include details of site meetings in monitoring reports.	CEMP Section 5.1.4	
2	The EM shall supervise all instream works.	☒Compliant ☐Non-Compliant ☐N/A	EM was on site during the audit visit.		WSA (5) 2 CEMP Section 5.1.4	
3	The EM will submit daily and bi-weekly monitoring reports to the Contractor for distribution to MoECCS.	☐Compliant ☒Non-Compliant ☐N/A	No environmental monitoring reports have been received to date.		CEMP Section 5.1.4	
4	The EM will complete and submit an Environmental Incident Report (EIR) for non-compliances with the CEMP, reportable spills or other environmental incident.	☐Compliant ☐Non-Compliant ☒N/A	No incidents have been reported to date.		CEMP Section 5.1.4	
5	EM is granted authority to stop the work if necessary	☒Compliant ☐Non-Compliant ☐N/A	Section 5.1.4 of the CEMP states that the EM has the authority to stop work.		WSA (i) 7 CEMP Section 5.1.4	
	Erosion and Sediment Control					
6	Appropriate site isolation is installed as required, including silt fencing prior to instream works. Silt fences are installed properly, intact, adequate, clear of accumulated sediment and are functioning.	☐Compliant ☐Non-Compliant ☒N/A	No silt fences or areas where silt fences were required were observed during the audit visit.		WSA (p) CEMP Appendix B	
7	Riprap or any other engineering material place in channel is clean of any substances deleterious to aquatic life.	☒Compliant ☐Non-Compliant ☐N/A	No riprap or other engineering materials were being placed during the audit visit. Stockpiled riprap appeared to be clean.		WSA (x) CEMP Section7.2	Photo 2
8	Stockpiling and storage areas are located 15 m from the watercourse TOB.	☒Compliant ☐Non-Compliant ☐N/A	Stockpiles are located well away from the watercourses.		DFO LOA WSA (o) CEMP Appendix B	Photo 2
9	Emergency ESC material onsite (e.g., 100 feet of silt fencing, 5 dry bales, and 100sq.m of ECBs/ Coconut matting, or polyethylene sheets)	☐Compliant ☒Non-Compliant ☐N/A	No ESC materials were observed during the audit visit.	Procure appropriate types of ESC materials in adequate quantities to respond to emergency ESC events.	CEMP Appendix B	
10	Sediment removed from the Site will be disposed of appropriately at a location approved by the EM and MoECCS.	☐Compliant ☐Non-Compliant ☒N/A	Details of sediment disposal were not provided in the CEMP; sediment was being stockpiled on site.	Update the CEMP with the waste disposal location(s)	CEMP Section 8.5	
11	Sediment removal boundaries must be clearly delineated prior to commencement of work.	☒Compliant ☐Non-Compliant ☐N/A	Boundaries were delineated in the field and excavation depths were being checked regularly by the contractor as work progressed.		WSA (q)	Photo 3
	Invasive Plant Management					
12	Ensure that machinery is free of invasive plant material that could potentially be transported throughout or between sites.	☐Compliant ☐Non-Compliant ☒N/A	No environmental monitoring reports with details of invasive plant management have been received to date. No vegetation clearing was observed during the audit visit.		WSA (opening) CEMP Section 7.5	
13	Ensure that invasive species removed from site are disposed of appropriately at an approved facility	☐Compliant ☒Non-Compliant ☐N/A	Vegetation clearing was not observed during the audit visit. Details of invasive plant disposal were not	Provide details of invasive plant clearing and disposal	WSA (opening) CEMP Section 7.5	

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
			provided in the CEMP and no EM reports have been submitted to date.	location(s) in monitoring reports.		
14	The Project site shall be regularly monitored by the EM for invasive plant infestations and these infestations will be mapped and managed according to applicable species-specific BMPs.	☐Compliant ☒Non-Compliant ☐N/A	No clearing of invasive plant infestations were observed during the audit visit. This item is marked as non-compliant because no environmental monitoring reports documenting invasive plant management occurring onsite have been received to date.	Provide details of invasive plant surveys/management in monitoring reports	CEMP Section 7.5	
16	Hand pull or mechanically remove tansy ragwort and wash equipment before exiting infested areas	☐Compliant ☒Non-Compliant ☐N/A	No environmental monitoring reports with details of tansy ragwort management have been received to date.	Provide details of tansy ragwort surveys/management in monitoring reports.	CEMP Section 7.5	
	Waste Management					
17	Dispose of all anthropogenic debris removed at an appropriate waste management facility.	☐Compliant ☒Non-Compliant ☐N/A	Disposal details were not provided in the CEMP. Anthropogenic debris was not observed on site during the audit.	Include waste disposal location(s) in monitoring reports.	WSA (opening) CEMP Section 8.5	
18	Non-hazardous waste stored appropriately and removed offsite daily.	☒Compliant ☐Non-Compliant ☐N/A	Waste appeared to be stored appropriately; the site was clean during the audit.		CEMP Section 8.5	
19	Hazardous waste stored > 30 m of watercourses.	☒Compliant ☐Non-Compliant ☐N/A	Outhouse was placed well away from watercourses. No other hazardous waste was observed during the audit.		CEMP Section 8.4	
20	Secondary containment used for all stored hazardous waste.	☒Compliant ☐Non-Compliant ☐N/A	Bulk fuel storage was in secondary containment.		CEMP Section 8.3.1	Photo 4
	Spill Control and Emergency Response					
21	Machinery operating in channel is equipped with environmentally friendly oil	☐Compliant ☒Non-Compliant ☐N/A	No environmental monitoring reports have been provided to date.	Provide confirmation of environmentally friendly oil in monitoring reports.	WSA (o) 4 CEMP Section 8.3.2	
22	Equipment and machinery are free of leaks	☒Compliant ☐Non-Compliant ☐N/A	No leaks were observed during the audit visit. One stationary generator was present and had built-in secondary containment to contain potential leaks.		WSA (o) 1 CEMP Section 8.3.2	
23	Drip trays are available and used during refueling and equipment maintenance	☐Compliant ☒Non-Compliant ☐N/A	No drip trays were observed during the audit.	Procure drip trays and store on site for rapid deployment during refuelling	CEMP Section 8.3.2	
24	Fuel is stored > 30 m from North and South Herford creeks and any connected drainages	☐Compliant ☒Non-Compliant ☐N/A	Fuel storage tank was present at the top of the bank of South Herford Creek	Move fuel storage more than 30 m from the nearest watercourse.	WSA (k) 3 CEMP Section 8.3.2	Photo 4
25	Machinery and vehicles operating onsite are equipped with spill kit.	☒Compliant ☐Non-Compliant ☐N/A	Spill kits were observed on site.		WSA (k) 2 CEMP Section 6.6	
26	Should suspected contaminated material be encountered (i.e., soil emitting olfactory cues indicative of hydrocarbon fuel), works should temporarily halt for investigation.	☐Compliant ☒Non-Compliant ☐N/A	Suspected contaminated material has not been reported to date; however, no environmental monitoring reports have been received at the time of this memo.	Include details of suspected contaminated material (or absence thereof) in monitoring reports.	CEMP Section 2.3	

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
27	Refuelling of machinery is conducted on level ground over a spill tray.	☐Compliant ☐Non-Compliant ☒N/A	No refuelling was observed during the audit visit.		CEMP Section 8.3.2	
	Riparian Area Management					
28	Stockpile LWD and root wads removed from channel for use in site restoration	☐Compliant ☐Non-Compliant ☒N/A	No LWD or root wads were observed during the audit visit.		CEMP Section 7.4	
29	Construct access points and approaches perpendicular to the watercourse;	☒Compliant ☐Non-Compliant ☐N/A	The access road used by haul trucks was constructed perpendicular to the watercourse, where possible.		DFO eFFA	
	Instream Works					
30	The EM shall ensure that instream works are isolated from flow and that measures are in place to protect fish and fish habitat, and to mitigate the migration of sediment downstream.	☐Compliant ☒Non-Compliant ☐N/A	Stop nets were installed downstream but were not present upstream of the work site. Although the stream flow was subterranean in the work area, rain events can increase flows enough for fish to travel downstream into the work area.	Install stop nets upstream of the work area.	WSA (k) 1 CEMP Section 5	Photo 1
31	Pumps and flow bypasses are in proper working condition	☐Compliant ☒Non-Compliant ☐N/A	During the audit visit, water from the South Herford Creek channel was being diverted to the adjacent field approximately 75 m west of the work area, instead of back into the creek channel downstream of the work area. The EM stated that the discharge to ground was being used because the work was causing turbid water to flow downstream of the work area. Additional pumps were observed in the small tributary stream near the west end of the South Herford Creek work area. These were not in use during the audit; however, the EM stated that these had been used to pump water out of the creek.	Ensure that flow bypasses and dewatering pumps discharge to the creek channel so that downstream flow is maintained. Add erosion and sediment control measures as necessary to prevent the release of turbid water.	WSA (k) 5	Photo 5
32	Instream works conducted in the dry / isolation of flow	☐Compliant ☒Non-Compliant ☐N/A	Work was being conducted in the wet where flow was subterranean.	If subsurface flow is encountered within the work area, install a full stream bypass upstream of the work area so that works can be completed in the dry.	WSA (k) 2 CEMP Section 7.2.6	Photo 6
	Water Quality					
33	Water quality is routinely monitored upstream and downstream of the work area. Instream water quality is compliant with provincial criteria: **Turbidity**: - <8 NTU from background at any one time for a duration of 24 h in clear waters; - < 5 NTU from background when background is 8 – 50 NTU;	☐Compliant ☒Non-Compliant ☐N/A	No environmental monitoring reports with details of water quality monitoring have been received at the time of this memo.	Include water quality results in environmental monitoring reports.	CEMP Section 8.1 WSA (r)	

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
	- <10% from background when background is > 50 NTU. **pH:** 6.5-9.0					
	Fish and Wildlife Protection					
34	Full time monitoring for fish during instream works is occurring.	☒Compliant ☐Non-Compliant ☐N/A	EM was on site during the audit visit.		WSA (k) 6	
35	Fish salvages are conducted in advance of instream works where required.	☒Compliant ☐Non-Compliant ☐N/A	EM stated during the audit visit that fish salvage was completed prior to instream works; environmental monitoring reports have not been received at the time of this memo.	Include fish salvage details in environmental monitoring reports.	CEMP Section 7.3.1 WSA (k) 6	
36	Salvaged fish are relocated back to the same watercourse in a nearby area that is not impacted by construction or removal works or its zone of influence	☐Compliant ☒Non-Compliant ☐N/A	No environmental monitoring reports with details of fish release sites have been received to date.	Include fish release details in environmental monitoring reports.	DFO FAA Section 2.2.4	
37	Pump intakes are 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"	☐Compliant ☒Non-Compliant ☐N/A	The pumps in the small tributary stream (see #30 above) were not operating during the audit visit but apparently had been used for diverting water from the stream and did not have fish-friendly screens installed.	Install fish-friendly screens on bypass/dewatering pumps that are placed in fish-bearing watercourses.	WSA (k) 5 CEMP Section 7.2.6	Photo 7
38	Obtain required permits prior to salvage(s).	☒Compliant ☐Non-Compliant ☐N/A	Leq'a:mel First Nation holds the appropriate permits for fish salvages.		WSA (Opening) CEMP Section 5.1.4	
39	EM is on site during disturbance to riparian vegetation and conducting pre-clearing breeding bird surveys prior to clearing.	☐Compliant ☒Non-Compliant ☐N/A	No environmental monitoring reports with details of clearing or bird surveys have been received to date.	Include details of vegetation clearing and pre-clearing bird surveys (if needed) in monitoring reports.	CEMP Section 5.1.4	
40	Instream works are conducted so as not to lead to fish stranding or other impacts to fish. The works shall not result in depressions that have the ability to trap fish and other aquatic life. Fish passage is maintained where practicable and in accordance with applicable permits.	☒Compliant ☐Non-Compliant ☐N/A	Fish salvages were conducted in advance of instream works and works were conducted in the absence of surface flow.		WSA (t) WSA (k) 6 (iii) DFO FAA Section 2.4.2	
	Restoration Requirements					
41	Restoration plans prepared by EM for disturbed area and implemented with EM oversight	☐Compliant ☐Non-Compliant ☒N/A	Restoration plans have not been required yet.		WSA (w) CEMP Section 8.2	
42	All temporary works shall be removed on completion of the project, and the stream channel restored to its natural condition	☐Compliant ☐Non-Compliant ☒N/A	Work is still in progress.		WSA (v) CEMP Section 8.2	

British Columbia Ministry of Environment and Climate Change Strategy. 2021. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture - Guideline Summary. Water Quality Guideline Series, WQG-20. Prov. B.C., Victoria B.C. Available at: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/wqg_summary_aquaticlife_wildlife_agri.pdf

5 DISCUSSION

5.1 Non-Compliant Items

Daily environmental monitoring reports not received

Work at South Herford Creek began on August 12, 2024, and the audit was conducted on August 15, 2024. At the time of this memo, Associated has not received any environmental monitoring reports. The CEMP requires that monitoring reports are produced daily by the EM. Monitoring reports should include details of vegetation clearing, fish salvages and isolation measures, water quality monitoring, invasive species management, and waste disposal.

Recommended action: Submit daily inspection reports.

Inappropriate water diversion / work in the wet

During the audit visit, work was being conducted in the wet where the flow in South Herford Creek was fully subterranean. Turbid water generated by construction was being pumped out of the creek channel and discharged in the adjacent field. Associated staff spoke with the EM on site, who directed the contractor to adjust works so that water would be returned to the creek channel downstream of the work area. Additional erosion and sediment control measures may be required to prevent the release of turbid water.

Recommended action: Ensure water bypass systems do not divert water away from the creek, but return it to the same creek downstream of works to maintain base flows.

Fuel storage within 30 m of South Herford Creek

A bulk fuel tank for the onsite generator was placed at the top of the bank of South Herford Creek. The CEMP and BMPs requires that fuel is stored more than 30 m from the nearest watercourse.

Recommended action: Move fuel storage more than 30 m from the nearest watercourse.

Erosion and sediment control materials

Emergency erosion and sediment control (ESC) materials were not observed on site during the audit visit.

Recommended action: Procure and stockpile appropriate types of ESC materials in adequate quantities to respond to emergency ESC events.

Pump intake without fish-friendly screen

Two pumps were observed in the small tributary stream near the west end of the South Herford Creek work area; these pumps were not operating during the audit visit but did not appear to have appropriate screens installed to prevent fish impingement/entrainment. In addition, the hoses for these pumps appeared to be diverting water outside the creek channel.

Recommended action: Install fish-friendly screens on all pumps (or at a minimum, check that existing screens installed across the channel have small enough mesh size to exclude juvenile fish and are appropriate to prevent fish impingement/entrainment) and return diverted water back to the creek channel downstream of work area(s). Additional erosion and sediment control measures may be required to prevent the release of turbid water.

6 SUMMARY

A list of environmental issues outstanding to date is provided in Table 6-1, below.

Table 6-11111 Tracking Table of Environmental Issues Outstanding to-Date (project commencement August 12, 2024)

Item #(s)	Issue	Date(s) Observed	Recommended Corrective Action(s)	Responsible Party
1	EM reports not received	August 15, 2024	Distribute daily monitoring reports to appropriate parties	EM
2	Lack of ESC materials on site	August 15, 2024	Procure appropriate ESC materials for responding to emergency ESC events.	Contractor/EM
3	Inappropriate water diversion	August 15, 2024	Ensure that site isolation and flow bypass measures maintain downstream flow in the creek.	Contractor/EM
4	Pump intake without fish-friendly screen	August 15, 2024	Avoid pumping water from fish-bearing watercourses if possible; add fish-friendly screens to pumps.	Contractor/EM
5	Bulk fuel tank at top of bank of South Herford Creek	August 15, 2024	Move fuel storage more than 30 m from the nearest watercourse.	Contractor

7 CLOSURE

We trust that the information in this memo is sufficient for your present needs. Should you have questions, please do not hesitate to contact the undersigned.

Prepared by:

Dave Muhlert, R.B.Tech.
Environmental Technologist

Reviewed by:

Naomi Sands, R.P.Bio.
Senior Environmental Scientist

DM/NS

Attachments:

- Site Photographs

Attachment 1: Site photographs taken during audit visit on August 15, 2024.

Photo 11111: Stop net in place on the east side of Sylvester Road, downstream of the work area 		**Photo 22222: Stockpiled riprap appeared to be clean and was stored more than 15 m from the watercourse** 
Photo 33333: Contractors were checking excavation depths frequently 		**Photo 44444: Fuel storage at the top of bank of South Herford Creek** 
Photo 55555: Work in the wet and pump diverting flow from downstream of the work area to the adjacent field 		**Photo 6: Excavator working in the wet in South Herford Creek where subterranean flow re-emerges** 

Photo 7: Pumps without fish-friendly screens installed in the small tributary to South Herford Creek 		

TECHNICAL MEMORANDUM

Issue Date:	August 28, 2024	**File:**	Audit No. 2
To:	**Thyren Jacobs, Flood Debris Management Secretariat**	**Previous Issue Date:**	
From:	Dave Muhlert, R.B.Tech. and Naomi Sands, R.P.Bio.		
Client:	Ministry of Environment and Climate Change Strategy		
Project Name:	North and South Herford Creek Bank Protection and Sediment Removal - SCR34 and SCR37	**Project No.:**	2022-2632-08/11
Subject:	Environmental Compliance Audit		
Monitoring Period:	August 16 to 22, 2024		
Contractor:	Mission Contractors Ltd.		
Environmental Monitor:	AquaTerra Environmental Ltd.		

1 INTRODUCTION

Associated Environmental Consultants Inc, (Associated) is pleased to provide this environmental audit report summarizing observations of site conditions, environmental protection measures, regulatory compliance, and corrective actions as part of erosion protection works on North and South Herford creeks, Southeast of Durieu, BC in the Hatzic Valley (the Project, the Site) during the monitoring period August 16 to 22, 2024. The results presented in this audit report are based on conditions observed at the time of the audit inspection(s) and represent a snapshot of the workday. Items identified as non-compliant may have been addressed before the report(s) are submitted. The audit report(s) are submitted to the owner, their agent (Associated Engineering), the Contractor, and their EM and are not intended for further distribution.

2 ROLES AND RESPONSIBILITIES

The prime contractor for the Project is Mission Contractors Ltd. (the Contractor), and works are being monitored for environmental compliance by AquaTerra Environmental Ltd. (AquaTerra) and audited by Associated. As the environmental monitor (EM), AquaTerra is to work with the Contractor to develop measures to protect the environment and to respond to environmental incidents as they occur. Leq'á:mel First Nation (LFN) is the cultural monitor for the Site and is responsible for all fish salvages. The responsibility of the auditor is to ensure on behalf of the owner, who is ultimately the permit holder, that the EM, LFN, and the Contractor adhere to the requirements of the Construction Environmental Monitoring Plan (CEMP)[1], environmental permit conditions and any applicable regulations.

3 SITE INSPECTION

A summary of site conditions as observed during the audit inspection completed during the monitoring period is provided in Table 3-1. At the time of this report, Associated has received monitoring reports covering activities on site August 17, August 19, and August 21.

[1] AquaTerra Environmental Ltd. 2024. Hatzic Emergency Program, South Herford Creek Project, Construction Environmental Management Plan (Rev. 1). Prepared for Mission Contractors Ltd. 65 p.

Table 3-1 Site Conditions During Audit Inspection

Date / Time	Auditor (Associated)	Weather	Construction Activities
August 22, 2024 11:45	Dave Muhlert	Mix of sun and cloud. No precipitation.	No activity in South Herford Creek Crews were laying out bypass hoses along North Herford Creek and west of Sylvester Road. Pumps were not yet installed in the creek or operating.

4 INSPECTION RESULTS

A checklist of required environmental protection measures and mitigative strategies for the Project is presented in Table 4-1. The checklist has been developed in accordance with terms and conditions of the environmental permits and approvals issued for the Project, environmental protection specifications and requirements as part of the construction contract for the Project, the Contractor's Construction Environmental Management Plan and environmental best management practices and guidelines.

Table 4-1 Summary of Environmental Protection Measures Reviewed and Results of the Inspection

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
	Environmental Monitoring					
1	The EM will attend key site meetings where environmental mitigations and issues may be discussed.	☒Compliant ☐Non-Compliant ☐N/A	EM has been on site for key site meetings.		CEMP Section 5.1.4	
2	The EM shall supervise all instream works. If temporary diversion installed, EM is onsite daily to check pumps and flow bypasses.	☒Compliant ☐Non-Compliant ☐N/A	EM has been on site during instream works.		WSA (k)4, (k)5.ii CEMP Section 5.1.4	
3	The EM will submit daily and bi-weekly monitoring reports to the Contractor for distribution to MoECCS.	☐Compliant ☒Non-Compliant ☐N/A	EM submitted reports on August 21 and August 23, 2024 for works completed August 7, 9, 12, 13, 15, 17, 19, and 21.	Submit reports daily.	CEMP Section 5.1.4	
4	The EM will complete and submit an Environmental Incident Report (EIR) for non-compliances with the CEMP, reportable spills or other environmental incident.	☐Compliant ☐Non-Compliant ☒N/A	No environmental incidents have been reported to date.		CEMP Section 5.1.4	
5	EM is granted authority to stop the work if necessary	☒Compliant ☐Non-Compliant ☐N/A	EM has the authority to stop work and has worked with contractors to adjust operations as needed.		WSA (i) 7 CEMP Section 5.1.4	
	Erosion and Sediment Control					
6	Appropriate site isolation is installed as required, including silt fencing prior to instream works. Silt fences are installed properly, intact, adequate, clear of accumulated sediment and are functioning.	☐Compliant ☐Non-Compliant ☒N/A	No silt fences or areas where silt fences were required were observed during the audit visit.		WSA (p) CEMP Appendix B	
7	Riprap or any other engineering material place in channel is clean of any substances deleterious to aquatic life.	☒Compliant ☐Non-Compliant ☐N/A	No riprap or other engineering materials were being placed during the audit visit. Stockpiled riprap appeared to be clean.		WSA (x) CEMP Section7.2	Photo 1
8	Stockpiling and storage areas are located 15 m from the watercourse TOB.	☒Compliant ☐Non-Compliant ☐N/A	Stockpiles are located well away from the watercourses.		DFO LOA WSA (o) CEMP Appendix B	
9	Emergency ESC material onsite (e.g., 100 feet of silt fencing, 5 dry bales, and 100sq.m of ECBs/ Coconut matting, or polyethylene sheets)	☐Compliant ☒Non-Compliant ☐N/A	No ESC materials were observed during the audit visit.	Procure appropriate types of ESC materials in adequate quantities to respond to emergency ESC events.	CEMP Appendix B	
10	Sediment removed from the Site will be disposed of appropriately at a location approved by the EM and MoECCS.	☐Compliant ☐Non-Compliant ☒N/A	No sediment removal was in progress during the audit. Details of sediment disposal were not provided in the CEMP or monitoring reports; sediment was being stockpiled on site.	Update the CEMP and/or monitoring reports with the waste disposal location(s).	CEMP Section 8.5	
11	Sediment removal boundaries must be clearly delineated prior to commencement of work.	☐Compliant ☐Non-Compliant ☒N/A	No sediment removal was in progress during the audit visit. Planned excavation depths in North Herford Creek were marked with stakes.		WSA (q)	
	Invasive Plant Management					
12	Ensure that machinery is free of invasive plant material that could	☒Compliant ☐Non-Compliant ☐N/A	Machinery appeared to be clean and free of plant material during the audit.		WSA (opening) CEMP Section 7.5	Photo 2

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
	potentially be transported throughout or between sites.					
13	Ensure that invasive species removed from site are disposed of appropriately at an approved facility	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant– Monitoring report states that the EM recommended off-site disposal at a designated facility, but disposal site(s) were not identified in the monitoring reports.	Provide details of invasive plant disposal site(s) in monitoring reports.	WSA (opening) CEMP Section 7.5	
14	The Project site shall be regularly monitored by the EM for invasive plant infestations and these infestations will be mapped and managed according to applicable species-specific BMPs.	☒Compliant ☐Non-Compliant ☐N/A	EM has been on site to direct invasive plant management.		CEMP Section 7.5	
16	Hand pull or mechanically remove tansy ragwort and wash equipment before exiting infested areas	☒Compliant ☐Non-Compliant ☐N/A	EM reports state that tansy ragwort was flowering but had not gone to seed, and that plants (including roots) were hand-pulled, as per best management practices.[2]		CEMP Section 7.5	
	Waste Management					
17	Dispose of all anthropogenic debris removed at an appropriate waste management facility.	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant- Disposal details were not provided in the CEMP. Anthropogenic debris was not observed on site during the audit.	Include waste disposal location(s) in monitoring reports.	WSA (opening) CEMP Section 8.5	
18	Non-hazardous waste stored appropriately and removed offsite daily.	☒Compliant ☐Non-Compliant ☐N/A	Waste appeared to be stored Appropriately. The site was clean during the audit.		CEMP Section 8.5	
19	Hazardous waste stored > 30 m of watercourses.	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant - as outhouse was placed away from watercourses, but was within 30 m of North Herford Creek. No other hazardous waste was observed during the audit.	Contractor to move the outhouse further from North Herford creek to ensure it is more than 30 m away.	CEMP Section 8.4	Photo 3
20	Secondary containment used for all stored hazardous waste.	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant – as bulk fuel storage was in secondary containment. Large generator was in secondary containment which had collapsed / wasn't fully assembled.	Contractor to install metal clips to hold the walls upright on the generator's secondary containment.	CEMP Section 8.3.1	
	Spill Control and Emergency Response					
21	Machinery operating in channel is equipped with environmentally friendly oil	☒Compliant ☐Non-Compliant ☐N/A	Contractor reported that the excavator working in the channel is using an environmentally friendly hydraulic oil.		WSA (o) 4 CEMP Section 8.3.2	
22	Equipment and machinery are free of leaks	☒Compliant ☐Non-Compliant ☐N/A	No leaks were observed during the audit visit.		WSA (o) 1 CEMP Section 8.3.2	
23	Drip trays are available and used during refueling and equipment maintenance	☐Compliant ☒Non-Compliant ☐N/A	No drip trays were observed under stationary equipment, including an excavator that was parked at the top of bank of South Herford Creek.	Place drip trays under stationary equipment. Park equipment more than 30 m away from watercourses whenever possible.	CEMP Section 8.3.2	Photo 4
24	Fuel is stored > 30 m from North and South Herford creeks and any connected drainages	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant – as bulk fuel was stored next to the outhouse, which was on level ground north of North Herford creek, but less than 30 m away.	Contractor to move the outhouse and fuel further away from the creek.	WSA (k) 3 CEMP Section 8.3.2	

[2] Invasive Species Council of BC. 2019. Tansy Ragwort Factsheet. Available at: https://bcinvasives.ca/wp-content/uploads/2021/01/Tansy-Ragwort_Factsheet_09_04_2019.pdf. Accessed August 2024.

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
25	Machinery and vehicles operating onsite are equipped with spill kit.	☒Compliant ☐Non-Compliant ☐N/A	Spill kits were available near both North and South Herford creeks.		WSA (k) 2 CEMP Section 6.6	
26	Should suspected contaminated material be encountered (i.e., soil emitting olfactory cues indicative of hydrocarbon fuel), works should temporarily halt for investigation.	☐Compliant ☐Non-Compliant ☒N/A	No suspected contaminated material has been reported to date.		CEMP Section 2.3	
27	Refuelling of machinery is conducted on level ground over a spill tray.	☒Compliant ☐Non-Compliant ☐N/A	No refuelling was observed during the audit. Per the Contractor, refueling is done on level ground in the middle of the laydown area adjacent to North Herford Creek, more than 30 m away from watercourses.		CEMP Section 8.3.2	
	Riparian Area Management					
28	Stockpile LWD and root wads removed from channel for use in site restoration	☐Compliant ☐Non-Compliant ☒N/A	No LWD or root wads were observed during the audit visit.		CEMP Section 7.4	
29	Construct access points and approaches perpendicular to the watercourse;	☒Compliant ☐Non-Compliant ☐N/A	The access road used by haul trucks was constructed perpendicular to South Herford Creek, where possible. The access point for North Herford Creek had not been constructed yet at the time of the audit.		DFO eFFA	
	Instream Works					
30	The EM shall ensure that instream works are isolated from flow and that measures are in place to protect fish and fish habitat, and to mitigate the migration of sediment downstream.	☐Compliant ☒Non-Compliant ☐N/A	No instream works were in progress during the audit. Stop net was in place on the west side of Sylvester Road (downstream of the work area). Environmental Monitoring Memo #04[3] states that one pump was being used in North Herford Creek without a fish protection screen, and another pump was within a 1/4" mesh basket. Fish salvages were completed in this area prior to instream works; however, it is still possible for fish to be present.	Ensure that all pumps have appropriately sized fish protection screens as per DFO guidance.[4]	WSA (k) 1 CEMP Section 5	Photo 5
31	Pumps and flow bypasses are in proper working condition	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant – as no pumps or bypasses were in operation during the audit. Environmental Monitoring Memo #03[5] states that on August 19, 2024, the EM directed contractors to discharge turbid water to the adjacent field instead of the creek channel or roadside ditch.	Ensure that water flowing in the creek is diverted **around** isolated instream work areas so that downstream flow is maintained. Add erosion and sediment control measures instream as necessary to prevent the release of turbid water downstream.	WSA (k) 5	

[3] AquaTerra. 2024. Herford Creek Project - Environmental Monitoring Memo #04. Prepared for Mission Contractors Ltd. 7 p.
[4] Fisheries and Oceans Canada. 2020. Interim code of practice: End-of-pipe fish protection screens for small water intakes in freshwater. Available at: https://www.dfo-mpo.gc.ca/pnw-ppe/codes/screen-ecran-eng.html. Accessed August 2024.
[5] AquaTerra. 2024. Herford Creek Project - Environmental Monitoring Memo #03. Prepared for Mission Contractors Ltd. 6 p.

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
32	Instream works conducted in the dry / isolation of flow	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant – as no instream works were in progress during the audit. Monitoring reports show isolation / dewatering pumps upstream of the work area; however, some turbid water was being pumped to the adjacent field.	Implement erosion and sediment controls within the creek channel to reduce diversion outside the watercourse, e.g., pump turbid water to riparian vegetation on the bank of the creek, dig a settling pool to allow turbidity from pump discharges to settle out, or install sediment socks on pump outlets to filter turbid water.	WSA (k) 2 CEMP Section 7.2.6	
	Water Quality					
33	Water quality is routinely monitored upstream and downstream of the work area, every day that instream works are occurring Instream water quality is compliant with provincial criteria[6]: **Turbidity**: - <8 NTU from background at any one time for a duration of 24 h in clear waters; - < 5 NTU from background when background is 8 – 50 NTU; - <10% from background when background is > 50 NTU. **pH:** 6.5-9.0	☒Compliant ☐Non-Compliant ☐N/A	Monitoring reports include turbidity measurements upstream and downstream of work areas. Although some elevated turbidity measurements were reported, these did not exceed the Approved BC Water Quality Guidelines for the protection of freshwater aquatic life, as the turbidity decreased to background levels in less than 24 h.		CEMP Section 8.1 WSA (r)	
	Fish and Wildlife Protection					
34	Full time monitoring for fish during instream works is occurring.	☒Compliant ☐Non-Compliant ☐N/A	EM has been on site during instream works. No instream works were occurring during the audit.		WSA (k) 6	
35	Fish salvages are conducted in advance of instream works where required.	☒Compliant ☐Non-Compliant ☐N/A	Leq'á:mel First Nation are completing fish salvages in advance of instream works.		CEMP Section 7.3.1 WSA (k) 6	
36	Salvaged fish are relocated back to the same watercourse in a nearby area that is not impacted by construction or removal works or its zone of influence	☐Compliant ☒Non-Compliant ☐N/A	Environmental monitoring reports do not identify fish release sites.	Include fish release details in environmental monitoring reports.	DFO FAA Section 2.2.4	
37	Pump intakes are 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"	☐Compliant ☒Non-Compliant ☐N/A	No pumps were installed or operating during the audit. The pump screen box observed during the audit had 1/4" mesh. These screen openings are potentially larger than recommended by the DFO interim code of practice for fish protection. DFO recommends openings 1/10 the size of the smallest fish expected.	Confirm that the mesh size is the appropriate size for the smallest fish observed during the fish salvage.	WSA (k) 5 CEMP Section 7.2.6	Photo 5

[6] British Columbia Ministry of Environment and Climate Change Strategy. 2024. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture - Guideline Summary – August 2024. Water Quality Guideline Series, WQG-20. Prov. B.C., Victoria B.C. Available at: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/wqg_summary_aquaticlife_wildlife_agri.pdf. Accessed August 2024.

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
			In addition, Environmental Monitoring Memo #04[7] states that one pump was being used in North Herford Creek without a fish protection screen (see item #30 above).			
38	Obtain required permits prior to salvage(s).	☒Compliant ☐Non-Compliant ☐N/A	Leq'á:mel First Nation holds the appropriate permits for fish salvages		WSA (Opening) CEMP Section 5.1.4	
39	EM is on site during disturbance to riparian vegetation and conducting pre-clearing breeding bird surveys prior to clearing.	☒Compliant ☐Non-Compliant ☐N/A	Environmental monitoring reports state that pre-clearing bird nest surveys were completed on August 7, 9, and 12, 2024.		CEMP Section 5.1.4	
40	Instream works are conducted so as not to lead to fish stranding or other impacts to fish. The works shall not result in depressions that have the ability to trap fish and other aquatic life. Fish passage is maintained where practicable and in accordance with applicable permits.	☒Compliant ☐Non-Compliant ☐N/A	No stranding of fish noted to date.		WSA (t) WSA (k) 6 (iii) DFO FAA Section 2.4.2	
	Restoration Requirements					
41	Restoration plans prepared by EM for disturbed area and implemented with EM oversight	☐Compliant ☐Non-Compliant ☒N/A	Restoration plans have not been required yet.		WSA (w) CEMP Section 8.2	
42	All temporary works shall be removed on completion of the project, and the stream channel restored to its natural condition	☐Compliant ☐Non-Compliant ☒N/A	Work is still in progress. At the time of the audit, the contractor reported that there was still some additional riprap to be placed in South Herford Creek.		WSA (v) CEMP Section 8.2	

[7] AquaTerra. 2024. Herford Creek Project - Environmental Monitoring Memo #04. Prepared for Mission Contractors Ltd. 7 p.

5 DISCUSSION

5.1 Non-Compliant Items

Environmental monitoring reports not received daily

The CEMP requires that monitoring reports are produced daily by the EM, and the *Water Sustainability Act* Section 11 Change Approval authorization requires that the EM is on site during all instream works, including while flow bypasses are operating. Monitoring reports should include details of vegetation clearing, timing and duration of instream works, fish salvages and isolation measures, water quality monitoring, invasive species management, and waste disposal. Pre-clearing bird surveys were completed on August 7, 9, and 12, and construction has been ongoing since August 12. To date, four monitoring memos have been received:

- Memo #1: August 12 (Received August 22)
- Memo #2: August 7, 9, 13, 15, 17 (Received August 22)
- Memo #3: August 19 (Received August 26)
- Memo #4: August 21 (Received August 26)

Recommended action: Submit environmental monitoring reports daily. Include details of fish salvages and release sites, as well as timing and duration of: instream works, flow bypasses, and EM visits in monitoring reports.

Drip trays not placed under parked equipment

The CEMP states that each piece of stationary equipment should have a drip tray placed under it to contain potential fluid leaks. No spill trays were observed during the audit, including under an excavator that was parked at the top of bank of South Herford Creek.

Recommended action: Place spill trays under the engines of parked equipment, and park equipment more than 30 m away from watercourses when possible.

Erosion and sediment control materials

Emergency erosion and sediment control (ESC) materials were not observed on site during the audit visit.

Recommended action: Procure and stockpile appropriate types of ESC materials in adequate quantities to respond to emergency ESC events.

5.2 Conditionally Compliant Items

Fuel storage and hazardous waste within 30 m of North Herford Creek

A bulk fuel tank for the onsite generator was placed within 30 m of North Herford Creek, adjacent to the portable outhouse. The CEMP and BMPs requires that fuel is stored more than 30 m from the nearest watercourse. The contractor reported that the outhouse and fuel would be moved further away from the creek.

Recommended action: Move outhouse and fuel storage more than 30 m from the nearest watercourse.

Water Management

Instream work was not in progress during the audit. However, Environmental Monitoring Memo #03 reports that during instream work on August 19, 2024, the EM directed contractors to discharge turbid water to the adjacent field instead of back to the creek channel or roadside ditch.

Recommended action: Ensure water bypass systems do not divert water away from the creek but return it to the same creek downstream of works to maintain base flows. Additional erosion and sediment control measures may be required to prevent a release of turbid water, e.g., pump turbid water to riparian vegetation, dig a settling pool to allow turbidity from pump discharges to settle out, or install sediment socks on pump outlets to filter turbid water.

Waste management

Monitoring reports state that the EM recommended off-site disposal of removed tansy ragwort at a designated facility but did not identify the specific disposal site(s). Details of disposal site(s) for anthropogenic debris and sediment removed from the creeks were also not provided in the CEMP or monitoring reports.

Recommended action: Provide details of disposal site(s) for invasive plant material, sediment, and anthropogenic debris in monitoring reports.

6 SUMMARY

A list of environmental issues outstanding to date is provided in Table 6-1, below.

Table 6-1 Tracking Table of Environmental Issues Outstanding to-Date (project commencement August 12, 2024)

Item #(s)	Issue	Date(s) Observed	Recommended Corrective Action(s)	Responsible Party
1	EM reports not received daily	August 15, 2024 August 22, 2024	Distribute daily monitoring reports to appropriate parties	EM
2	Lack of ESC materials on site	August 15, 2024 August 22, 2024	Procure appropriate ESC materials for responding to emergency ESC events.	Contractor/EM
3	Inappropriate water diversion	August 15, 2024 August 19, 2024*	Ensure that site isolation and flow bypass measures maintain downstream flow in the creek.	Contractor/EM
4	Pump intake without fish-friendly screen	August 15, 2024 August 19, 2024* August 22, 2024	Avoid pumping water from fish-bearing watercourses if possible; add fish-friendly screens to pumps as per DFO guidance.	Contractor/EM
5	Bulk fuel tank at top of bank of South Herford Creek	August 15, 2024	Move fuel storage more than 30 m from the nearest watercourse.	Contractor

Note: Items marked with an asterisk (*) were reported by the EM.

7 CLOSURE

We trust that the information in this memo is sufficient for your present needs. Should you have questions, please do not hesitate to contact the undersigned.

Prepared by:	**Reviewed by:**
Dave Muhlert, R.B.Tech. Environmental Technologist	Naomi Sands, R.P.Bio. Senior Environmental Scientist

DM/NS

Attachments:

- Site Photographs

Attachment 1: Site photographs taken during audit visit on August 22, 2024.

Photo 1: Riprap stockpiled north of North Herford creek appeared to be clean. 		**Photo 2: Equipment on site was clean.** 
Photo 3: Outhouse located within 30 m of North Herford Creek 		**Photo 4: Excavator parked at top of bank of South Herford Creek without a drip tray** 
Photo 5: Dewatering pump with ¼" mesh screen 		

TECHNICAL MEMORANDUM

Issue Date:	October 1, 2024	**File:**	Audit No. 7
To:	**Thyren Jacobs, Flood Debris Management Secretariat**	**Previous Issue Date:**	
From:	Dave Muhlert, R.B.Tech. and Naomi Sands, R.P.Bio.		
Client:	Ministry of Environment and Climate Change Strategy		
Project Name:	North and South Herford Creek Bank Protection and Sediment Removal - SCR34 and SCR37	**Project No.:**	2022-2632-08/11
Subject:	Environmental Compliance Audit		
Monitoring Period:	September 20 to September 25, 2024		
Contractor:	Mission Contractors Ltd.		
Environmental Monitor:	AquaTerra Environmental Ltd.		

1 INTRODUCTION

Associated Environmental Consultants Inc, (Associated) is pleased to provide this environmental audit report summarizing observations of site conditions, environmental protection measures, regulatory compliance, and corrective actions as part of erosion protection works on North and South Herford creeks, Southeast of Durieu, BC in the Hatzic Valley (the Project, the Site) during the monitoring period September 20 to September 25, 2024. The results presented in this audit report are based on conditions observed at the time of the audit inspection(s) and represent a snapshot of the workday. Items identified as non-compliant may have been addressed before the report(s) are submitted. The audit report(s) are submitted to the owner, their agent (Associated Engineering), the Contractor, and their EM and are not intended for further distribution.

2 ROLES AND RESPONSIBILITIES

The prime contractor for the Project is Mission Contractors Ltd. (the Contractor), and works are being monitored for environmental compliance by AquaTerra Environmental Ltd. (AquaTerra) and audited by Associated. As the environmental monitor (EM), AquaTerra is to work with the Contractor to develop measures to protect the environment and to respond to environmental incidents as they occur. Leq'á:mel First Nation (LFN) is the cultural monitor for the Site and is responsible for all fish salvages. The responsibility of the auditor is to ensure on behalf of the owner, who is ultimately the permit holder, that the EM, LFN, and the Contractor adhere to the requirements of the Construction Environmental Monitoring Plan (CEMP)[1], environmental permit conditions and any applicable regulations.

3 SITE INSPECTION

A summary of site conditions as observed during the audit inspection completed during the monitoring period is provided in Table 3-1. At the time of this report, Associated has not received any monitoring reports for this audit period.

[1] AquaTerra Environmental Ltd. 2024. Hatzic Emergency Program, South Herford Creek Project, Construction Environmental Management Plan (Rev. 1). Prepared for Mission Contractors Ltd. 65 p.

Table 3-1 Site Conditions During Audit Inspection

Date / Time	Auditor (Associated)	Weather	Construction Activities
September 25, 2024 10:30	Dave Muhlert	Overcast. 14°C. Moderate rain[2].	Surveyors working at South Herford Creek One excavator loading stockpiled sediment onto trucks for off-site disposal. No instream works in progress during the audit.

4 INSPECTION RESULTS

A checklist of required environmental protection measures and mitigative strategies for the Project is presented in Table 4-1. The checklist has been developed in accordance with terms and conditions of the environmental permits and approvals issued for the Project, environmental protection specifications and requirements as part of the construction contract for the Project, the Contractor's Construction Environmental Management Plan and environmental best management practices and guidelines.

[2] Government of Canada. 2024. Historical Data (Abbotsford Airport station). Available at: https://climate.weather.gc.ca/historical_data/search_historic_data_e.html. Accessed September 2024.

Table 4-1 Summary of Environmental Protection Measures Reviewed and Results of the Inspection

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
	Environmental Monitoring					
1	The EM will attend key site meetings where environmental mitigations and issues may be discussed.	☒Compliant ☐Non-Compliant ☐N/A	EM has been on site for key site meetings.		CEMP Section 5.1.4	
2	The EM shall supervise all instream works. If temporary diversion installed, EM is onsite daily to check pumps and flow bypasses.	☐Compliant ☒**Non-Compliant** ☐N/A	EM has **not** attended site daily while temporary diversion was operating and instream excavation was occurring. Instream works concluded on Sept 20	EM should continue to attend site routinely to monitor site restoration.	WSA (k)4, (k)5.ii CEMP Section 5.1.4	
3	The EM will submit daily and bi-weekly monitoring reports to the Contractor for distribution to MoECCS.	☐Compliant ☒**Non-Compliant** ☐N/A	Reports continue to be submitted more than 1 week overdue. No reports have been submitted for this audit period.	Submit all outstanding report as soon as possible and submit daily moving forward.	CEMP Section 5.1.4	
4	The EM will complete and submit an Environmental Incident Report (EIR) for non-compliances with the CEMP, reportable spills or other environmental incident.	☐Compliant ☐Non-Compliant ☒N/A	No environmental incidents have been reported; however, all EM reports for this audit period are still outstanding.		CEMP Section 5.1.4	
5	EM is granted authority to stop the work if necessary	☒Compliant ☐Non-Compliant ☐N/A	EM has the authority to stop work and has worked with contractors to adjust operations as needed.		WSA (i) 7 CEMP Section 5.1.4	
	Erosion and Sediment Control					
6	Appropriate site isolation is installed as required, including silt fencing prior to instream works. Silt fences are installed properly, intact, adequate, clear of accumulated sediment and are functioning.	☐Compliant ☐Non-Compliant ☒N/A	No silt fences or areas where silt fences were required were observed during the audit visit.		WSA (p) CEMP Appendix B	
7	Riprap or any other engineering material place in channel is clean of any substances deleterious to aquatic life.	☐Compliant ☐Non-Compliant ☒N/A	No riprap or other engineering material was being placed during the audit.	.	WSA (x) CEMP Section7.2	
8	Stockpiling and storage areas are located 15 m from the watercourse TOB.	☒Compliant ☐Non-Compliant ☐N/A	Stockpiles are located well away from the watercourses.		DFO LOA WSA (o) CEMP Appendix B	Photo 1
9	Emergency ESC material onsite (e.g., 100 feet of silt fencing, 5 dry bales, and 100sq.m of ECBs/ Coconut matting, or polyethylene sheets)	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant - limited ESC materials were observed stockpiled onsite during the audit visit. No ESC issues were observed during the significant rain event on September 25.	Ensure appropriate types of ESC materials in adequate quantities are kept onsite to respond to emergency ESC events.	CEMP Appendix B	
10	Sediment removed from the Site will be disposed of appropriately at a location approved by the EM and MoECCS.	☐Compliant ☐Non-Compliant ☒N/A	No sediment removal was in progress during the audit. Details of sediment disposal are still outstanding.	Update the CEMP and/or monitoring reports with the sediment disposal location(s).	CEMP Section 8.5	
11	Sediment removal boundaries must be clearly delineated prior to commencement of work.	☒Compliant ☐Non-Compliant ☐N/A	Instream sediment removal is now complete		WSA (q)	
	Invasive Plant Management					
12	Ensure that machinery is free of invasive plant material that could	☒Compliant ☐Non-Compliant ☐N/A	Machinery appeared to be clean and free of plant material during the audit.		WSA (opening) CEMP Section 7.5	

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
	potentially be transported throughout or between sites.					
13	Ensure that invasive species removed from site are disposed of appropriately at an approved facility	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant– disposal site(s) are not identified in the monitoring reports.	Provide details of invasive plant disposal site(s) in monitoring reports.	WSA (opening) CEMP Section 7.5	
14	The Project site shall be regularly monitored by the EM for invasive plant infestations and these infestations will be mapped and managed according to applicable species-specific BMPs.	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant – no EM reports have been received with details of invasive plant management.		CEMP Section 7.5	
16	Hand pull or mechanically remove tansy ragwort and wash equipment before exiting infested areas	☒Compliant ☐Non-Compliant ☐N/A	As reported by the contractor to the EM.		CEMP Section 7.5	
	Waste Management					
17	Dispose of all anthropogenic debris removed at an appropriate waste management facility.	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant- disposal details have not been provided. Anthropogenic debris was not observed on site during the audit.	Include waste disposal location(s) in monitoring reports.	WSA (opening) CEMP Section 8.5	
18	Non-hazardous waste stored appropriately and removed offsite daily.	☒Compliant ☐Non-Compliant ☐N/A	No non-hazardous waste was observed during the audit.		CEMP Section 8.5	
19	Hazardous waste stored > 30 m of watercourses.	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant - outhouse is within 30 m of North Herford Creek and the roadside ditch; however it is within laydown area / other side of access road. No other hazardous waste was observed during the audit.		CEMP Section 8.4	
20	Secondary containment used for all stored hazardous waste.	☐Compliant ☒Non-Compliant ☐N/A	Large generator was stored more than 30 m from watercourses but did not have secondary containment.		CEMP Section 8.3.1	Photo 2
	Spill Control and Emergency Response					
21	Machinery operating in channel is equipped with environmentally friendly oil	☒Compliant ☐Non-Compliant ☐N/A	Contractor previously reported that the excavator working instream is using environmentally friendly hydraulic oil.		WSA (o) 4 CEMP Section 8.3.2	
22	Equipment and machinery are free of leaks	☒Compliant ☐Non-Compliant ☐N/A	No leaks were observed during the audit visit.		WSA (o) 1 CEMP Section 8.3.2	
23	Drip trays are available and used during refueling and equipment maintenance	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant: Flexible drip tray under an excavator parked at top of bank of North Herford Creek was collapsed/folded.		CEMP Section 8.3.2	Photo 3
24	Fuel is stored > 30 m from North and South Herford creeks and any connected drainages	☐Compliant ☐Non-Compliant ☒N/A	Fuel storage was not observed during the audit.		WSA (k) 3 CEMP Section 8.3.2	
25	Machinery and vehicles operating onsite are equipped with spill kit.	☒Compliant ☐Non-Compliant ☐N/A	Spill kit is available near the work area.		WSA (k) 2 CEMP Section 6.6	
26	Should suspected contaminated material be encountered (i.e., soil emitting olfactory cues indicative of hydrocarbon fuel), works should	☐Compliant ☐Non-Compliant ☒N/A	No suspected contaminated material has been reported to date.		CEMP Section 2.3	

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
	temporarily halt for investigation.					
27	Refuelling of machinery is conducted on level ground over a spill tray.	☐Compliant ☐Non-Compliant ☒N/A	No refuelling was observed during the audit. Contractor previously reported that refueling is done on level ground in the middle of the laydown area, more than 30 m away from watercourses.		CEMP Section 8.3.2	
	Riparian Area Management					
28	Stockpile LWD and root wads removed from channel for use in site restoration	☒Compliant ☐Non-Compliant ☐N/A	LWD has been used for site restoration in North Herford Creek, west of Sylvester Road.		CEMP Section 7.4	
29	Construct access points and approaches perpendicular to the watercourse;	☒Compliant ☐Non-Compliant ☐N/A	Access roads used by haul trucks were constructed perpendicular to the creeks, where possible.		DFO eFFA	
	Instream Works					
30	The EM shall ensure that instream works are isolated from flow and that measures are in place to protect fish and fish habitat, and to mitigate the migration of sediment downstream.	☐Compliant ☒**Non-Compliant** ☐N/A	EM is not onsite for all sensitive works (e.g., initial dewatering of channel following salvage). Bypass pumps had been removed at the time of the audit. However, no EM reports have been received for instream works conducted during the audit period.	While LFN is responsible for conducting salvages, EM is still responsible for general oversight and to ensure the ongoing protection of fish and fish habitat.	WSA (k) 1 CEMP Section 5	
31	Pumps and flow bypasses are in proper working condition	☐Compliant ☐Non-Compliant ☒N/A	Bypass system has been removed.		WSA (k) 5	Photo 4
32	Instream works conducted in the dry / isolation of flow	☐Compliant ☐Non-Compliant ☒N/A	Instream works are now complete.		WSA (k) 2 CEMP Section 7.2.6	Photo 5
	Water Quality					
33	Water quality is routinely monitored upstream and downstream of the work area, every day that instream works are occurring Instream water quality is compliant with provincial criteria[3]: **Turbidity**: - <8 NTU from background at any one time for a duration of 24 h in clear waters; - < 5 NTU from background when background is 8 – 50 NTU; - <10% from background when background is > 50 NTU. **pH:** 6.5-9.0	☐Compliant ☒**Non-Compliant** ☐N/A	WQ monitoring did **not** occur daily during instream works, only when the EM was present.	Collect water quality data daily during instream works and include results in the EM reports.	CEMP Section 8.1 WSA (r)	
	Fish and Wildlife Protection					
34	Full time monitoring for fish during instream works is occurring.	☐Compliant ☒**Non-Compliant** ☐N/A	EM has not been onsite full time, nor even daily during instream works.	EM must be onsite in accordance with permit conditions.	WSA (k) 6	
35	Fish salvages are conducted in advance of instream works where required.	☒Compliant ☐Non-Compliant ☐N/A	Leq'á:mel First Nation has been conducting fish salvages in advance of instream works.		CEMP Section 7.3.1 WSA (k) 6	
36	Salvaged fish are relocated back to the same	☒Compliant ☐Non-Compliant	Fish were being relocated immediately downstream of the	Include fish release details in	DFO FAA Section 2.2.4	

[3] British Columbia Ministry of Environment and Climate Change Strategy. 2024. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture - Guideline Summary – August 2024. Water Quality Guideline Series, WQG-20. Prov. B.C., Victoria B.C. Available at: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/wqg_summary_aquaticlife_wildlife_agri.pdf. Accessed August 2024.

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
	watercourse in a nearby area that is not impacted by construction or removal works or its zone of influence	☐N/A	isolated work area in North Herford Creek.	environmental monitoring reports.		
37	Pump intakes are 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"	☐Compliant ☐Non-Compliant ☒N/A	Bypass pumps have been removed.		WSA (k) 5 CEMP Section 7.2.6	
38	Obtain required permits prior to salvage(s).	☒Compliant ☐Non-Compliant ☐N/A	Leq'á:mel First Nation holds the appropriate permits for fish salvages		WSA (Opening) CEMP Section 5.1.4	
39	EM is on site during disturbance to riparian vegetation and conducting pre-clearing breeding bird surveys prior to clearing. Surveys for year-round protected nests are conducted as required.	☐Compliant ☐Non-Compliant ☒N/A	Vegetation clearing does not appear to have been required since last audit.	Submit EM reports on time.	CEMP Section 5.1.4	
40	Instream works are conducted so as not to lead to fish stranding or other impacts to fish. The works shall not result in depressions that have the ability to trap fish and other aquatic life. Fish passage is maintained where practicable and in accordance with applicable permits.	☐Compliant ☒**Non-Compliant** ☐N/A	The upstream stop net was left in place on North Herford creek, and the sump for the bypass pumps has not been filled in. An empty pump screen box was still in place in the tributary stream to North Herford Creek	Fill in the sump and remove the stop net from the creek. Remove the screen box from the stream channel as soon as possible.	WSA (t) WSA (k) 6 (iii) DFO FAA Section 2.4.2	Photo 4, Photo 5
	Restoration Requirements					
41	Restoration plans prepared by EM for disturbed area and implemented with EM oversight	☐Compliant ☐Non-Compliant ☒N/A	Restoration plan is pending.		WSA (w) CEMP Section 8.2	Photo 6
42	All temporary works shall be removed on completion of the project, and the stream channel restored to its natural condition	☐Compliant ☐Non-Compliant ☒N/A	Work was still in progress at time of inspection.		WSA (v) CEMP Section 8.2	

5 DISCUSSION

5.1 Non-Compliant Items

Frequency of environmental monitoring during instream works and associated reporting is not compliant with environmental permits.

The CEMP requires that monitoring reports are produced daily by the EM, and the *Water Sustainability Act* Section 11 Change Approval authorization requires that the EM is on site during all instream works, including while flow bypasses are operating. Monitoring reports should include details of vegetation clearing, timing and duration of instream works, fish salvages and isolation measures, water quality monitoring, invasive species management, and waste disposal.

Recommended action: EM to attend site in accordance with environmental permit conditions. Environmental monitoring reports should be submitted same day, or early following morning. Include details of fish salvages and release sites, as well as timing and duration of: instream works, flow bypasses, and EM visits in monitoring reports.

Impediments to fish passage on North Herford Creek

The fish isolation stop net at the upstream end of North Herford Creek was still in place, and the deep pool sump that was excavated for the bypass pump had not yet been filled in at the time of the audit. In addition, an empty pump screen box was still in place in the tributary to North Herford Creek.

Recommended action: Using appropriate fill material and under the direction of the EM, fill the sump back up to level with the rest of the stream channel and remove fish isolation nets from the creek as soon as possible.

Water quality monitoring is not occurring every day of instream works.

The WSA S.11 approval stipulates that water quality measurements are to be taken every day that instream works is occurring. The EM has not been onsite daily during instream works, but record water quality on the days that they do attend when instream works are occurring. EM report with water quality data are still outstanding.

Recommended action: EM to attend site daily during instream works.

Large generator without secondary containment

A large generator stored by the red barn north of North Herford Creek was more than 30 m away from the watercourse but did not have a drip tray to contain drips or leaks.

Recommended action: Use secondary containment for all equipment that contains fuel, oil, or other hazardous materials.

5.2 Conditionally Compliant Items

Collapsed secondary containment under excavator

The flexible drip tray under an excavator parked at top of bank of North Herford Creek was collapsed and unlikely to contain any substantial spills.

Recommended action: Ensure that drip trays have adequate structure and volume to contain potential leaks or spills from equipment. Park mobile equipment more than 30 m from watercourses whenever possible.

Erosion and sediment control materials

Minimal emergency erosion and sediment control (ESC) materials were observed on site during the audit visit.

Recommended action: Procure and stockpile appropriate types of ESC materials in adequate quantities to respond to emergency ESC events.

Waste management

Monitoring reports state that the EM recommended off-site disposal of removed tansy ragwort at a designated facility but did not identify the specific disposal site(s). Details of disposal site(s) for anthropogenic debris and sediment removed from the creeks were also not provided in the CEMP or monitoring reports.

Recommended action: Provide details of disposal site(s) for invasive plant material, sediment, and anthropogenic debris in monitoring reports.

6 SUMMARY

A list of environmental issues outstanding to date is provided in Table 6-1, below.

Table 6-1 Tracking Table of Environmental Issues Outstanding to-Date (project commencement August 12, 2024)

Item #(s)	Issue	Date(s) Observed	Recommended Corrective Action(s)	Responsible Party
1	EM reports not received daily	August 15, 2024 August 22, 2024 August 29, 2024 September 5, 2024	Distribute daily monitoring reports to appropriate parties	EM
2	Limited ESC materials on site	August 15, 2024 August 22, 2024 August 29, 2024 September 5, 2024	Procure appropriate ESC materials for responding to emergency ESC events.	Contractor/EM
6	Tansy ragwort infestations not flagged	August 29, 2024	Delineate and/or remove tansy ragwort infestations before works begin in affected areas. EM should oversee removal.	EM
7	Equipment with inadequate secondary containment	August 22, 2024 August 29, 2024 September 5, 2024 September 25, 2024	Repair or replace secondary containment so that it has sufficient structure and volume to contain potential leaks.	Contractor
8	Environmental issues and resolutions are not reported in a timely manner.	September 7, 2024 (EM report) September 13, 2024 (EM report)	Identify to whom recommended actions are communicated along with follow up actions in the EM report and submit daily.	EM

Item #(s)	Issue	Date(s) Observed	Recommended Corrective Action(s)	Responsible Party
9	Impediments to fish passage left in North Herford Creek	September 25, 2024	Using appropriate fill material and under the direction of the EM, fill the sump back up to level with the rest of the stream channel and remove fish isolation measures from the creek as soon as possible.	Contractor/EM

7 CLOSURE

We trust that the information in this memo is sufficient for your present needs. Should you have questions, please do not hesitate to contact the undersigned.

Prepared by:

Dave Muhlert, R.B.Tech.
Environmental Technologist

Reviewed by:

Naomi Sands, R.P.Bio.
Environmental Scientist

DM/NS

Attachments:
- Site Photographs
- Table A2: Tracking Table of Resolved Non-Compliance Issues

Attachment 1: Site photographs taken during audit visit on September 25, 2024.

Photo 1: Stockpiles located more than 15 m from watercourses 		**Photo 2: Large generator without secondary containment** 
Photo 3: Collapsed drip tray under excavator 		**Photo 4: Fish isolation net and excavated sump still in place on North Herford Creek** 
Photo 5: Pump screen box left in tributary to North Herford Creek 		**Photo 6: Site restoration plan pending** 

Table A2: Tracking Table of Resolved Non-Compliance Issues

Item #(s)	Issue	Date(s) Observed	Date Corrected	Corrective Action(s)	Responsible Party
3	Inappropriate water diversion	August 15, 2024 August 19, 2024*	August 22, 2024	Contractor adjusted operations so that majority of bypass flow would be returned to the creek channel.	Contractor/EM
4	Pump intake without fish-friendly screen	August 15, 2024 August 19, 2024* August 22, 2024 August 29, 2024	September 5, 2024	Pump is situated in mesh cage within isolated work zone.	Contractor/EM
5	Bulk fuel tank at top of bank of South Herford Creek	August 15, 2024	August 22, 2024	Fuel tank was moved to laydown area. New location is less than 30 m away from North Herford Creek; per the contractor, other locations would be closer to ditches/watercourses. The tank is in secondary containment.	Contractor
7	Generator with inadequate secondary containment	August 22, 2024 August 29, 2024 September 5, 2024	September 12, 2024	Contractor shored up the edges of the containment tray with rocks	Contractor

Note: Items marked with an asterisk (*) were reported by the EM.

TECHNICAL MEMORANDUM

Issue Date:	September 9, 2024	**File:**	Audit No. 4
To:	**Thyren Jacobs, Flood Debris Management Secretariat**	**Previous Issue Date:**	
From:	Naomi Sands, R.P.Bio.		
Client:	Ministry of Environment and Climate Change Strategy		
Project Name:	North and South Herford Creek Bank Protection and Sediment Removal - SCR34 and SCR37	**Project No.:**	2022-2632-08/11
Subject:	Environmental Compliance Audit		
Monitoring Period:	August 30 to September 5, 2024		
Contractor:	Mission Contractors Ltd.		
Environmental Monitor:	AquaTerra Environmental Ltd.		

1 INTRODUCTION

Associated Environmental Consultants Inc, (Associated) is pleased to provide this environmental audit report summarizing observations of site conditions, environmental protection measures, regulatory compliance, and corrective actions as part of erosion protection works on North and South Herford creeks, Southeast of Durieu, BC in the Hatzic Valley (the Project, the Site) during the monitoring period August 30 to September 5, 2024. The results presented in this audit report are based on conditions observed at the time of the audit inspection(s) and represent a snapshot of the workday. Items identified as non-compliant may have been addressed before the report(s) are submitted. The audit report(s) are submitted to the owner, their agent (Associated Engineering), the Contractor, and their EM and are not intended for further distribution.

2 ROLES AND RESPONSIBILITIES

The prime contractor for the Project is Mission Contractors Ltd. (the Contractor), and works are being monitored for environmental compliance by AquaTerra Environmental Ltd. (AquaTerra) and audited by Associated. As the environmental monitor (EM), AquaTerra is to work with the Contractor to develop measures to protect the environment and to respond to environmental incidents as they occur. Leq'á:mel First Nation (LFN) is the cultural monitor for the Site and is responsible for all fish salvages. The responsibility of the auditor is to ensure on behalf of the owner, who is ultimately the permit holder, that the EM, LFN, and the Contractor adhere to the requirements of the Construction Environmental Monitoring Plan (CEMP)[1], environmental permit conditions and any applicable regulations.

3 SITE INSPECTION

A summary of site conditions as observed during the audit inspection completed during the monitoring period is provided in Table 3-1. At the time of this report, Associated has not received any monitoring reports for this audit period.

[1] AquaTerra Environmental Ltd. 2024. Hatzic Emergency Program, South Herford Creek Project, Construction Environmental Management Plan (Rev. 1). Prepared for Mission Contractors Ltd. 65 p.

Table 3-1 Site Conditions During Audit Inspection

Date / Time	Auditor (Associated)	Weather	Construction Activities
September 5, 2024 09:20	Naomi Sands	Sunny, clear skies. 24°C. No precipitation.	No activity in South Herford Creek Contractor was stockpiling riprap in laydown area north of North Herford Creek, on the west side of Sylvester Road. LFN was onsite conducting fish salvage in North Herford Creek, east of Sylvester Road. Bypass pump was set up, but not operating.

4 INSPECTION RESULTS

A checklist of required environmental protection measures and mitigative strategies for the Project is presented in Table 4-1. The checklist has been developed in accordance with terms and conditions of the environmental permits and approvals issued for the Project, environmental protection specifications and requirements as part of the construction contract for the Project, the Contractor's Construction Environmental Management Plan and environmental best management practices and guidelines.

Table 4-1 Summary of Environmental Protection Measures Reviewed and Results of the Inspection

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
	Environmental Monitoring					
1	The EM will attend key site meetings where environmental mitigations and issues may be discussed.	☒Compliant ☐Non-Compliant ☐N/A	EM has been on site for key site meetings.		CEMP Section 5.1.4	
2	The EM shall supervise all instream works. If temporary diversion installed, EM is onsite daily to check pumps and flow bypasses.	☐Compliant ☒Non-Compliant ☐N/A	EM is **not** attending site daily while temporary diversion operating and instream excavation occurring.	EM should attend site daily when bypass pumps are operating and/or during in-channel excavation	WSA (k)4, (k)5.ii CEMP Section 5.1.4	
3	The EM will submit daily and bi-weekly monitoring reports to the Contractor for distribution to MoECCS.	☐Compliant ☒Non-Compliant ☐N/A	Reports are outstanding and are being submitted up to one week late.	Submit reports daily.	CEMP Section 5.1.4	
4	The EM will complete and submit an Environmental Incident Report (EIR) for non-compliances with the CEMP, reportable spills or other environmental incident.	☐Compliant ☐Non-Compliant ☒N/A	No environmental incidents have been reported to date.		CEMP Section 5.1.4	
5	EM is granted authority to stop the work if necessary	☒Compliant ☐Non-Compliant ☐N/A	EM has the authority to stop work and has worked with contractors to adjust operations as needed.		WSA (i) 7 CEMP Section 5.1.4	
	Erosion and Sediment Control					
6	Appropriate site isolation is installed as required, including silt fencing prior to instream works. Silt fences are installed properly, intact, adequate, clear of accumulated sediment and are functioning.	☐Compliant ☐Non-Compliant ☒N/A	No silt fences or areas where silt fences were required were observed during the audit visit.		WSA (p) CEMP Appendix B	
7	Riprap or any other engineering material place in channel is clean of any substances deleterious to aquatic life.	☒Compliant ☐Non-Compliant ☐N/A	There was no riprap being placed at the time of the inspection; riprap in channel appeared clean. Some of the riprap stockpiled in laydown area is dirty.	Clean riprap prior to installing in channel.	WSA (x) CEMP Section7.2	Photo 1
8	Stockpiling and storage areas are located 15 m from the watercourse TOB.	☒Compliant ☐Non-Compliant ☐N/A	Stockpiles are located well away from the watercourses.		DFO LOA WSA (o) CEMP Appendix B	
9	Emergency ESC material onsite (e.g., 100 feet of silt fencing, 5 dry bales, and 100sq.m of ECBs/ Coconut matting, or polyethylene sheets)	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant - limited ESC materials were observed stockpiled onsite during the audit visit.	Ensure appropriate types of ESC materials in adequate quantities are kept onsite to respond to emergency ESC events.	CEMP Appendix B	Photo 2
10	Sediment removed from the Site will be disposed of appropriately at a location approved by the EM and MoECCS.	☐Compliant ☐Non-Compliant ☒N/A	No sediment removal was in progress during the audit. Details of sediment disposal are not provided in the CEMP or monitoring reports.	Update the CEMP and/or monitoring reports with the sediment disposal location(s).	CEMP Section 8.5	
11	Sediment removal boundaries must be clearly delineated prior to commencement of work.	☐Compliant ☐Non-Compliant ☒N/A	Sediment removal was not in progress during the audit.		WSA (q)	
	Invasive Plant Management					
12	Ensure that machinery is free of invasive plant material that could	☒Compliant ☐Non-Compliant ☐N/A	Machinery appeared to be clean and free of plant material during the audit.		WSA (opening) CEMP Section 7.5	

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
	potentially be transported throughout or between sites.					
13	Ensure that invasive species removed from site are disposed of appropriately at an approved facility	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant– disposal site(s) are not identified in the monitoring reports.	Provide details of invasive plant disposal site(s) in monitoring reports.	WSA (opening) CEMP Section 7.5	
14	The Project site shall be regularly monitored by the EM for invasive plant infestations and these infestations will be mapped and managed according to applicable species-specific BMPs.	☐Compliant ☒Non-Compliant ☐N/A	Tansy ragwort is noted in the monitoring reports, but does not appear to be delineated in the field. EM is not onsite to oversee invasive species removal; contractor provides photo-documentation to EM.	Delineate tansy ragwort in the field and/or monitor invasive species removal.	CEMP Section 7.5	
16	Hand pull or mechanically remove tansy ragwort and wash equipment before exiting infested areas	☒Compliant ☐Non-Compliant ☐N/A	As reported by the contractor to the EM.		CEMP Section 7.5	
	Waste Management					
17	Dispose of all anthropogenic debris removed at an appropriate waste management facility.	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant- disposal details have not been provided. Anthropogenic debris was not observed on site during the audit.	Include waste disposal location(s) in monitoring reports.	WSA (opening) CEMP Section 8.5	
18	Non-hazardous waste stored appropriately and removed offsite daily.	☒Compliant ☐Non-Compliant ☐N/A	Waste appeared to be stored appropriately. The site was clean during the audit.		CEMP Section 8.5	
19	Hazardous waste stored > 30 m of watercourses.	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant - outhouse is within 30 m of North Herford Creek and the roadside ditch; however it is within laydown area / other side of access road. No other hazardous waste was observed during the audit.		CEMP Section 8.4	
20	Secondary containment used for all stored hazardous waste.	☐Compliant ☒Non-Compliant ☐N/A	Secondary containment for large generator was still collapsed / not fully assembled; first noted on Aug 22	Contractor to install metal clips to hold the walls upright on the generator's secondary containment.	CEMP Section 8.3.1	Photo 3
	Spill Control and Emergency Response					
21	Machinery operating in channel is equipped with environmentally friendly oil	☐Compliant ☐Non-Compliant ☒N/A	No equipment operating instream at time of inspection. Contractor previously reported that the excavator working instream is using environmentally friendly hydraulic oil.		WSA (o) 4 CEMP Section 8.3.2	
22	Equipment and machinery are free of leaks	☒Compliant ☐Non-Compliant ☐N/A	No leaks were observed during the audit visit.		WSA (o) 1 CEMP Section 8.3.2	
23	Drip trays are available and used during refueling and equipment maintenance	☒Compliant ☐Non-Compliant ☐N/A	Drip trays were placed under parked machinery, except recently parked excavator and John Deere cart.		CEMP Section 8.3.2	Photo 4
24	Fuel is stored > 30 m from North and South Herford creeks and any connected drainages	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant - bulk fuel was within 30 m of North Herford Creek, but within laydown area. Fuel was in secondary containment.		WSA (k) 3 CEMP Section 8.3.2	
25	Machinery and vehicles operating onsite are equipped with spill kit.	☒Compliant ☐Non-Compliant ☐N/A	Spill kits were available near both North and South Herford creeks.		WSA (k) 2 CEMP Section 6.6	
26	Should suspected contaminated material be encountered (i.e., soil emitting olfactory cues	☐Compliant ☐Non-Compliant ☒N/A	No suspected contaminated material has been reported to date.		CEMP Section 2.3	

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
	indicative of hydrocarbon fuel), works should temporarily halt for investigation.					
27	Refuelling of machinery is conducted on level ground over a spill tray.	☐Compliant ☐Non-Compliant ☒N/A	No refuelling was observed during the audit. Contractor previously reported that refueling is done on level ground in the middle of the laydown area, more than 30 m away from watercourses.		CEMP Section 8.3.2	
	Riparian Area Management					
28	Stockpile LWD and root wads removed from channel for use in site restoration	☐Compliant ☐Non-Compliant ☒N/A	No stockpiles of LWD/root wads observed.		CEMP Section 7.4	
29	Construct access points and approaches perpendicular to the watercourse;	☒Compliant ☐Non-Compliant ☐N/A	Access roads used by haul trucks were constructed perpendicular to the creeks, where possible.		DFO eFFA	
	Instream Works					
30	The EM shall ensure that instream works are isolated from flow and that measures are in place to protect fish and fish habitat, and to mitigate the migration of sediment downstream.	☐Compliant ☐Non-Compliant ☒N/A	No instream works at the time of the audit inspect. Bypass system set up on North Herford Creek, east of Sylvester Road, but was not operating. Pumps were in a mesh box with 0.5 cm mesh within the isolated reach.		WSA (k) 1 CEMP Section 5	Photo 5
31	Pumps and flow bypasses are in proper working condition	☐Compliant ☐Non-Compliant ☒N/A	Bypass system was set up but **not** operating at the time of the inspection.		WSA (k) 5	
32	Instream works conducted in the dry / isolation of flow	☐Compliant ☐Non-Compliant ☒N/A	No instream works at the time of the inspection.		WSA (k) 2 CEMP Section 7.2.6	
	Water Quality					
33	Water quality is routinely monitored upstream and downstream of the work area, every day that instream works are occurring Instream water quality is compliant with provincial criteria[2]: **Turbidity**: - <8 NTU from background at any one time for a duration of 24 h in clear waters; - < 5 NTU from background when background is 8 – 50 NTU; - <10% from background when background is > 50 NTU. **pH:** 6.5-9.0	☐Compliant ☒Non-Compliant ☐N/A	WQ monitoring is **not** occurring daily during instream works, only when the EM is present.	Collect water quality data daily during instream works and include results in the EM reports.	CEMP Section 8.1 WSA (r)	
	Fish and Wildlife Protection					
34	Full time monitoring for fish during instream works is occurring.	☐Compliant ☒Non-Compliant ☐N/A	EM is not onsite full time, nor even daily during instream works.	EM to be on site full time during instream works (i.e., excavation in the stream channel).	WSA (k) 6	
35	Fish salvages are conducted in advance of instream works where required.	☒Compliant ☐Non-Compliant ☐N/A	Leq'á:mel First Nation were conducting a fish salvage of upper North Herford Creek in advance of instream works.		CEMP Section 7.3.1 WSA (k) 6	Photo 5

[2] British Columbia Ministry of Environment and Climate Change Strategy. 2024. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture - Guideline Summary – August 2024. Water Quality Guideline Series, WQG-20. Prov. B.C., Victoria B.C. Available at: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/wqg_summary_aquaticlife_wildlife_agri.pdf. Accessed August 2024.

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
36	Salvaged fish are relocated back to the same watercourse in a nearby area that is not impacted by construction or removal works or its zone of influence	☒Compliant ☐Non-Compliant ☐N/A	Fish were being relocated immediately downstream of the isolated work area in North Herford Creek.	Include fish release details in environmental monitoring reports.	DFO FAA Section 2.2.4	
37	Pump intakes are 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"	☒Compliant ☐Non-Compliant ☐N/A	Bypass pump was in a screen box with ~ 0.5 cm mesh. DFO interim code of practice for fish protection recommends openings 1/10 the size of the smallest fish expected. At the time of this memo, Associated has not received salvage reports with measurements of the smallest fish observed.	Confirm that the mesh size is the appropriate size for the smallest fish observed during the fish salvage.	WSA (k) 5 CEMP Section 7.2.6	
38	Obtain required permits prior to salvage(s).	☒Compliant ☐Non-Compliant ☐N/A	Leq'á:mel First Nation holds the appropriate permits for fish salvages		WSA (Opening) CEMP Section 5.1.4	
39	EM is on site during disturbance to riparian vegetation and conducting pre-clearing breeding bird surveys prior to clearing. Surveys for year-round protected nests are conducted as required.	☐Compliant ☐Non-Compliant ☒N/A	Clearing of invasive species shrubs occurred during the monitoring period, outside the peak bird nesting window. No clearing of trees or snags requiring survey reported.		CEMP Section 5.1.4	
40	Instream works are conducted so as not to lead to fish stranding or other impacts to fish. The works shall not result in depressions that have the ability to trap fish and other aquatic life. Fish passage is maintained where practicable and in accordance with applicable permits.	☒Compliant ☐Non-Compliant ☐N/A	No stranding of fish noted to date, fish passage maintained.		WSA (t) WSA (k) 6 (iii) DFO FAA Section 2.4.2	Photo 6
	Restoration Requirements					
41	Restoration plans prepared by EM for disturbed area and implemented with EM oversight	☐Compliant ☐Non-Compliant ☒N/A	Restoration plans have not been required yet.		WSA (w) CEMP Section 8.2	
42	All temporary works shall be removed on completion of the project, and the stream channel restored to its natural condition	☐Compliant ☐Non-Compliant ☒N/A	Work is still in progress.		WSA (v) CEMP Section 8.2	

5 DISCUSSION

5.1 Non-Compliant Items

Frequency of environmental monitoring during instream works and associated reporting is not compliant with environmental permits.

The CEMP requires that monitoring reports are produced daily by the EM, and the *Water Sustainability Act* Section 11 Change Approval authorization requires that the EM is on site during all instream works, including while flow bypasses are operating. Monitoring reports should include details of vegetation clearing, timing and duration of instream works, fish salvages and isolation measures, water quality monitoring, invasive species management, and waste disposal.

Recommended action: EM to attend site a minimum of daily during instream works and/or when water bypass system is operating. Environmental monitoring reports should be submitted same day, or early following morning. Include details of fish salvages and release sites, as well as timing and duration of: instream works, flow bypasses, and EM visits in monitoring reports.

Generator with inadequate secondary containment

Secondary containment for a large generator was collapsed and did not have adequate structure to contain potential leaks. This was noted in previous audits and has not yet been repaired.

Recommended action: Install metal clips to hold the walls upright on the generator's secondary containment.

Water quality monitoring is not occurring every day of instream works.

The WSA S.11 approval stipulates that water quality measurements are to be taken every day that instream works is occurring. The EM has not been onsite daily during instream works, but record water quality on the days that they do attend when instream works are occurring.

Recommended action: EM to attend site daily during instream works.

5.2 Conditionally Compliant Items

Erosion and sediment control materials

Minimal emergency erosion and sediment control (ESC) materials were observed on site during the audit visit.

Recommended action: Procure and stockpile appropriate types of ESC materials in adequate quantities to respond to emergency ESC events.

Invasive plant management

Tansy ragwort does not appear to be delineated in the field but is communicated in the monitoring reports. The EM is not onsite to oversee invasive species removal, but the contractor is providing photo-documentation to the EM as/once completed.

Recommended action: Invasive species including tansy ragwort should be delineated in the field where observed and the EM should oversee its removal.

Waste management

Monitoring reports state that the EM recommended off-site disposal of removed tansy ragwort at a designated facility but did not identify the specific disposal site(s). Details of disposal site(s) for anthropogenic debris and sediment removed from the creeks were also not provided in the CEMP or monitoring reports.

Recommended action: Provide details of disposal site(s) for invasive plant material, sediment, and anthropogenic debris in monitoring reports.

6 SUMMARY

A list of environmental issues outstanding to date is provided in Table 6-1, below.

Table 6-1 Tracking Table of Environmental Issues Outstanding to-Date (project commencement August 12, 2024)

Item #(s)	Issue	Date(s) Observed	Recommended Corrective Action(s)	Responsible Party
1	EM reports not received daily	August 15, 2024 August 22, 2024 August 29, 2024 September 5, 2024	Distribute daily monitoring reports to appropriate parties	EM
2	Limited ESC materials on site	August 15, 2024 August 22, 2024 August 29, 2024 September 5, 2024	Procure appropriate ESC materials for responding to emergency ESC events.	Contractor/EM
6	Tansy ragwort infestations not flagged	August 29, 2024	Delineate and/or remove tansy ragwort infestations before works begin in affected areas. EM should oversee removal.	EM
7	Generator with inadequate secondary containment	August 22, 2024 August 29, 2024 September 5, 2024	Repair or replace secondary containment so that it has sufficient structure and volume to contain potential leaks.	Contractor

7 CLOSURE

We trust that the information in this memo is sufficient for your present needs. Should you have questions, please do not hesitate to contact the undersigned.

Prepared by:	**Reviewed by:**
Naomi Sands, R.P.Bio. Environmental Scientist	Jennifer Privé, R.P.Bio. Manager, Environmental Sciences

NS/JP

Attachments:
- Site Photographs

Attachment 1: Site photographs taken during audit visit on August 22, 2024.

Photo 1: Riprap stockpile in laydown area; clean prior to placing instream 		**Photo 2: Limited ESC supplies onsite** 
Photo 3: Repair secondary containment under generator. 		**Photo 4: Drip tray under parked machinery.** 
Photo 5: Water bypass pump installed in upstream North Herford Creek. 		**Photo 6: Fish habitat along South Herford Creek.** 

Table A2: Tracking Table of Resolved Non-Compliance Issues

Item #(s)	Issue	Date(s) Observed	Date Corrected	Corrective Action(s)	Responsible Party
3	Inappropriate water diversion	August 15, 2024 August 19, 2024*	August 22, 2024	Contractor adjusted operations so that majority of bypass flow would be returned to the creek channel.	Contractor/EM
4	Pump intake without fish-friendly screen	August 15, 2024 August 19, 2024* August 22, 2024 August 29, 2024	September 5, 2024	Pump is situated in mesh cage within isolated work zone.	Contractor/EM
5	Bulk fuel tank at top of bank of South Herford Creek	August 15, 2024	August 22, 2024	Fuel tank was moved to laydown area. New location is less than 30 m away from North Herford Creek; per the contractor, other locations would be closer to ditches/watercourses. The tank is in secondary containment.	Contractor

Note: Items marked with an asterisk (*) were reported by the EM.

TECHNICAL MEMORANDUM

Issue Date:	September 13, 2024	**File:**	Audit No. 5
To:	**Thyren Jacobs, Flood Debris Management Secretariat**	**Previous Issue Date:**	
From:	Dave Muhlert, R.B.Tech. and Naomi Sands, R.P.Bio.		
Client:	Ministry of Environment and Climate Change Strategy		
Project Name:	North and South Herford Creek Bank Protection and Sediment Removal - SCR34 and SCR37	**Project No.:**	2022-2632-08/11
Subject:	Environmental Compliance Audit		
Monitoring Period:	September 6 to September 12, 2024		
Contractor:	Mission Contractors Ltd.		
Environmental Monitor:	AquaTerra Environmental Ltd.		

1 INTRODUCTION

Associated Environmental Consultants Inc, (Associated) is pleased to provide this environmental audit report summarizing observations of site conditions, environmental protection measures, regulatory compliance, and corrective actions as part of erosion protection works on North and South Herford creeks, Southeast of Durieu, BC in the Hatzic Valley (the Project, the Site) during the monitoring period September 6 to September 12, 2024. The results presented in this audit report are based on conditions observed at the time of the audit inspection(s) and represent a snapshot of the workday. Items identified as non-compliant may have been addressed before the report(s) are submitted. The audit report(s) are submitted to the owner, their agent (Associated Engineering), the Contractor, and their EM and are not intended for further distribution.

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The prime contractor for the Project is Mission Contractors Ltd. (the Contractor), and works are being monitored for environmental compliance by AquaTerra Environmental Ltd. (AquaTerra) and audited by Associated. As the environmental monitor (EM), AquaTerra is to work with the Contractor to develop measures to protect the environment and to respond to environmental incidents as they occur. Leq'á:mel First Nation (LFN) is the cultural monitor for the Site and is responsible for all fish salvages. The responsibility of the auditor is to ensure on behalf of the owner, who is ultimately the permit holder, that the EM, LFN, and the Contractor adhere to the requirements of the Construction Environmental Monitoring Plan (CEMP)[1], environmental permit conditions and any applicable regulations.

3 SITE INSPECTION

A summary of site conditions as observed during the audit inspection completed during the monitoring period is provided in Table 3-1. At the time of this report, Associated has not received any monitoring reports for this audit period.

[1] AquaTerra Environmental Ltd. 2024. Hatzic Emergency Program, South Herford Creek Project, Construction Environmental Management Plan (Rev. 1). Prepared for Mission Contractors Ltd. 65 p.

Table 3-1 Site Conditions During Audit Inspection

Date / Time	Auditor (Associated)	Weather	Construction Activities
September 12, 2024 09:15	Dave Muhlert	Overcast. 15°C. No precipitation.	No activity in South Herford Creek No construction activity in North Herford Creek or elsewhere on site. LFN was onsite conducting fish salvage in North Herford Creek, near the upstream end of the project area. Bypass pump was set up, but not operating.

4 INSPECTION RESULTS

A checklist of required environmental protection measures and mitigative strategies for the Project is presented in Table 4-1. The checklist has been developed in accordance with terms and conditions of the environmental permits and approvals issued for the Project, environmental protection specifications and requirements as part of the construction contract for the Project, the Contractor's Construction Environmental Management Plan and environmental best management practices and guidelines.

Table 4-1 Summary of Environmental Protection Measures Reviewed and Results of the Inspection

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
	Environmental Monitoring					
1	The EM will attend key site meetings where environmental mitigations and issues may be discussed.	☒Compliant ☐Non-Compliant ☐N/A	EM has been on site for key site meetings.	As instream works progress outside the least risk fish window, EM reports should document consideration of increased risk and if enhanced mitigation is required.	CEMP Section 5.1.4	
2	The EM shall supervise all instream works. If temporary diversion installed, EM is onsite daily to check pumps and flow bypasses.	☐Compliant ☒Non-Compliant ☐N/A	EM is **not** attending site daily while temporary diversion operating and instream excavation occurring.	EM should attend site daily when bypass pumps are operating and/or during in-channel excavation	WSA (k)4, (k)5.ii CEMP Section 5.1.4	
3	The EM will submit daily and bi-weekly monitoring reports to the Contractor for distribution to MoECCS.	☐Compliant ☒Non-Compliant ☐N/A	Reports are outstanding and are being submitted more than a week late.	Submit reports daily.	CEMP Section 5.1.4	
4	The EM will complete and submit an Environmental Incident Report (EIR) for non-compliances with the CEMP, reportable spills or other environmental incident.	☐Compliant ☐Non-Compliant ☒N/A	No environmental incidents have been reported to date.		CEMP Section 5.1.4	
5	EM is granted authority to stop the work if necessary	☒Compliant ☐Non-Compliant ☐N/A	EM has the authority to stop work and has worked with contractors to adjust operations as needed.		WSA (i) 7 CEMP Section 5.1.4	
	Erosion and Sediment Control					
6	Appropriate site isolation is installed as required, including silt fencing prior to instream works. Silt fences are installed properly, intact, adequate, clear of accumulated sediment and are functioning.	☐Compliant ☐Non-Compliant ☒N/A	No silt fences or areas where silt fences were required were observed during the audit visit.		WSA (p) CEMP Appendix B	
7	Riprap or any other engineering material place in channel is clean of any substances deleterious to aquatic life.	☐Compliant ☐Non-Compliant ☒N/A	There was no riprap being placed at the time of the inspection; stockpiled riprap at the laydown appeared clean.	.	WSA (x) CEMP Section7.2	
8	Stockpiling and storage areas are located 15 m from the watercourse TOB.	☒Compliant ☐Non-Compliant ☐N/A	Stockpiles are located well away from the watercourses.		DFO LOA WSA (o) CEMP Appendix B	Photo 1
9	Emergency ESC material onsite (e.g., 100 feet of silt fencing, 5 dry bales, and 100sq.m of ECBs/ Coconut matting, or polyethylene sheets)	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant - limited ESC materials were observed stockpiled onsite during the audit visit.	Ensure appropriate types of ESC materials in adequate quantities are kept onsite to respond to emergency ESC events.	CEMP Appendix B	Photo 2
10	Sediment removed from the Site will be disposed of appropriately at a location approved by the EM and MoECCS.	☐Compliant ☐Non-Compliant ☒N/A	No sediment removal was in progress during the audit. Details of sediment disposal are not provided in the CEMP or monitoring reports.	Update the CEMP and/or monitoring reports with the sediment disposal location(s).	CEMP Section 8.5	
11	Sediment removal boundaries must be clearly delineated prior to commencement of work.	☐Compliant ☐Non-Compliant ☒N/A	Sediment removal was not in progress during the audit.		WSA (q)	

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
	Invasive Plant Management					
12	Ensure that machinery is free of invasive plant material that could potentially be transported throughout or between sites.	☒Compliant ☐Non-Compliant ☐N/A	Machinery appeared to be clean and free of plant material during the audit.		WSA (opening) CEMP Section 7.5	
13	Ensure that invasive species removed from site are disposed of appropriately at an approved facility	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant– disposal site(s) are not identified in the monitoring reports.	Provide details of invasive plant disposal site(s) in monitoring reports.	WSA (opening) CEMP Section 7.5	
14	The Project site shall be regularly monitored by the EM for invasive plant infestations and these infestations will be mapped and managed according to applicable species-specific BMPs.	☐Compliant ☒Non-Compliant ☐N/A	Tansy ragwort is noted in the monitoring reports, but was not delineated in the field. EM is not onsite to oversee invasive species removal; contractor provides photo-documentation to EM.	Delineate tansy ragwort in the field and/or monitor invasive species removal.	CEMP Section 7.5	
16	Hand pull or mechanically remove tansy ragwort and wash equipment before exiting infested areas	☒Compliant ☐Non-Compliant ☐N/A	As reported by the contractor to the EM.		CEMP Section 7.5	
	Waste Management					
17	Dispose of all anthropogenic debris removed at an appropriate waste management facility.	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant- disposal details have not been provided. Anthropogenic debris was not observed on site during the audit.	Include waste disposal location(s) in monitoring reports.	WSA (opening) CEMP Section 8.5	
18	Non-hazardous waste stored appropriately and removed offsite daily.	☒Compliant ☐Non-Compliant ☐N/A	Waste appeared to be stored appropriately. The site was clean during the audit.		CEMP Section 8.5	
19	Hazardous waste stored > 30 m of watercourses.	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant - outhouse is within 30 m of North Herford Creek and the roadside ditch; however it is within laydown area / other side of access road. No other hazardous waste was observed during the audit.		CEMP Section 8.4	Photo 2
20	Secondary containment used for all stored hazardous waste.	☒Compliant ☐Non-Compliant ☐N/A	Secondary containment for large generator was collapsed but was fixed by the Contractor during the audit.	Contractor placed rocks around the perimeter of the containment tray to hold up the edges; the included metal clips don't work for this purpose.	CEMP Section 8.3.1	Photo 3
	Spill Control and Emergency Response					
21	Machinery operating in channel is equipped with environmentally friendly oil	☐Compliant ☐Non-Compliant ☒N/A	No equipment operating instream at time of inspection. Contractor previously reported that the excavator working instream is using environmentally friendly hydraulic oil.		WSA (o) 4 CEMP Section 8.3.2	
22	Equipment and machinery are free of leaks	☒Compliant ☐Non-Compliant ☐N/A	No leaks were observed during the audit visit.		WSA (o) 1 CEMP Section 8.3.2	
23	Drip trays are available and used during refueling and equipment maintenance	☒Compliant ☐Non-Compliant ☐N/A	Drip trays were placed under parked machinery, except recently parked John Deere cart.		CEMP Section 8.3.2	
24	Fuel is stored > 30 m from North and South Herford creeks and any connected drainages	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant - bulk fuel was within 30 m of North Herford Creek, but within laydown area. Fuel was in secondary containment.		WSA (k) 3 CEMP Section 8.3.2	

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
25	Machinery and vehicles operating onsite are equipped with spill kit.	☒Compliant ☐Non-Compliant ☐N/A	Spill kits were available near the work area.		WSA (k) 2 CEMP Section 6.6	
26	Should suspected contaminated material be encountered (i.e., soil emitting olfactory cues indicative of hydrocarbon fuel), works should temporarily halt for investigation.	☐Compliant ☐Non-Compliant ☒N/A	No suspected contaminated material has been reported to date.		CEMP Section 2.3	
27	Refuelling of machinery is conducted on level ground over a spill tray.	☐Compliant ☐Non-Compliant ☒N/A	No refuelling was observed during the audit. Contractor previously reported that refueling is done on level ground in the middle of the laydown area, more than 30 m away from watercourses.		CEMP Section 8.3.2	
	Riparian Area Management					
28	Stockpile LWD and root wads removed from channel for use in site restoration	☒Compliant ☐Non-Compliant ☐N/A	LWD has been used for site restoration in North Herford Creek, west of Sylvester Road.		CEMP Section 7.4	Photo 5
29	Construct access points and approaches perpendicular to the watercourse;	☒Compliant ☐Non-Compliant ☐N/A	Access roads used by haul trucks were constructed perpendicular to the creeks, where possible.		DFO eFFA	
	Instream Works					
30	The EM shall ensure that instream works are isolated from flow and that measures are in place to protect fish and fish habitat, and to mitigate the migration of sediment downstream.	☒Compliant ☐Non-Compliant ☐N/A	Isolation and bypass were installed but not operating during the audit.		WSA (k) 1 CEMP Section 5	Photo 6
31	Pumps and flow bypasses are in proper working condition	☐Compliant ☐Non-Compliant ☒N/A	Bypass system was set up but **not** operating at the time of the inspection.		WSA (k) 5	
32	Instream works conducted in the dry / isolation of flow	☐Compliant ☐Non-Compliant ☒N/A	No instream works at the time of the inspection.		WSA (k) 2 CEMP Section 7.2.6	
	Water Quality					
33	Water quality is routinely monitored upstream and downstream of the work area, every day that instream works are occurring Instream water quality is compliant with provincial criteria[2]: **Turbidity**: - <8 NTU from background at any one time for a duration of 24 h in clear waters; - < 5 NTU from background when background is 8 – 50 NTU; - <10% from background when background is > 50 NTU. **pH:** 6.5-9.0	☐Compliant ☒Non-Compliant ☐N/A	WQ monitoring is **not** occurring daily during instream works, only when the EM is present.	Collect water quality data daily during instream works and include results in the EM reports.	CEMP Section 8.1 WSA (r)	
	Fish and Wildlife Protection					

[2] British Columbia Ministry of Environment and Climate Change Strategy. 2024. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture - Guideline Summary – August 2024. Water Quality Guideline Series, WQG-20. Prov. B.C., Victoria B.C. Available at: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/wqg_summary_aquaticlife_wildlife_agri.pdf. Accessed August 2024.

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
34	Full time monitoring for fish during instream works is occurring.	☐Compliant ☒Non-Compliant ☐N/A	EM is not onsite full time, nor even daily during instream works.	EM to be on site full time during instream works (i.e., excavation in the stream channel).	WSA (k) 6	
35	Fish salvages are conducted in advance of instream works where required.	☒Compliant ☐Non-Compliant ☐N/A	During the audit, Leq'á:mel First Nation were conducting a fish salvage of upper North Herford Creek in advance of instream works.		CEMP Section 7.3.1 WSA (k) 6	Photo 5
36	Salvaged fish are relocated back to the same watercourse in a nearby area that is not impacted by construction or removal works or its zone of influence	☒Compliant ☐Non-Compliant ☐N/A	Fish were being relocated immediately downstream of the isolated work area in North Herford Creek.	Include fish release details in environmental monitoring reports.	DFO FAA Section 2.2.4	
37	Pump intakes are 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"	☒Compliant ☐Non-Compliant ☐N/A	Bypass pump was in a screen box with ~ 0.5 cm mesh. DFO interim code of practice for fish protection recommends openings 1/10 the size of the smallest fish expected. At the time of this memo, Associated has not received salvage reports with measurements of the smallest fish observed.	Confirm that the mesh size is the appropriate size for the smallest fish observed during the fish salvage.	WSA (k) 5 CEMP Section 7.2.6	
38	Obtain required permits prior to salvage(s).	☒Compliant ☐Non-Compliant ☐N/A	Leq'á:mel First Nation holds the appropriate permits for fish salvages		WSA (Opening) CEMP Section 5.1.4	
39	EM is on site during disturbance to riparian vegetation and conducting pre-clearing breeding bird surveys prior to clearing. Surveys for year-round protected nests are conducted as required.	☐Compliant ☐Non-Compliant ☒N/A	Clearing of invasive species shrubs occurred during the monitoring period, outside the peak bird nesting window. No clearing of trees or snags requiring survey was reported.		CEMP Section 5.1.4	
40	Instream works are conducted so as not to lead to fish stranding or other impacts to fish. The works shall not result in depressions that have the ability to trap fish and other aquatic life. Fish passage is maintained where practicable and in accordance with applicable permits.	☐Compliant ☒Non-Compliant ☐N/A	No stranding of fish noted to date, fish passage maintained. EM report no. 5 for North Herford, for monitoring on Sept 7 (submitted on Sept 15) recommends the relocation of fish stranded in a pool at the downstream end of the work area. Report does not provide any context for the issue, nor does it confirm if this was communicated to LFN or the Contractor in a timely manner, nor does it provide any follow up. AE Inspector reported that LFN returned to site on Sept 9 to relocate the stranded fish.	EM reports should clearly identify any issues, provide context for how it occurred, note to who recommendations have been communicated and outline any follow-up. EM reports must be submitted in a timely manner to ensure the effective communication of environmental issues and confirm follow-up.	WSA (t) WSA (k) 6 (iii) DFO FAA Section 2.4.2	
	Restoration Requirements					
41	Restoration plans prepared by EM for disturbed area and implemented with EM oversight	☐Compliant ☐Non-Compliant ☒N/A	Restoration plans have not been required yet.		WSA (w) CEMP Section 8.2	
42	All temporary works shall be removed on completion of the project, and the stream channel restored to its natural condition	☐Compliant ☐Non-Compliant ☒N/A	Work is still in progress.		WSA (v) CEMP Section 8.2	

5 DISCUSSION

5.1 Non-Compliant Items

Frequency of environmental monitoring during instream works and associated reporting is not compliant with environmental permits.

The CEMP requires that monitoring reports are produced daily by the EM, and the *Water Sustainability Act* Section 11 Change Approval authorization requires that the EM is on site during all instream works, including while flow bypasses are operating. Monitoring reports should include details of vegetation clearing, timing and duration of instream works, fish salvages and isolation measures, water quality monitoring, invasive species management, and waste disposal.

Recommended action: EM to attend site a minimum of daily during instream works and/or when water bypass system is operating. Environmental monitoring reports should be submitted same day, or early following morning. Include details of fish salvages and release sites, as well as timing and duration of: instream works, flow bypasses, and EM visits in monitoring reports.

Invasive plant management

Tansy ragwort does not appear to be delineated in the field but is communicated in the monitoring reports. The EM is not onsite to oversee invasive species removal, but the contractor is providing photo-documentation to the EM as/once completed.

Recommended action: Invasive species including tansy ragwort should be delineated in the field where observed and the EM should oversee its removal.

Fish stranding not reported in timely manner

EM report no. 5 for North Herford for monitoring on Sept 7 identified a recommendation to relocate fish that were trapped in a pool at the downstream end of the instream works area. The EM report was not submitted until Sept 16, and it did not provide any context for the issue (i.e., it was just noted in recommendations), nor was any follow up identified. LFN is responsible for carrying out the salvage and the actual handling of fish, however, the EM has a responsibility to ensure the protection of fish and wildlife during the execution of the works.

Recommended action: Identify to whom recommended actions are communicated along with follow up actions in the EM report. Submit EM reports in a timely manner to ensure effective communication of all issues and resolutions.

Water quality monitoring is not occurring every day of instream works.

The WSA S.11 approval stipulates that water quality measurements are to be taken every day that instream works is occurring. The EM has not been onsite daily during instream works, but record water quality on the days that they do attend when instream works are occurring.

Recommended action: EM to attend site daily during instream works.

5.2 Conditionally Compliant Items

EM reporting to document risk and mitigation

As instream works progress beyond the least risk fish window, the EM must provide guidance and advice to the contractor regarding any changes in risk associated with working past the window and required mitigation.

Recommended action: EM reports should document their consideration of any increased risk with working past the least risk and identify if enhanced mitigation is required. EM should continue to document implementation of mitigation measures, evaluate changing conditions, and report any incidents or near-misses.

Erosion and sediment control materials

Minimal emergency erosion and sediment control (ESC) materials were observed on site during the audit visit.

Recommended action: Procure and stockpile appropriate types of ESC materials in adequate quantities to respond to emergency ESC events.

Waste management

Monitoring reports state that the EM recommended off-site disposal of removed tansy ragwort at a designated facility but did not identify the specific disposal site(s). Details of disposal site(s) for anthropogenic debris and sediment removed from the creeks were also not provided in the CEMP or monitoring reports.

Recommended action: Provide details of disposal site(s) for invasive plant material, sediment, and anthropogenic debris in monitoring reports.

6 SUMMARY

A list of environmental issues outstanding to date is provided in Table 6-1, below.

Table 6-1 Tracking Table of Environmental Issues Outstanding to-Date (project commencement August 12, 2024)

Item #(s)	Issue	Date(s) Observed	Recommended Corrective Action(s)	Responsible Party
1	EM reports not received daily	August 15, 2024 August 22, 2024 August 29, 2024 September 5, 2024	Distribute daily monitoring reports to appropriate parties	EM
2	Limited ESC materials on site	August 15, 2024 August 22, 2024 August 29, 2024 September 5, 2024	Procure appropriate ESC materials for responding to emergency ESC events.	Contractor/EM
6	Tansy ragwort infestations not flagged	August 29, 2024	Delineate and/or remove tansy ragwort infestations before works begin in affected areas. EM should oversee removal.	EM
7	Generator with inadequate secondary containment	August 22, 2024 August 29, 2024 September 5, 2024	Repair or replace secondary containment so that it has sufficient structure and volume to contain potential leaks.	Contractor

Item #(s)	Issue	Date(s) Observed	Recommended Corrective Action(s)	Responsible Party
8	Environmental issues and resolutions are not reported in a timely manner.	September 7, 2024 (EM report)	Identify to whom recommended actions are communicated along with follow up actions in the EM report and submit daily.	EM

7 CLOSURE

We trust that the information in this memo is sufficient for your present needs. Should you have questions, please do not hesitate to contact the undersigned.

Prepared by:

for Dave Muhlert, R.B.Tech.
Environmental Technologist

Reviewed by:

Naomi Sands, R.P.Bio.
Environmental Scientist

DM/NS

Attachments:
- Site Photographs

Attachment 1: Site photographs taken during audit visit on August 22, 2024.

Photo 1: Riprap stockpile in laydown area appeared to be clean 		**Photo 2: Limited ESC supplies onsite** 
Photo 3: Secondary containment under generator 		**Photo 4: Drip tray under parked machinery.** 
Photo 5: Large woody debris used for restoration in North Herford Creek, west of Sylvester Road 		**Photo 6: Fish isolation net and bypass pump at the upstream end of the work area (not operating)** 

Table A2: Tracking Table of Resolved Non-Compliance Issues

Item #(s)	Issue	Date(s) Observed	Date Corrected	Corrective Action(s)	Responsible Party
3	Inappropriate water diversion	August 15, 2024 August 19, 2024*	August 22, 2024	Contractor adjusted operations so that majority of bypass flow would be returned to the creek channel.	Contractor/EM
4	Pump intake without fish-friendly screen	August 15, 2024 August 19, 2024* August 22, 2024 August 29, 2024	September 5, 2024	Pump is situated in mesh cage within isolated work zone.	Contractor/EM
5	Bulk fuel tank at top of bank of South Herford Creek	August 15, 2024	August 22, 2024	Fuel tank was moved to laydown area. New location is less than 30 m away from North Herford Creek; per the contractor, other locations would be closer to ditches/watercourses. The tank is in secondary containment.	Contractor
7	Generator with inadequate secondary containment	August 22, 2024 August 29, 2024 September 5, 2024	September 12, 2024	Contractor shored up the edges of the containment tray with rocks	Contractor

Note: Items marked with an asterisk (*) were reported by the EM.

TECHNICAL MEMORANDUM

Issue Date:	September 20, 2024	**File:**	Audit No. 6
To:	**Thyren Jacobs, Flood Debris Management Secretariat**	**Previous Issue Date:**	
From:	Naomi Sands, R.P.Bio.		
Client:	Ministry of Environment and Climate Change Strategy		
Project Name:	North and South Herford Creek Bank Protection and Sediment Removal - SCR34 and SCR37	**Project No.:**	2022-2632-08/11
Subject:	Environmental Compliance Audit		
Monitoring Period:	September 13 to September 19, 2024		
Contractor:	Mission Contractors Ltd.		
Environmental Monitor:	AquaTerra Environmental Ltd.		

1 INTRODUCTION

Associated Environmental Consultants Inc, (Associated) is pleased to provide this environmental audit report summarizing observations of site conditions, environmental protection measures, regulatory compliance, and corrective actions as part of erosion protection works on North and South Herford creeks, Southeast of Durieu, BC in the Hatzic Valley (the Project, the Site) during the monitoring period September 13 to September 19, 2024. The results presented in this audit report are based on conditions observed at the time of the audit inspection(s) and represent a snapshot of the workday. Items identified as non-compliant may have been addressed before the report(s) are submitted. The audit report(s) are submitted to the owner, their agent (Associated Engineering), the Contractor, and their EM and are not intended for further distribution.

2 ROLES AND RESPONSIBILITIES

The prime contractor for the Project is Mission Contractors Ltd. (the Contractor), and works are being monitored for environmental compliance by AquaTerra Environmental Ltd. (AquaTerra) and audited by Associated. As the environmental monitor (EM), AquaTerra is to work with the Contractor to develop measures to protect the environment and to respond to environmental incidents as they occur. Leq'á:mel First Nation (LFN) is the cultural monitor for the Site and is responsible for all fish salvages. The responsibility of the auditor is to ensure on behalf of the owner, who is ultimately the permit holder, that the EM, LFN, and the Contractor adhere to the requirements of the Construction Environmental Monitoring Plan (CEMP)[1], environmental permit conditions and any applicable regulations.

3 SITE INSPECTION

A summary of site conditions as observed during the audit inspection completed during the monitoring period is provided in Table 3-1. At the time of this report, Associated has not received any monitoring reports for this audit period.

[1] AquaTerra Environmental Ltd. 2024. Hatzic Emergency Program, South Herford Creek Project, Construction Environmental Management Plan (Rev. 1). Prepared for Mission Contractors Ltd. 65 p.

Table 3-1 Site Conditions During Audit Inspection

Date / Time	Auditor (Associated)	Weather	Construction Activities
September 19, 2024 09:15	Naomi Sands	Sun & cloud. 13°C. No precipitation.	No activity in South Herford Creek Placing riprap in upstream North Herford Creek. Bypass pump was operating.

4 INSPECTION RESULTS

A checklist of required environmental protection measures and mitigative strategies for the Project is presented in Table 4-1. The checklist has been developed in accordance with terms and conditions of the environmental permits and approvals issued for the Project, environmental protection specifications and requirements as part of the construction contract for the Project, the Contractor's Construction Environmental Management Plan and environmental best management practices and guidelines.

Table 4-1 Summary of Environmental Protection Measures Reviewed and Results of the Inspection

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
	Environmental Monitoring					
1	The EM will attend key site meetings where environmental mitigations and issues may be discussed.	☒Compliant ☐Non-Compliant ☐N/A	EM has been on site for key site meetings.	As works continue outside the least risk fish window, EM reports should document consideration of increased risk and if enhanced mitigation is required.	CEMP Section 5.1.4	
2	The EM shall supervise all instream works. If temporary diversion installed, EM is onsite daily to check pumps and flow bypasses.	☐Compliant ☒Non-Compliant ☐N/A	EM is **not** attending site daily while temporary diversion operating and instream excavation occurring.	EM should attend site daily when bypass pumps are operating and/or during in-channel excavation	WSA (k)4, (k)5.ii CEMP Section 5.1.4	
3	The EM will submit daily and bi-weekly monitoring reports to the Contractor for distribution to MoECCS.	☐Compliant ☒Non-Compliant ☐N/A	Reports continue to be submitted more than 1 week overdue. No reports provided for monitoring period in advance of inspection.	Submit reports daily.	CEMP Section 5.1.4	
4	The EM will complete and submit an Environmental Incident Report (EIR) for non-compliances with the CEMP, reportable spills or other environmental incident.	☐Compliant ☒Non-Compliant ☐N/A	Fish mortality due to stranding / dewatering (noted in EM report for Sept 13 visit, but submitted Sept 23), was not reported in a timely manner.	EM to report all incidents in a timely manner.	CEMP Section 5.1.4	
5	EM is granted authority to stop the work if necessary	☒Compliant ☐Non-Compliant ☐N/A	EM has the authority to stop work and has worked with contractors to adjust operations as needed.		WSA (i) 7 CEMP Section 5.1.4	
	Erosion and Sediment Control					
6	Appropriate site isolation is installed as required, including silt fencing prior to instream works. Silt fences are installed properly, intact, adequate, clear of accumulated sediment and are functioning.	☐Compliant ☐Non-Compliant ☒N/A	No silt fences or areas where silt fences were required were observed during the audit visit.		WSA (p) CEMP Appendix B	
7	Riprap or any other engineering material place in channel is clean of any substances deleterious to aquatic life.	☒Compliant ☐Non-Compliant ☐N/A	Riprap placed in channel, and stockpiled onsite appears clean.	.	WSA (x) CEMP Section7.2	Photo 1
8	Stockpiling and storage areas are located 15 m from the watercourse TOB.	☒Compliant ☐Non-Compliant ☐N/A	Stockpiles are located well away from the watercourses.		DFO LOA WSA (o) CEMP Appendix B	Photo 2
9	Emergency ESC material onsite (e.g., 100 feet of silt fencing, 5 dry bales, and 100sq.m of ECBs/ Coconut matting, or polyethylene sheets)	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant - limited ESC materials were observed stockpiled onsite during the audit visit.	Ensure appropriate types of ESC materials in adequate quantities are kept onsite to respond to emergency ESC events. Discussed with EM forecast rain and recommended doing a walk through to ensure site is stabilized.	CEMP Appendix B	
10	Sediment removed from the Site will be disposed of appropriately at a location	☐Compliant ☐Non-Compliant ☒N/A	No sediment removal was in progress during the audit.	Update the CEMP and/or monitoring reports with the	CEMP Section 8.5	

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
	approved by the EM and MoECCS.		Details of sediment disposal are still outstanding.	sediment disposal location(s).		
11	Sediment removal boundaries must be clearly delineated prior to commencement of work.	☒Compliant ☐Non-Compliant ☐N/A	Sediment removal was not in progress during the audit; excavation depths were marked.		WSA (q)	
	Invasive Plant Management					
12	Ensure that machinery is free of invasive plant material that could potentially be transported throughout or between sites.	☒Compliant ☐Non-Compliant ☐N/A	Machinery appeared to be clean and free of plant material during the audit.		WSA (opening) CEMP Section 7.5	
13	Ensure that invasive species removed from site are disposed of appropriately at an approved facility	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant– disposal site(s) are not identified in the monitoring reports.	Provide details of invasive plant disposal site(s) in monitoring reports.	WSA (opening) CEMP Section 7.5	
14	The Project site shall be regularly monitored by the EM for invasive plant infestations and these infestations will be mapped and managed according to applicable species-specific BMPs.	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant – EM was onsite to oversee most of the recent invasive species removal.		CEMP Section 7.5	
16	Hand pull or mechanically remove tansy ragwort and wash equipment before exiting infested areas	☒Compliant ☐Non-Compliant ☐N/A	As reported by the contractor to the EM.		CEMP Section 7.5	
	Waste Management					
17	Dispose of all anthropogenic debris removed at an appropriate waste management facility.	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant- disposal details have not been provided. Anthropogenic debris was not observed on site during the audit.	Include waste disposal location(s) in monitoring reports.	WSA (opening) CEMP Section 8.5	
18	Non-hazardous waste stored appropriately and removed offsite daily.	☒Compliant ☐Non-Compliant ☐N/A	Waste appeared to be stored appropriately. The site was clean during the audit.		CEMP Section 8.5	
19	Hazardous waste stored > 30 m of watercourses.	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant - outhouse is within 30 m of North Herford Creek and the roadside ditch; however it is within laydown area / other side of access road. No other hazardous waste was observed during the audit.		CEMP Section 8.4	
20	Secondary containment used for all stored hazardous waste.	☒Compliant ☐Non-Compliant ☐N/A	Secondary containment provided for large generator.		CEMP Section 8.3.1	Photo 3
	Spill Control and Emergency Response					
21	Machinery operating in channel is equipped with environmentally friendly oil	☒Compliant ☐Non-Compliant ☐N/A	Equipment was operating from top of bank. Contractor previously reported that the excavator working instream is using environmentally friendly hydraulic oil.		WSA (o) 4 CEMP Section 8.3.2	
22	Equipment and machinery are free of leaks	☒Compliant ☐Non-Compliant ☐N/A	No leaks were observed during the audit visit.		WSA (o) 1 CEMP Section 8.3.2	
23	Drip trays are available and used during refueling and equipment maintenance	☒Compliant ☐Non-Compliant ☐N/A	Drip trays were placed under parked machinery.		CEMP Section 8.3.2	
24	Fuel is stored > 30 m from North and South Herford	☒Compliant ☐Non-Compliant ☐N/A	Conditionally compliant - bulk fuel was within 30 m of North Herford		WSA (k) 3 CEMP Section 8.3.2	

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
	creeks and any connected drainages		Creek, but within laydown area. Fuel was in secondary containment.			
25	Machinery and vehicles operating onsite are equipped with spill kit.	☒Compliant ☐Non-Compliant ☐N/A	Spill kits were available near the work area.		WSA (k) 2 CEMP Section 6.6	
26	Should suspected contaminated material be encountered (i.e., soil emitting olfactory cues indicative of hydrocarbon fuel), works should temporarily halt for investigation.	☐Compliant ☐Non-Compliant ☒N/A	No suspected contaminated material has been reported to date.		CEMP Section 2.3	
27	Refuelling of machinery is conducted on level ground over a spill tray.	☐Compliant ☐Non-Compliant ☒N/A	No refuelling was observed during the audit. Contractor previously reported that refueling is done on level ground in the middle of the laydown area, more than 30 m away from watercourses.		CEMP Section 8.3.2	
	Riparian Area Management					
28	Stockpile LWD and root wads removed from channel for use in site restoration	☒Compliant ☐Non-Compliant ☐N/A	LWD has been used for site restoration in North Herford Creek, west of Sylvester Road.		CEMP Section 7.4	
29	Construct access points and approaches perpendicular to the watercourse;	☒Compliant ☐Non-Compliant ☐N/A	Access roads used by haul trucks were constructed perpendicular to the creeks, where possible.		DFO eFFA	
	Instream Works					
30	The EM shall ensure that instream works are isolated from flow and that measures are in place to protect fish and fish habitat, and to mitigate the migration of sediment downstream.	☐Compliant ☒**Non-Compliant** ☐N/A	Bypass pump is operating without daily EM oversight. EM is not onsite for all sensitive works (e.g., initial dewatering of channel following salvage).	While LFN is responsible for conducting salvages, EM is still responsible for general oversight and to ensure the ongoing protection of fish and fish habitat.	WSA (k) 1 CEMP Section 5	
31	Pumps and flow bypasses are in proper working condition	☒Compliant ☐Non-Compliant ☐N/A	Bypass system was operating as intended at the time of the inspection.		WSA (k) 5	Photo 4
32	Instream works conducted in the dry / isolation of flow	☒Compliant ☐Non-Compliant ☐N/A	Full water bypass was operating at time of inspection.		WSA (k) 2 CEMP Section 7.2.6	Photo 5
	Water Quality					
33	Water quality is routinely monitored upstream and downstream of the work area, every day that instream works are occurring Instream water quality is compliant with provincial criteria[2]: **Turbidity**: - <8 NTU from background at any one time for a duration of 24 h in clear waters; - < 5 NTU from background when background is 8 – 50 NTU; - <10% from background when background is > 50 NTU. **pH:** 6.5-9.0	☐Compliant ☒**Non-Compliant** ☐N/A	WQ monitoring is **not** occurring daily during instream works, only when the EM is present.	Collect water quality data daily during instream works and include results in the EM reports.	CEMP Section 8.1 WSA (r)	

[2] British Columbia Ministry of Environment and Climate Change Strategy. 2024. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture - Guideline Summary – August 2024. Water Quality Guideline Series, WQG-20. Prov. B.C., Victoria B.C. Available at: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/wqg_summary_aquaticlife_wildlife_agri.pdf. Accessed August 2024.

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
	Fish and Wildlife Protection					
34	Full time monitoring for fish during instream works is occurring.	☐Compliant ☒**Non-Compliant** ☐N/A	EM is not onsite full time, nor even daily during instream works.	EM to be on site full time during instream works (i.e., excavation in the stream channel).	WSA (k) 6	
35	Fish salvages are conducted in advance of instream works where required.	☒Compliant ☐Non-Compliant ☐N/A	Leq'á:mel First Nation has been conducting fish salvages in advance of instream works.		CEMP Section 7.3.1 WSA (k) 6	
36	Salvaged fish are relocated back to the same watercourse in a nearby area that is not impacted by construction or removal works or its zone of influence	☒Compliant ☐Non-Compliant ☐N/A	Fish were being relocated immediately downstream of the isolated work area in North Herford Creek.	Include fish release details in environmental monitoring reports.	DFO FAA Section 2.2.4	
37	Pump intakes are 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"	☒Compliant ☐Non-Compliant ☐N/A	Bypass pump was in a screen box with ~ 0.5 cm mesh. DFO interim code of practice for fish protection recommends openings 1/10 the size of the smallest fish expected. At the time of this memo, Associated has not received salvage reports with measurements of the smallest fish observed.	Confirm that the mesh size is the appropriate size for the smallest fish observed during the fish salvage.	WSA (k) 5 CEMP Section 7.2.6	Photo 4
38	Obtain required permits prior to salvage(s).	☒Compliant ☐Non-Compliant ☐N/A	Leq'á:mel First Nation holds the appropriate permits for fish salvages		WSA (Opening) CEMP Section 5.1.4	
39	EM is on site during disturbance to riparian vegetation and conducting pre-clearing breeding bird surveys prior to clearing. Surveys for year-round protected nests are conducted as required.	☒Compliant ☐Non-Compliant ☐N/A	**Conditionally compliant** - EM report for Sept 10, 12, 13 notes a Raptor Survey in the intro, but no details are provided in the report.	Update EM reports to include details of any surveys including findings.	CEMP Section 5.1.4	
40	Instream works are conducted so as not to lead to fish stranding or other impacts to fish. The works shall not result in depressions that have the ability to trap fish and other aquatic life. Fish passage is maintained where practicable and in accordance with applicable permits.	☐Compliant ☒**Non-Compliant** ☐N/A	EM report no. 8 for North Herford, for monitoring on Sept 13 (submitted on Sept 23) noted fish mortalities in dewatered section of the creek that had been previously salvaged. Incident was **not** reported immediately to the Project Owner or their rep. Nor was any kind of follow-up detailed to mitigate this type of incident occurring again. While LFN is responsible for conducting the salvages, the EM is still responsible for general oversight and to monitor for fish and wildlife to ensure their ongoing protection throughout the project. No stranding of fish noted to date in completed sections, fish passage maintained.	Environmental incidents should be reported to the Owner's rep immediately. EM reports should provide guidance on how to mitigate future incidents from occurring, and should be submitted in a timely manner to ensure environmental issues can be addressed efficiently.	WSA (t) WSA (k) 6 (iii) DFO FAA Section 2.4.2	
	Restoration Requirements					
41	Restoration plans prepared by EM for disturbed area and implemented with EM oversight	☐Compliant ☐Non-Compliant ☒N/A	Restoration plan from Contractor / EM is pending.		WSA (w) CEMP Section 8.2	Photo 6

Item #	Item or Location	Compliance	Comments	Corrective actions	Reference Documents	Photos
42	All temporary works shall be removed on completion of the project, and the stream channel restored to its natural condition	☐Compliant ☐Non-Compliant ☒N/A	Work was still in progress at time of inspection.		WSA (v) CEMP Section 8.2	

5 DISCUSSION

5.1 Non-Compliant Items

Frequency of environmental monitoring during instream works and associated reporting is not compliant with environmental permits.

The CEMP requires that monitoring reports are produced daily by the EM, and the *Water Sustainability Act* Section 11 Change Approval authorization requires that the EM is on site during all instream works, including while flow bypasses are operating. Monitoring reports should include details of vegetation clearing, timing and duration of instream works, fish salvages and isolation measures, water quality monitoring, invasive species management, and waste disposal.

Recommended action: EM to attend site a minimum of daily during instream works and/or when water bypass system is operating. Environmental monitoring reports should be submitted same day, or early following morning. Include details of fish salvages and release sites, as well as timing and duration of: instream works, flow bypasses, and EM visits in monitoring reports.

Fish mortality during dewatering and not reported in timely manner

EM report no. 8 for North Herford for monitoring on Sept 13 identified fish mortality in the dewatered section of the creek after a salvage was completed. The EM report was not submitted until Sept 23, and did not provide any follow-up or mitigation. In addition, while LFN is responsible for carrying out the salvage and the actual handling of fish, the EM has a responsibility to ensure the protection of fish and wildlife during the execution of the works. EM oversight during instream works, particularly dewatering of the channel, is required.

Recommended action: Identify to whom incidents are reported and provide follow up actions in the EM report. Submit EM reports in a timely manner to ensure effective communication of all issues and resolutions.

Water quality monitoring is not occurring every day of instream works.

The WSA S.11 approval stipulates that water quality measurements are to be taken every day that instream works is occurring. The EM has not been onsite daily during instream works, but record water quality on the days that they do attend when instream works are occurring.

Recommended action: EM to attend site daily during instream works.

5.2 Conditionally Compliant Items

EM reporting to document risk and mitigation

As instream works progress beyond the least risk fish window, the EM must provide guidance and advice to the contractor regarding any changes in risk associated with working past the window and required mitigation.

Recommended action: EM reports should document their consideration of any increased risk with working past the least risk and identify if enhanced mitigation is required. EM should continue to document implementation of mitigation measures, evaluate changing conditions, and report any incidents or near-misses.

Invasive plant management

The EM is not always onsite to oversee invasive species removal, but they are identifying plants onsite, communicating to contractor, and checking on removal on subsequent visits.

Recommended action: EM should monitor invasive species removal.

Erosion and sediment control materials

Minimal emergency erosion and sediment control (ESC) materials were observed on site during the audit visit.

Recommended action: Procure and stockpile appropriate types of ESC materials in adequate quantities to respond to emergency ESC events.

Waste management

Monitoring reports state that the EM recommended off-site disposal of removed tansy ragwort at a designated facility but did not identify the specific disposal site(s). Details of disposal site(s) for anthropogenic debris and sediment removed from the creeks were also not provided in the CEMP or monitoring reports.

Recommended action: Provide details of disposal site(s) for invasive plant material, sediment, and anthropogenic debris in monitoring reports.

6 SUMMARY

A list of environmental issues outstanding to date is provided in Table 6-1, below.

Table 6-1 Tracking Table of Environmental Issues Outstanding to-Date (project commencement August 12, 2024)

Item #(s)	Issue	Date(s) Observed	Recommended Corrective Action(s)	Responsible Party
1	EM reports not received daily	August 15, 2024 August 22, 2024 August 29, 2024 September 5, 2024	Distribute daily monitoring reports to appropriate parties	EM
2	Limited ESC materials on site	August 15, 2024 August 22, 2024 August 29, 2024 September 5, 2024	Procure appropriate ESC materials for responding to emergency ESC events.	Contractor/EM
6	Tansy ragwort infestations not flagged	August 29, 2024	Delineate and/or remove tansy ragwort infestations before works begin in affected areas. EM should oversee removal.	EM
7	Generator with inadequate secondary containment	August 22, 2024 August 29, 2024 September 5, 2024	Repair or replace secondary containment so that it has sufficient structure and volume to contain potential leaks.	Contractor

Item #(s)	Issue	Date(s) Observed	Recommended Corrective Action(s)	Responsible Party
8	Environmental issues and resolutions are not reported in a timely manner.	September 7, 2024 (EM report) September 13, 2024 (EM report)	Identify to whom recommended actions are communicated along with follow up actions in the EM report and submit daily.	EM

7 CLOSURE

We trust that the information in this memo is sufficient for your present needs. Should you have questions, please do not hesitate to contact the undersigned.

Prepared by:

Naomi Sands, R.P.Bio.
Environmental Scientist

Reviewed by:



Jennifer Privé, R.P.Bio.
Manager, Environmental Sciences

NS/JP

Attachments:
- Site Photographs

Attachment 1: Site photographs taken during audit visit on September 19, 2024.

Photo 1: Excavator placing riprap in upstream North Herford Creek 		**Photo 2: Stockpile and storage area** 
Photo 3: Secondary containment under generator 		**Photo 4: Fish isolation net and bypass pump at the upstream end of the work area** 
Photo 5: Instream works conducted in the dry 		**Photo 6: Site restoration plan pending** 

Table A2: Tracking Table of Resolved Non-Compliance Issues

Item #(s)	Issue	Date(s) Observed	Date Corrected	Corrective Action(s)	Responsible Party
3	Inappropriate water diversion	August 15, 2024 August 19, 2024*	August 22, 2024	Contractor adjusted operations so that majority of bypass flow would be returned to the creek channel.	Contractor/EM
4	Pump intake without fish-friendly screen	August 15, 2024 August 19, 2024* August 22, 2024 August 29, 2024	September 5, 2024	Pump is situated in mesh cage within isolated work zone.	Contractor/EM
5	Bulk fuel tank at top of bank of South Herford Creek	August 15, 2024	August 22, 2024	Fuel tank was moved to laydown area. New location is less than 30 m away from North Herford Creek; per the contractor, other locations would be closer to ditches/watercourses. The tank is in secondary containment.	Contractor
7	Generator with inadequate secondary containment	August 22, 2024 August 29, 2024 September 5, 2024	September 12, 2024	Contractor shored up the edges of the containment tray with rocks	Contractor

Note: Items marked with an asterisk (*) were reported by the EM.

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Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	1
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Reference/Project No.:**	2022-2632-08 2022-2632-11
Component:		**Date:**	October 24, 2024
Location:	Herford Creeks	**Issue Copies To:**	
AE Representative:	Joon Kwak	**Project Manager:**	
Others Present:		**Owner Contact:**	
		Contractor:	Mission
		Other:	

This report outlines the observed changes to North and South Herford Creeks following the atmospheric river event (ARE) that occurred from October 18 to October 20, 2024.

Key Observations

1. **Secondary Creek Formation near Bridge Section**
   The main concern is the bridge section, which was not excavated during construction. Due to the elevation difference, this area is now forming what appears to be a secondary creek.

2. **Displacement of Riffle Rocks and Bank Erosion**
   Heavy rainfall during the ARE displaced several riffle rocks. Water flow is now directed towards the edges of the rocks instead of the center. This displacement has initiated erosion along the creek bank, posing potential stability issues.

3. **Sediment Transport and Channel Alteration**
   The intense rainfall transported significant sediment, altering the channels' shape and depth. This poses potential issues, such as increased bank erosion and flooding, due to the skewed channel bottom and reduced elevation difference between the channel bottom and the top of the bank.

4. **Condition of Sylvester Road Crossing Culverts (MOTI)**
   - **North Herford Culvert:** Fully cleared of debris and functioning as intended.
   - **South Herford Culvert:** Partially cleared but significantly improved compared to its prior condition.

These changes have been documented through Drone footage captured by Duncan and photos taken during the site visit.

Figure-1: South Herford MOTI Culvert before ARE



Figure-2: South Herford MOTI Culvert after ARE



Figure-3: North Herford MOTI Culvert before ARE



Figure-4: North Herford MOTI Culvert before ARE



Figure-5: South Herford riffle weirs near the culvert before ARE



Figure-6: South Herford riffle weirs near the culvert after ARE



Figure-7: South Herford limit of construction before ARE



Figure-8: South Herford limit of construction after ARE



Figure-9: South Herford - displaced riffle rocks

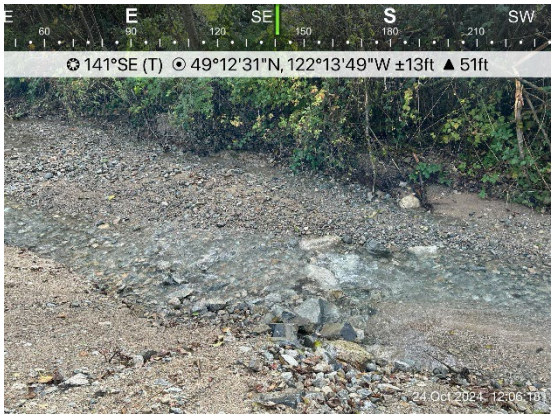


Figure-10: South Herford – transported sediment



Figure-11: West side of North Herford before ARE



Figure-12: East side of North Herford after ARE



Figure-13: East side of North Herford before ARE

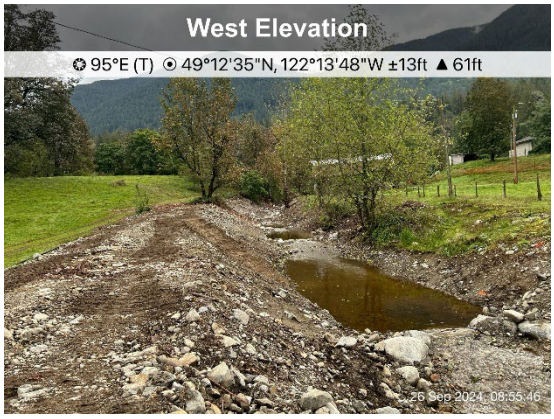


Figure-14: East side of North Herford before ARE



Figure-15: East side of North Herford after ARE



Figure-16: East side of North Herford after ARE



Figure-17: North Herford bridge area before ARE



Figure-18: North Herford bridge area before ARE



Figure-19: North Herford bridge area after ARE



Figure-20: North Herford bridge area after ARE



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Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	001
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 2
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	August 12, 2024
Contract No.:		**Temperature:**	High: 19 Low: 14
Weather:	Cloudy		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 foreman, 1 environmental monitor (Aquaterra), 4 fish salvage workers (Laq'a:mel)

Contractor's Equipment: 1 Komatsu PC360LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck

Report:

Work focused on vegetation clearing and fish salvage.

The contractor is going to start in-stream work tomorrow.





Photo 1 & 2: Vegetation clearing.





Photo 3 & 4: Fish salvaging.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	002
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 2
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	August 13, 2024
Contract No.:		**Temperature:**	High: 21 Low: 16
Weather:	Cloudy		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 foreman, 1 environmental monitor (Aquaterra), 4 fish salvage workers (Laq'a:mel)

Contractor's Equipment: 1 Komatsu PC360LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck

Report:

Work focused on establishing access to the channel for equipment and fish salvage.

Laq'amel couldn't finish fish salvage today, so the contractor couldn't start in-stream work today.





Photo 1 & 2: Establishing access to the channel.





Photo 3 & 4: Fish salvaging.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	003
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 3
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	August 14, 2024
Contract No.:		**Temperature:**	High: 25 Low: 13
Weather:	Partly cloudy		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 foreman, 10 fish salvage workers (Laq'a:mel)

Contractor's Equipment: 1 Komatsu PC360LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck

Report:

Work focused on channel excavation, hauling riprap, and fish salvage.

Laq'a:mel finished fish salvage today, and the contractor began channel excavation, covering Sta.0+250 to Sta. 0+277.





Photo 1 & 2: Channel excavation.



Photo 3: Bypass pumping.



Photo 4: Fish salvaging.



Photo 5: Hauling riprap.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	004
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 3
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	August 15, 2024
Contract No.:		**Temperature:**	High: 24 Low: 15
Weather:	Partly cloudy		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 foreman, 1 inspector (Laq'a:mel), 1 environmental monitor (Aquaterra)

Contractor's Equipment: 1 Komatsu PC360LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck

Report:

Work focused on channel excavation and riffle-pool placement.

Channel excavation covered Sta. 0+200 to Sta. 0+250. The contractor attempted to retain larger boulders/rocks where possible, but additional material was needed for the fish habitats. The property owner has offered to provide his rocks at no cost, and the size appeared sufficient for the riffle-pools.





Photo 1 & 2: Channel excavation.





Photo 3 & 4: Placing riffle-pool.





Photo 5 & 6: Rocks from property owner.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	005
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 2
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	August 16, 2024
Contract No.:		**Temperature:**	High: 22 Low: 11
Weather:	Partly cloudy		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 foreman, 1 operator, 2 laborers, 1 TCP, 1 inspector (Laq'a:mel)

Contractor's Equipment: 1 Komatsu PC360LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck

Report:

Work focused on channel excavation and placing excavated gravel to property owner's land.

Channel excavation covered Sta. 0+090 to Sta. 0+200. The culvert at Station 0+150 will not be lowered to avoid creating further challenges for fish passage through the structure. Instead, the contractor will install a boulder/riffle weir downstream of the culvert. The crest of the boulder riffle will be set at an elevation roughly equal to the invert of the culvert outlet.

The contractor is going to work tomorrow (Saturday). They are going to finish riffle-pool placement tomorrow.





Photo 1 & 2: Channel excavation.





Photo 3 & 4: Placing excavated gravel to property owner's land.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	006
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 2
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	August 17, 2024
Contract No.:		**Temperature:**	High: 32 Low: 20
Weather:	Sunny		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 foreman, 1 laborer, 1 TCP, 1 environmental monitor (Aquaterra), 1 inspector (Laq'a:mel)

Contractor's Equipment: 1 Komatsu PC360LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck

Report:

Work focused on riffle-pool placement.

Elevation difference between the culvert invert (proposed riffle crest elevation) and the design profile is approximately 1 m. Therefore, the contractor suggested installing multiple weirs at that location.




Photo 1 & 2: Placing riffle-pool.




Photo 3 & 4: Riffle pools.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	007
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 2
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	August 19, 2024
Contract No.:		**Temperature:**	High: 24 Low: 15
Weather:	Sunny		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 foreman, 1 operator, 1 laborer, 1 TCP, 1 inspector (Laq'a:mel), 1 environmental monitor (Aquaterra)

Contractor's Equipment: 1 Komatsu PC360LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck

Report:

Work focused on channel excavation and placing 50 kg Class Riprap upstream of the Sylvester Road culvert crossing.

Channel excavation covered culvert inlet (Sta. 0+070) to Sta. 0+090.

Leq'a:mel is behind schedule for the fish salvage at 15/16. The plan was to start the fish salvage for 34/37 on the west side of Sylvester Road today morning, but it got postponed to tomorrow. It might extend into Wednesday morning.





Photo 1 & 2: Channel excavation.





Photo 3 & 4: Placing riprap upstream of the Sylvester Road culvert crossing.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	008
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 2
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	August 20, 2024
Contract No.:		**Temperature:**	High: 21 Low: 14
Weather:	Cloudy		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 laborer, 1 TCP, 3 fish salvage laborers (Laq'a:mel)

Contractor's Equipment: 1 Komatsu PC360LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck

Report:

Work focused on hauling 50kg Class Riprap and fish salvaging.

The contractor is planning to begin excavation on the west side of Sylvester Road tomorrow afternoon after Leqamel is done with fish salvage.

The contractor mentioned that ground survey for South Herford won't be done soon as they still need to work on sloping for South Herford. This work is scheduled to occur after they finish using the hauling road to North Herford, which will be at the very end. Currently, all materials excavated from South Herford Creek have been placed on Keiko's property, with none disposed of offsite yet.

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Photo 1 & 2: Riffle-pools after rain.



Photo 3: Fish salvaging.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	009
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 2
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	August 21, 2024
Contract No.:		**Temperature:**	High: 19 Low: 13
Weather:	Cloudy		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 foreman, 1 operator, 1 laborer, 1 TCP, 1 inspector (Laq'a:mel), 1 environmental monitor (Aquaterra)

Contractor's Equipment: 1 Komatsu PC360LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck

Report:

Work focused on channel excavation and placing 50 kg Class Riprap downstream of the Sylvester Road culvert crossing.

Channel excavation covered Sta. 0+000 to culvert outlet (Sta. 0+050).

The contractor is going to install 50kg Class Riprap on the right bank from approximately Sta. 0+128 (5-6 meters downstream of the third riffle weir from the culvert outlet) to Sta. 0+147 (where the culvert outlet is located) to prevent erosion.





Photo 1 & 2: Channel excavation.





Photo 3 & 4: Placing riprap downstream of the Sylvester Road culvert crossing.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	010
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 2
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	August 22, 2024
Contract No.:		**Temperature:**	High: 21 Low: 13
Weather:	Sunny		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 laborer, 1 TCP

Contractor's Equipment: 1 Komatsu PC360LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck

Report:

Work focused on setting up for the bypass pumping for North Herford Creek (Sta 0+000 to Sta 0+100)

Leq'a:mel will be doing the fish salvage tomorrow, as they're occupied with 15/16 site today, and the contractor is planning to place riprap around the South Herford culvert per Field Memo #5 tomorrow morning.

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BEST MANAGED COMPANIES Platinum member



Photo 1: Setting up for the bypass pumping.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	011
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 2
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	August 23, 2024
Contract No.:		**Temperature:**	High: 16 Low: 12
Weather:	Rain		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 operator, 1 laborer, 1 TCP, 1 environmental monitor (Aquaterra)

Contractor's Equipment: 1 Komatsu PC360LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck

Report:

Work focused on placing riprap around the South Herford culvert (Sta 0+150) per Field Memo #5.

There is no construction activities scheduled for tomorrow. Tomorrow's work is limited to fish salvage by Leqamel, but they might not be able to continue over the weekend due to the forecasted rain.





Photo 1 & 2: Placing riprap around the South Herford culvert (Sta 0+150).



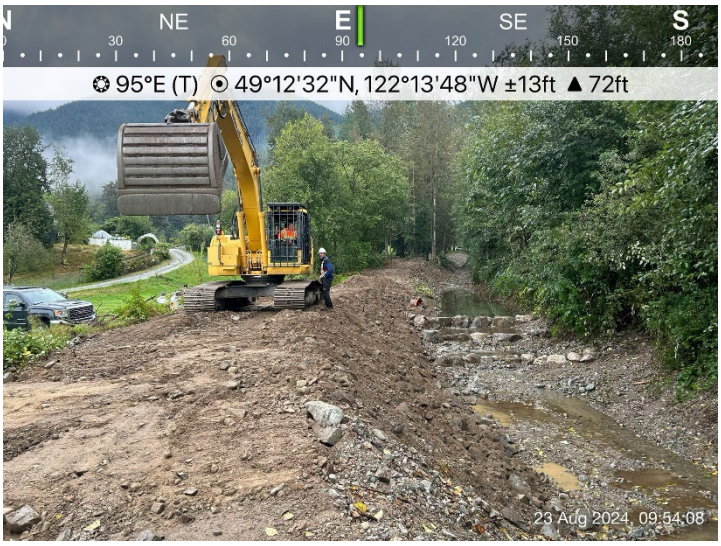


Photo 3 & 4: Placing riprap around the South Herford culvert (Sta 0+150).

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	012
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 2
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	August 26, 2024
Contract No.:		**Temperature:**	High: 18 Low: 11
Weather:	Rain		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 foreman, 1 laborer, 1 TCP, 6 fish salvage workers (Leqamel)

Contractor's Equipment: 1 Komatsu PC360LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck

Report:

Work focused on fish salvaging and bypass pumping.

Two fish salvage nets were knocked over during the weekend, so Leqamel had to set them up again. They also had to redo the fish salvage in some areas, aiming to finish by the end of today, but it might take until tomorrow if needed. The contractor plans to finish digging from Sta. 0+000 to Sta. 0+100 and place riprap upstream and downstream of the North Herford culvert crossing by the end of this week.





Photo 1 & 2: Fish salvage nets that got pushed over during the weekend.





Photo 3 & 4: Fish salvaging.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	013
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 2
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	August 27, 2024
Contract No.:		**Temperature:**	High: 18 Low: 9
Weather:	Rain, Cloudy		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 foreman, 1 laborer, 1 TCP, 7 fish salvage workers (Leqamel)

Contractor's Equipment: 1 Komatsu PC360LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck

Report:

Work focused on fish salvaging and bypass pumping.

Leqamel's fish salvage crew left the site early today due to their annual staff event. They were nearly finished with the fish salvage but will need to return tomorrow morning to complete the last 2-3 hours of work. The contractor originally planned so start channel excavation today, but that will now commence to tomorrow morning.





Photo 1 & 2: Bypass pumping.



Photo 3: Fish salvaging.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	014
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 4
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	August 28, 2024
Contract No.:		**Temperature:**	High: 21 Low: 10
Weather:	Sunny		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 foreman, 1 operator, 1 laborer, 1 TCP, 1 environmental monitor (Aquaterra), 11 fish salvage workers (Leqamel)

Contractor's Equipment: 1 Komatsu PC360LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck

Report:

Work focused on fish salvage and channel excavation.

Channel excavation covered Sta. 0+000 to Sta. 0+080.

The contractor discovered an unknown 275mm diameter concrete pipe at Sta. 0+060. There was no water flow, and the landowner was unsure of its connection or purpose.

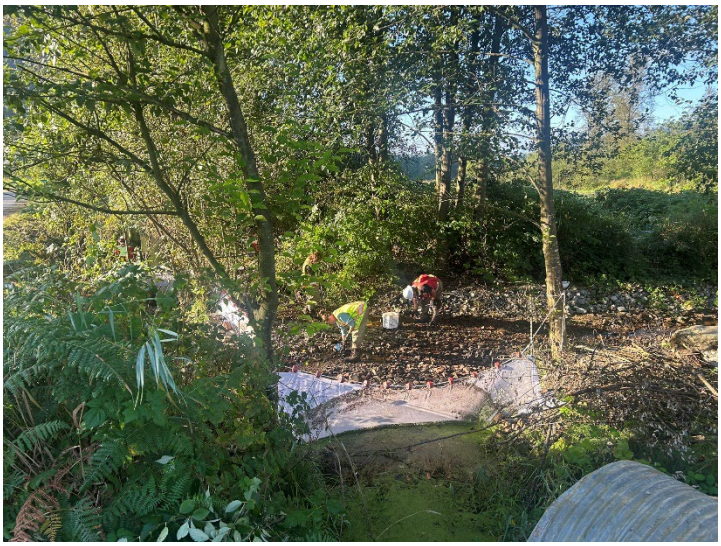




Photo 1 & 2: Fish salvaging.





Photo 3 & 4: Channel excavation.



Photo 5: Checking 2:1 channel side slope.



Photo 6: Temporary access.



Photo 7: Unknown concrete pipe.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	015
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 3
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	August 29, 2024
Contract No.:		**Temperature:**	High: 26 Low: 12
Weather:	Sunny		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 foreman, 1 operator, 1 laborer, 2 TCPs

Contractor's Equipment: 1 Komatsu PC360LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck

Report:

Work focused on channel excavation, placing 50 kg Class Riprap upstream of the North Herford culvert crossing, placing root wads, and placing boulder weir at Sta. 0+000.

Channel excavation covered Sta. 0+080 to culvert outlet (Sta. 0+100) including the intersection of South Herford and North Herford.





Photo 1 & 2: Channel excavation.



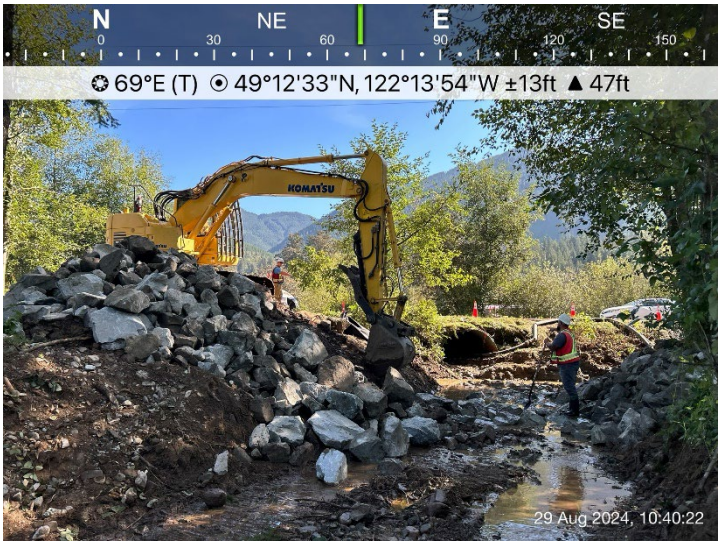


Photo 3 & 4: Placing riprap.





Photo 5 & 6: Placing root wads.



Photo 7: Placing boulder weir.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:5**	016
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 3
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	August 30, 2024
Contract No.:		**Temperature:**	High: 28 Low: 14
Weather:	Sunny		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 foreman, 1 operator, 1 laborer, 1 TCP, 1 environmental monitor (Aquaterra)

Contractor's Equipment: 1 Komatsu PC360LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck

Report:

Work focused on channel excavation and placing 50 kg Class Riprap upstream of the North Herford culvert crossing.

Channel excavation covered culvert inlet (Sta. 0+110) to Sta. 0+130.

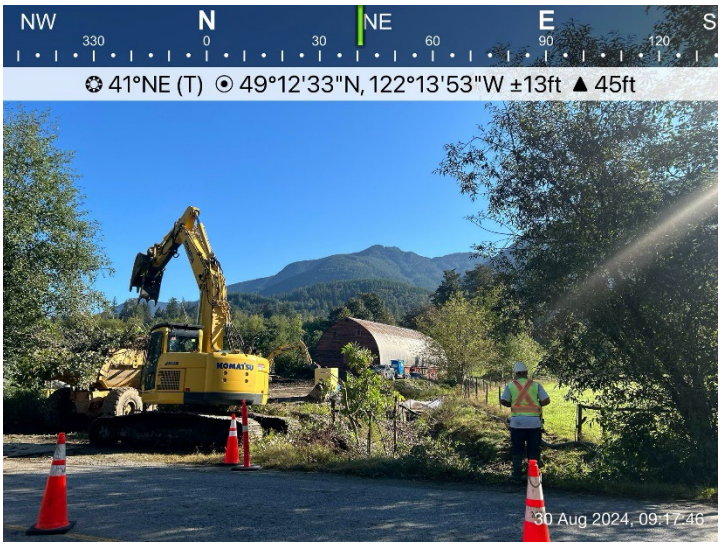




Photo 1 & 2: Channel excavation.





Photo 3 & 4: Placing riprap.



Photo 5: Hauling riprap.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	017
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 2
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	September 3, 2024
Contract No.:		**Temperature:**	High: 22 Low: 13
Weather:	Partly cloudy.		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 foreman, 1 operator, 1 laborer

Contractor's Equipment: 1 Komatsu PC360LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck

Report:

Work focused on setting up the bypass pumping.

Leqamel's fish salvage crew was scheduled to be on-site at 8:00 am today to work on the fish salvage throughout the day. However, their team leader called in sick, and the crew didn't show up.





Photo 1 & 2: Bypass pumping setup.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	018
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 2
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	September 4, 2024
Contract No.:		**Temperature:**	High: 28 Low: 15
Weather:	Sunny		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 laborer, 1 TCP, 6 fish salvage workers (Leqamel)

Contractor's Equipment: 1 Komatsu PC360LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck

Report:

Work focused on fish salvage.



Photo 1: Fish salvage workers.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	019
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 2
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	September 19, 2024
Contract No.:		**Temperature:**	High: 32 Low: 16
Weather:	Sunny		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 laborer, 7 fish salvage workers (Leqamel)

Contractor's Equipment: 1 Komatsu PC360LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck

Report:

Work focused on fish salvage.

Arrived on-site around 2:30 pm. The site was completely shut down. There was no fish salvage crew from Leqamel, and no one from Mission was present either. The superintendent informed me that the fish salvage crew (7 people) left around noon because they felt it was too hot to continue working. The fish salvage crew will come back to the site tomorrow morning to finish the fish salvage.



Photo 1: Empty site.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	020
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 2
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	September 6, 2024
Contract No.:		**Temperature:**	High: 32 Low: 15
Weather:	Sunny		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 8 fish salvage workers (Leqamel), 1 environmental monitor (Aquaterra)

Contractor's Equipment: 1 Komatsu PC360LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck

Report:

Work focused on fish salvage

Arrived on-site around 9:30 am. At 10:55 AM, I arrived at the bypass pump and found it running. The contractor was not present, so I asked the fish salvage worker when dewatering had started, and they informed me it began about five minutes earlier. Nicole (EM) arrived shortly after, around 11 AM. She mentioned that she had visited the site on Wednesday to inspect the bypass pump setup. Fish salvage was completed around 2:30 pm, and the contractor is going to start channel excavation tomorrow morning.





Photo 1 & 2: Fish salvaging.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	021
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 3
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	September 7, 2024
Contract No.:		**Temperature:**	High: 31 Low: 16
Weather:	Sunny		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 foreman, 1 operator, 1 laborer, 1 environmental monitor (Aquaterra)

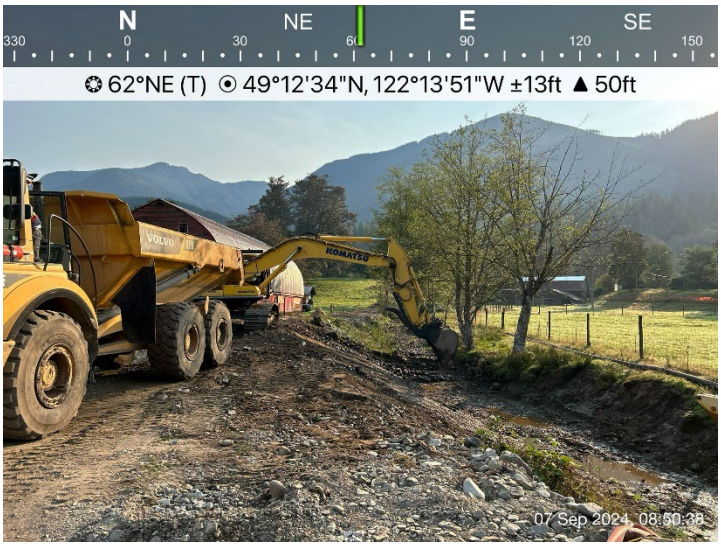
Contractor's Equipment: 1 Komatsu PC360LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck

Report:

Work focused on channel excavation.

Arrived on-site around 8:40 AM. Channel excavation covered Sta. 0+140 to Sta. 0+220.

Bypass pump was being used, and the EM arrived on-site around 1:55 PM.



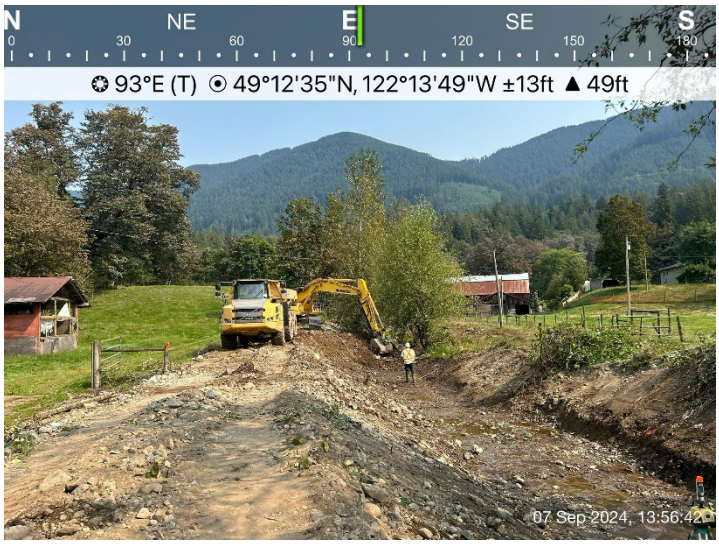


Photo 1 & 2: Channel excavation.



Photo 3: Checking channel side slope.



Photo 4: Placing excavated material.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	022
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 3
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	September 9, 2024
Contract No.:		**Temperature:**	High: 22 Low: 14
Weather:	Cloudy		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 foreman, 2 operators, 1 laborer, 1 foreman (Emil Anderson), 2 TCPs (Emil Anderson), 1 hydrovac man (Email Anderson), 1 inspector (Leqamel), 4 fish salvage workers (Leqamel)

Contractor's Equipment: 1 Komatsu PC300LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck,

Report:

Work focused on channel excavation.

Channel excavation covered Sta. 0+220 to Sta. 0+330.

Workers from Emil Anderson was on-site to clean the MOTI culvert crossings. I informed the foreman that there were fish in the area since the isolation nets had been removed. I also mentioned that we had contacted MOTI several times in July and August regarding this issue, and there had been periods when everything was set up for the work, but that's no longer the case. They had already started working, but after I explained the situation, the foreman stopped the work and drove off to call MOTI. I didn't instruct them to stop work, as I don't have the authority to do that; I simply provided the information. The culvert cleaning crew left the site around 10:00 am. A representative from MOTI visited afterward. I explained that while there had been periods when everything was in place for the work, that's no longer the case.

Fish salvage workers returned to the site to salvage the stranded fish from the pool located between Sta. 0+130 and Sta. 0+140.





Photo 1 & 2: Channel excavation,





Photo 3 & 4: Emil Anderson's culvert cleaning crew.



Photo 5: Fish salvaging.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	023
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 2
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	September 10, 2024
Contract No.:		**Temperature:**	High: 19 Low: 12
Weather:	Partly cloudy		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 2 operators, 1 laborer, 1 inspector (Leqamel), 1 environmental monitor (Aquaterra)

Contractor's Equipment: 1 Komatsu PC300LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck,

Report:

Work focused on placing riffle weirs.

14 riffle weirs were placed between Sta. 0+120 and Sta. 0+330. Tomorrow, they will move the bypass pump setup to the final section of North Herford Creek, where Leqamel will be on site to install the fish salvage net. Leqamel is scheduled to perform the fish salvage on Thursday, with the contractor planning to start the channel excavation on Friday and continue through Saturday.

The homeowner asked contractor to reinstate three cattle trails along the north bank of North Herford Creek, allowing the cows access to the creek for drinking. There will be no additional cost for this work.

Environmental monitor was on site from approximately 10:30 AM to 11:50 AM. The bypass pump got completely turned off at 2:45 pm.





Photo 1 & 2: Placing riffle weirs.



Photo 3: Working on channel side slope.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	024
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 2
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	September 11, 2024
Contract No.:		**Temperature:**	High: 17 Low: 12
Weather:	Rain		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 operator, 1 laborer, Tina (Leqamel)

Contractor's Equipment: 1 Komatsu PC300LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck,

Report:

Work focused on setting up bypass pumps and fish isolation nets.

The contractor will turn on the bypass pumps tomorrow, and the environmental monitor will be on site to watch it.

Leqamel will be fish salvaging tomorrow.

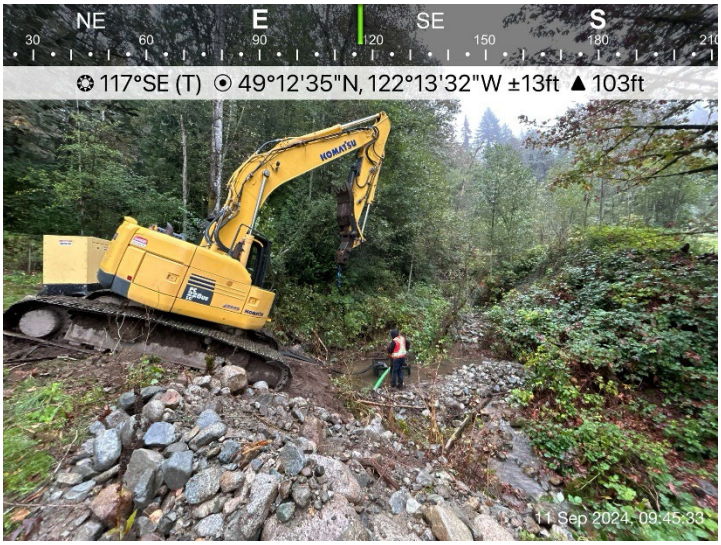




Photo 1 & 2: Bypass pumps set up.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	025
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 3
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	September 12, 2024
Contract No.:		**Temperature:**	High: 19 Low: 12
Weather:	Partly cloudy		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 operator, 1 laborer, Tina (Leqamel), 4 fish salvage workers (Leqamel), 1 environmental monitor (Aquaterra)

Contractor's Equipment: 1 Komatsu PC300LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck,

Report:

Work focused on fish salvaging.

I left the site around 3:40 PM while Leqamel was still conducting fish salvage. They plan to complete it today, so the contractor can begin channel excavation tomorrow.

The environmental monitor was present from 9:45 AM until noon, as dewatering was originally scheduled for 10:00 AM. However, fish salvage took longer than expected, and the EM had to leave for another site. The contractor ended up starting dewatering around 3:00 PM without the EM present.





Photo 1 & 2: Fish salvaging.





Photo 3 & 4: Dewatering using bypass pumps.





Photo 5 & 6: Removing invasive species.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	026
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 2
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	September 13, 2024
Contract No.:		**Temperature:**	High: 18 Low: 12
Weather:	Cloudy		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 project manager, 2 operators, 1 laborer, 2 TCPs, 1 environmental monitor (Aquaterra)

Contractor's Equipment: 1 Komatsu PC300LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck,

Report:

Work focused on channel excavation.

Channel excavation covered Sta. 0+330 to Sta. 0+380. The contractor aims to complete the channel excavation by the end of Monday/Tuesday. They are going to leave the channel untouched from Sta. 0+380 to Sta. 0+400 since property owner's bridge is at Sta. 0+390 (approximately).

Yesterday, Leqamel stayed until 6:15 pm and finished the work.

EM was on site from 2:00 pm to 3:00 pm to check bypass pumps.



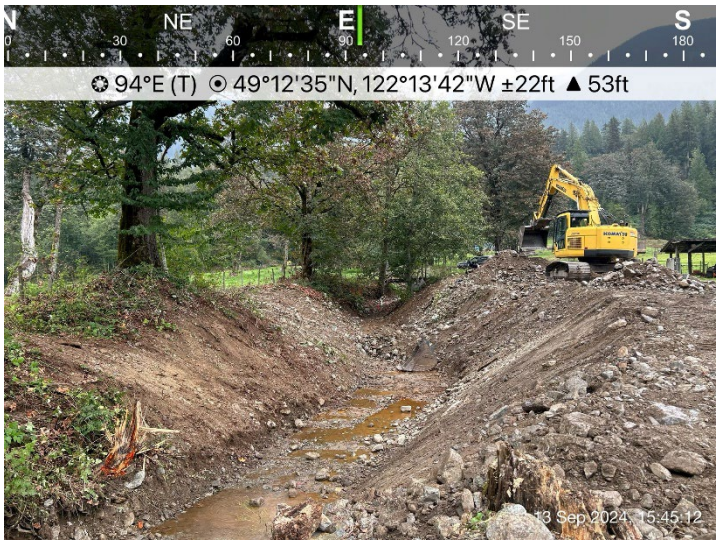


Photo 1 & 2: Channel excavation.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	027
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 2
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	September 14, 2024
Contract No.:		**Temperature:**	High: 16 Low: 11
Weather:	Cloudy, rain		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 foreman, 1 operator, 1 laborer, 1 inspector (Leqamel)

Contractor's Equipment: 1 Komatsu PC300LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck,

Report:

Work focused on channel excavation.

Channel excavation covered Sta. 0+400 to Sta. 0+420. It included riprap preparation.

The contractor left site around 2:00 pm today due to heavy rain.


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SE
S
0
30
60
120
150
180
90°E (T) 49°12'34"N, 122°13'42"W ±16ft ▲ 53ft
14 Sep 2024 08:40:53


NE
E
SE
S
60
90
120
150
180
210
127°SE (T) 49°12'34"N, 122°13'39"W ±13ft ▲ 70ft
14 Sep 2024 13:36:03

Photo 1 & 2:

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	028
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 2
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	September 16, 2024
Contract No.:		**Temperature:**	High: 22 Low: 10
Weather:	Sunny		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 2 operators, 1 laborer, 1 TCP

Contractor's Equipment: 1 Komatsu PC300LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck,

Report:

Work focused on placing riprap and channel excavation.

The contractor placed riprap between Sta. 0+400 and Sta. 0+420, and the channel excavation covered Sta. 0+420 to Sta. 0+445.

There was noticeable elevation difference between the existing channel and the proposed channel, caused by no working on the section near the bridge. The contractor is going to place some boulders to make it look like a riffle weir.

Nicola and Braden were on site from 11:45 AM to 12:45 PM.

EM was on site from 9:45 AM to 10:20 AM.

carbon neutral since 2009

CANADA BEST MANAGED COMPANIES Platinum member





Photo 1 & 2: Placing riprap.

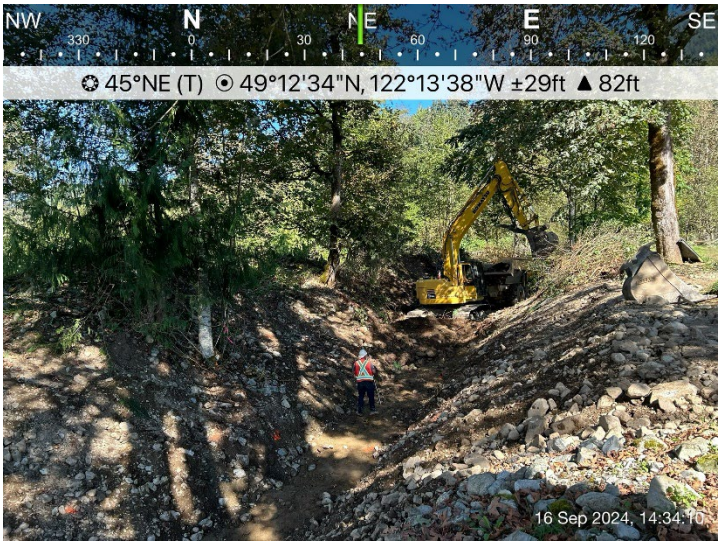




Photo 3 & 4: Channel excavation.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	029
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 2
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	September 17, 2024
Contract No.:		**Temperature:**	High: 17 Low: 12
Weather:	Overcast		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 2 operators, 1 laborer, 1 TCP

Contractor's Equipment: 1 Komatsu PC300LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck,

Report:

Work focused on placing riprap and channel excavation.

The contractor began placing riprap between Sta. 0+540 and Sta. 0+555, and the channel excavation covered Sta. 0+445 to Sta. 0+555 (not finished today).

The contractor and AE agreed that it makes sense to stop 5m before our new construction limit (Sta. 0+560), so our new construction limit is now Sta. 0+555.

The contractor installed riprap along the north bank today, and they placed some large rocks along the bottom of south bank.

Riteway tree service was on Sylvester Road from 8:30 AM to 9:30 AM to trim trees on the road.





Photo 1 & 2: Channel excavation.





Photo 3 & 4: Placing riprap.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	030
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 3
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	September 18, 2024
Contract No.:		**Temperature:**	High: 19 Low: 11
Weather:	Sunny		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 2 operators, 1 laborer, 2 TCPs

Contractor's Equipment: 1 Komatsu PC300LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck,

Report:

Work focused on placing riprap and channel excavation.

The contractor finished placing riprap between Sta. 0+540 and Sta. 0+555, and the channel excavation covered Sta. 0+445 to Sta. 0+555.

Also, the contractor reinstated riprap along the south bank from approximately Sta. 0+340 to Sta. 0+360.





Photo 1 & 2: Placing riprap.





Photo 3 & 4: Channel excavation.





Photo 5 & 6: Reinstating riprap.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	031
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 2
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	September 19, 2024
Contract No.:		**Temperature:**	High: 28 Low: 11
Weather:	Sunny		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 2 operators, 1 laborer, 1 TCP, 1 EM (Aquaterra)

Contractor's Equipment: 1 Komatsu PC300LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck,

Report:

Work focused on placing riffle weirs and boulder clusters.

The contractor placed 13 riffle weirs and 3 boulder clusters. They are going to work on the South Herford Creek channel slope tomorrow.

Naomi was on site from 9:30 AM to 10:00 AM.

EM was on site from 10:00 AM to 10:45 AM. The contractor plans to shut off the bypass pump tomorrow when the EM is on-site.

carbon neutral since 2009

CANADA BEST MANAGED COMPANIES Platinum member





Photo 1 & 2: Placing riffle weirs.





Photo 3 & 4: Placing boulder clusters.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	032
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 3
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	September 20, 2024
Contract No.:		**Temperature:**	High: 18 Low: 10
Weather:	Sunny		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 2 operators, 1 laborer, 1 TCP, 1 EM (Aquaterra), 2 surveyors (Protech)

Contractor's Equipment: 1 Komatsu PC300LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck,

Report:

Work focused on working on the South Herford Creek channel slope.

The contractor turned off the bypass pump at 7:50 AM, and EM was on site from 7:30 AM to 10:00 AM.

Protech surveyors came to the site to begin surveying the creek. They are going return next week to finish the survey.

The contractor plans to haul the stockpiled materials off-site next week, with completion expected by Thursday.





Photo 1 & 2: Shaping channel side slope.



Photo 3: Shutting off the bypass pump.



Photo 4: Creek survey.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	033
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 2
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	September 23, 2024
Contract No.:		**Temperature:**	High: 18 Low: 13
Weather:	Cloudy		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 operators, 1 cultural monitor (Leqamel)

Contractor's Equipment: 1 Komatsu PC300LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck

Report:

Work focused on hauling stockpiled materials off-site.

No work is scheduled from Friday through Monday. Pro-tech surveyors visited the site on Friday to begin surveying the creek, but they were unable to complete the work. They plan to return on Tuesday or Wednesday to finish the survey



Photo 1: Hauling stockpiled materials off-site.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	034
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 2
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	September 24, 2024
Contract No.:		**Temperature:**	High: 25 Low: 15
Weather:	Sunny		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 operator, 2 surveyors (Protech), 1 cultural monitor (Leqamel)

Contractor's Equipment: 1 Komatsu PC300LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck

Report:

Work focused on hauling stockpiled materials off-site.

Pro-tech surveyors came to the site to survey the creek.





Photo 1 & 2: Hauling stockpiled materials off-site.

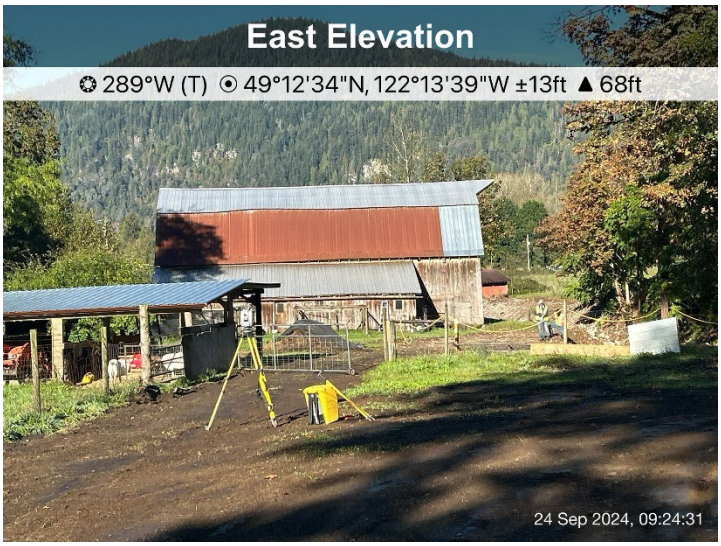


Photo 3: Protech surveyors.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	035
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 2
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	September 25, 2024
Contract No.:		**Temperature:**	High: 16 Low: 9
Weather:	Rain		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 operator, 2 surveyors (Protech), 1 cultural monitor (Leqamel)

Contractor's Equipment: 1 Komatsu PC300LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck,

Report:

Work focused on hauling stockpiled materials off-site.

The surveyors finished the creek survey today.

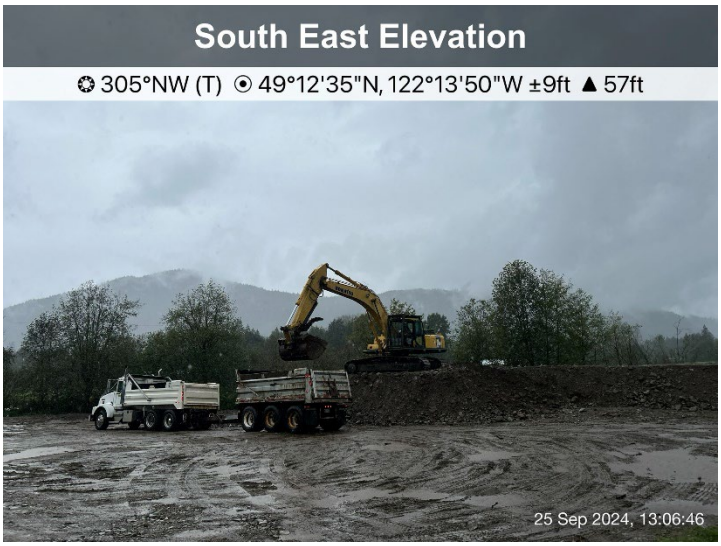


Photo 1: Hauling stockpiled materials off-site.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	036
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 3
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	September 26, 2024
Contract No.:		**Temperature:**	High: 14 Low: 11
Weather:	Rain		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 operator

Contractor's Equipment: 1 Komatsu PC300LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck,

Report:

Work focused on hauling stockpiled materials off-site.

The contractor was unable to complete the stockpile hauling this week. They will continue working on it next week.

The contractor placed 7 additional boulder clusters, and they installed cattle trails for a property owner.

Brad and Andrew came to the site and walked through North Herford Creek.



Photo 1: Hauling stockpiled materials off-site.

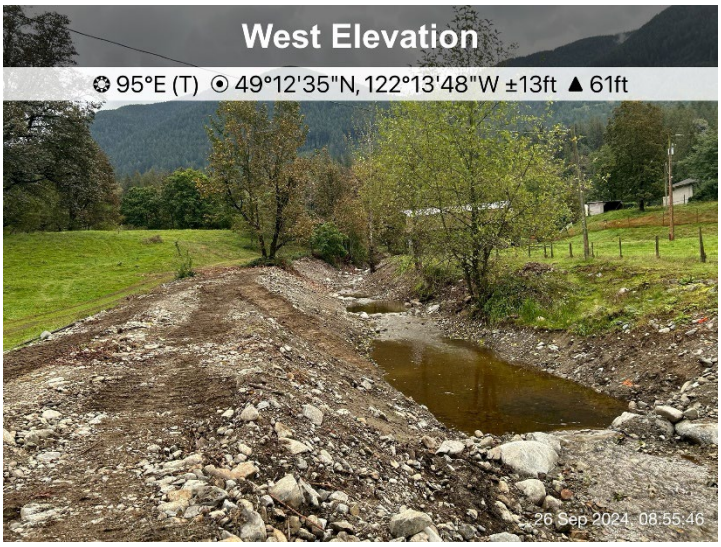


Photo 2: Cattle trails.



Photo 3: Additional boulder clusters.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	037
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 3
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	October 9, 2024
Contract No.:		**Temperature:**	High: 16 Low: 8
Weather:	Overcast		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 1 superintendent, 1 operator

Contractor's Equipment: 1 Komatsu PC300LC Excavator, 1 PC228USLC Excavator, 1 Volvo A30F Dump Truck,

Report:

Work focused on hauling stockpiled materials off-site and hauling topsoil on-site.



Photo 1: Hauling stockpiled materials off-site.

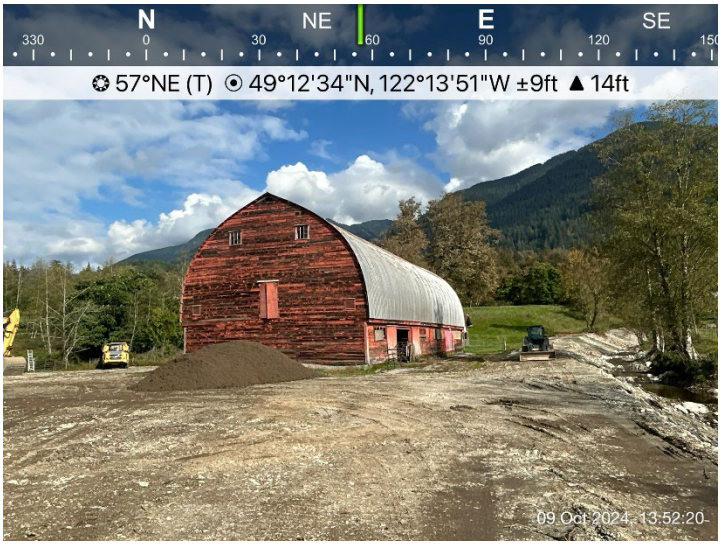


Photo 2: Topsoil on site.



Photo 3: Reinstating fence.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	038
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 3
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	November 8, 2024
Contract No.:		**Temperature:**	High: 10 Low: 6
Weather:	Overcast		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: 2 laborers

Contractor's Equipment: 1 Hydroseed Truck

Report:

Work focused on hydroseeding North Herford Creek.

The bridge section that was not excavated has become an area of concern, as the elevation difference appears to be forming a secondary creek. Additionally, water flow has been redirected toward the side edges of the riffle rocks rather than the center, likely due to their displacement during heavy rainfall. This shift in flow has initiated erosion along the bank. The intense rainfall has also transported sediment, altering the channel's shape. These changes have been documented in Duncan's drone footage and in site visit photos and reports.

Upon inspection two weeks ago, following the heavy storm, no large salmon were observed in South Herford Creek. However, a substantial number of dead and stranded salmon were noted today. Jon was consulted about this observation, and he clarified that it is a normal part of the salmon life cycle after spawning, suggesting that the presence of dead salmon is a positive indication of their return to spawn in the area.



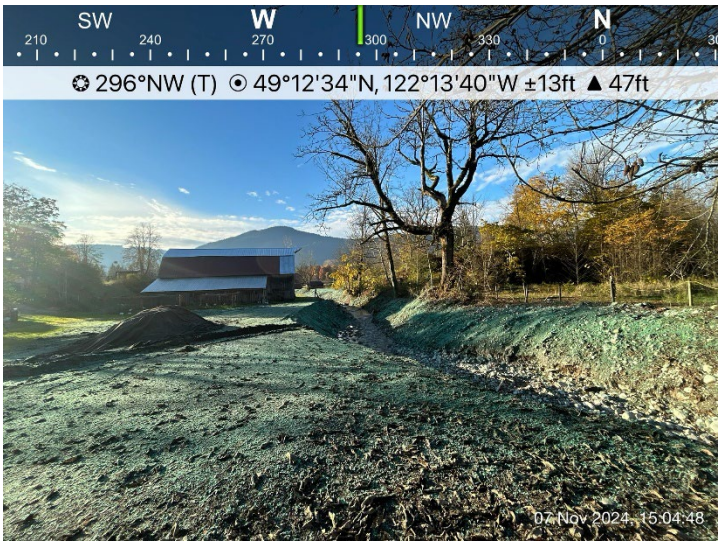


Photo 1: Hauling stockpiled materials off-site.

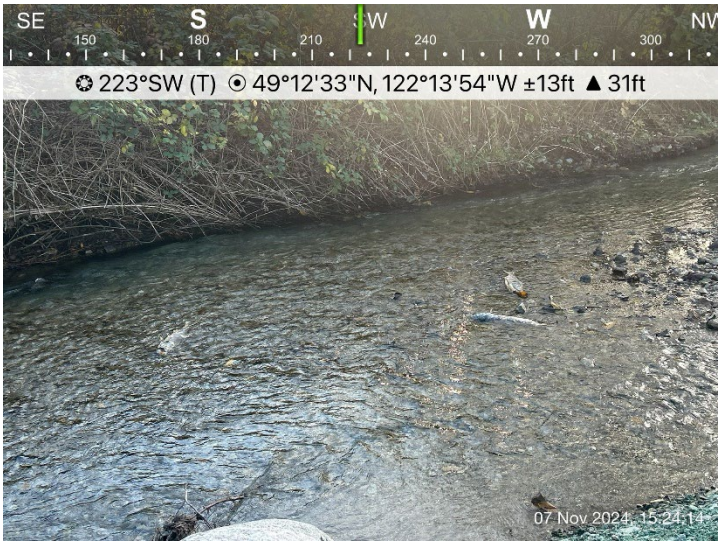




Photo 2: Dead salmons



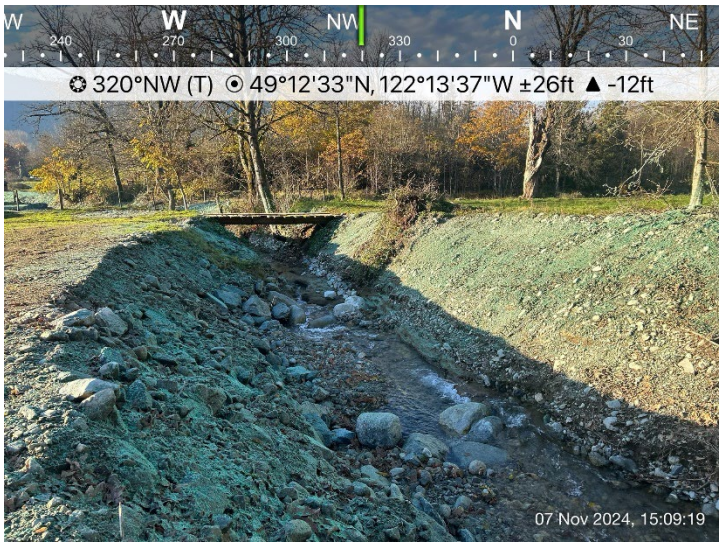


Photo 3: Reinstating fence.

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Owner:	Ministry of Environment and Climate Change Strategy	**Report No.:**	039
Project:	Haztic Flood Mitigation – SCR 34/37 Herford Creeks	**Page:**	1 of 3
Location:	Herford Creeks	**Project No.:**	2022-2632-08 2022-2632-11
Contractor:	Mission Contractors Ltd	**File No.:**	
Contract:		**Date:**	November 21, 2024
Contract No.:		**Temperature:**	High: 7 Low: 4
Weather:	Overcast		

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

Labour Force: Adam, 2 laborers

Contractor's Equipment:

Report:

The substantial completion walkthrough was conducted with Adam this morning. Only minimal deficiencies were identified, as the work completed since the end of September has been limited to the placement of topsoil and hydroseeding.

During the walkthrough, the contractor's hand-marked drawings were reviewed, which outlined the areas of topsoil placement and hydroseeding. The markings appeared reasonable, and the contractor will finalize these drawings in AutoCAD for submission and review.

An informal walkthrough of the instream work had already been conducted at the end of September. Although the October Atmospheric River Event (ARE) caused significant changes to the site, these changes are not considered deficiencies, as they occurred after the completion of instream work. Documentation of the ARE impacts, including site reports, photos, and drone footage captured by Duncan, is stored on the project SharePoint for reference.

Two site-specific issues were noted during the walkthrough:

1. A section of topsoil and hydroseed near Keiko's barn was disturbed after the work was completed, likely by a tractor driving over it.
2. At the request of the property owner west of Sylvester Road, the contractor will leave the temporary access road with culvert underneath in place rather than removing it.

Additionally, a few minor cleanup tasks were identified:

- **Removal of survey stakes**
- **Removal of sandbags**

The contractor has been instructed to address these cleanup items promptly.

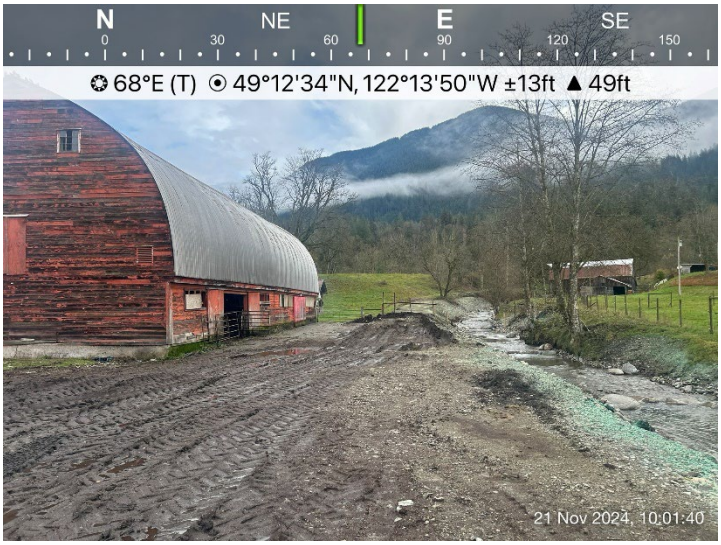




Photo 1&2: Hauling stockpiled materials off-site.





Photo 3&4: Dead salmons

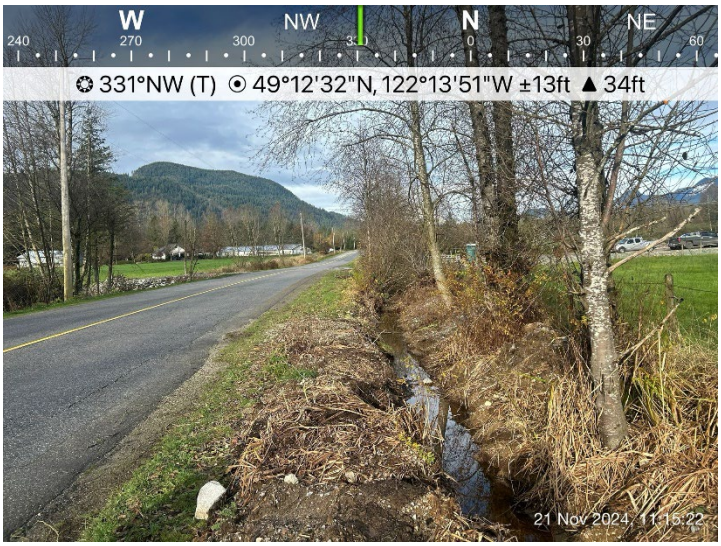




Photo 5&6: Reinstating fence.

SHEET LIST TABLE

SHEET	DRAWING NAME	REVISION	DRAWING TITLE	DRAWING DESCRIPTION
GENERAL				
1	2632-08-G-001	3	COVER	
2	2632-08-G-002	3	LEGEND	
3	2632-08-G-003	3	LOCATION PLAN	SCR34 AND SCR37
4	2632-08-G-004	3	SCR 37 PLAN	ACCESS AND LAYDOWN AREA
5	2632-08-G-005	3	SCR 34 PLAN	ACCESS AND LAYDOWN AREA
CIVIL				
6	2632-08-C-101	3	SCR37 PLAN	STA 0+000 TO STA 0+230
7	2632-08-C-102	3	SCR37 PLAN	STA 0+230 TO STA 0+450
8	2632-08-C-103	3	SCR37 PLAN	STA 0+450 TO STA 0+640
9	2632-08-C-104	3	SCR37 PLAN / PROFILE	STA 0+000 TO STA 0+640
10	2632-08-C-110	3	SCR34 PLAN	STA 0+000 TO STA 0+210
11	2632-08-C-111	3	SCR34 PLAN	STA 0+210 TO STA 0+400
12	2632-08-C-112	3	SCR34 PLAN / PROFILE	STA 0+000 TO STA 0+340
13	2632-08-C-301	3	SECTIONS	SCR34 AND SCR37
14	2632-08-C-501	3	DETAILS	

BC MINISTRY OF ENVIRONMENT AND PARKS

HATZIC EMERGENCY WORKS PROGRAM

SCR34 SOUTH HERFORD CREEK AND SCR37 NORTH HERFORD CREEK

PLOT DATE: 2025-04-30 11:48:15 AM
SAVE DATE: 2025-03-12 5:07:38 PM SAVED BY: SHINH
DWG PATH: q:\2022-2632-08_standards\c3d & drawing standards\2632-08-g-001.dwg

Associated Engineering

CANADA BEST MANAGED COMPANIES
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BRITISH COLUMBIA

BC MINISTRY OF ENVIRONMENT
AND PARKS
HATZIC EMERGENCY
WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

THE INFORMATION CONTAINED ON THESE DRAWINGS ORIGINATED FROM SOURCES OTHER THAN THE DESIGN PROFESSIONAL AND ASSOCIATED ENGINEERING GROUP LTD. DOES NOT WARRANT OR REPRESENT THAT SUCH INFORMATION IS ACCURATE OR REPRESENTS THE ORIGINAL DESIGN AS CONTAINED WITHIN THE CONTRACT DOCUMENTS.

REV	DATE	DESIGN	DRAWN	DESCRIPTION
3	2025MAY02	A. WIENS	H. SHIN	ISSUED FOR RECORD DRAWING
2	2024JUL10	A. WIENS	M. LEZON	ISSUED FOR CONSTRUCTION
1	2024MAR28	L. MEDINA	M. LEZON	ISSUED FOR RFP
0	2023DEC15	L. MEDINA	M. LEZON	ISSUED FOR REGULATORY PERMITTING

DRAWING	REVISION	SHEET
2632-08-G-001	3	1

IF NOT 50 mm ADJUST SCALES
50 mm

SCALE(S) SHOWN ARE INTENDED FOR ANSI D (22X34) SIZE DRAWINGS, TABLOID (11X17) SIZE DRAWINGS ARE 1/2 OF SCALE(S) SHOWN UNLESS NOTED OTHERWISE

ROAD

EXISTING	DESIGN	
	100+000	CONTROL LINE
		GRAVEL ROAD
		EDGE OF PAVEMENT
		CURB (ACTUAL WIDTH)
		SIDEWALK (ACTUAL WIDTH)
		CURB DEPRESSION
		GUIDE RAIL

PROFILE VIEW

EXISTING	DESIGN	
		GROUND
		WATER MAIN
		SANITARY SEWER
		STORM SEWER

SURVEY

EXISTING	DESIGN	
HUB		SURVEY HUB
MON		MONUMENT
IP		IRON PIN
IPF		IRON PIN (FOUND)
LP		LEAD PLUG
U		UNIDENTIFIED MANHOLE
MW		MONITORING WELL
PZ		PIEZOMETER
OW		OBSERVATION WELL

CONTOUR

EXISTING	DESIGN	
		MAJOR
		MINOR

PROPERTY

EXISTING	DESIGN	
		PARCEL / LOT LINE
		EASEMENT
		STATUTORY ROW
		ROAD ROW

GAS / OIL

EXISTING	DESIGN	
G	G	GAS
OIL	OIL	OIL
F	F	VAULT BOX
G	G	VALVE BOX
G	G	MANHOLE
G	G	METER

WATER

EXISTING	DESIGN	
W	W	WATER MAIN
F	F	FIRE SUPPRESSION
IR	IR	IRRIGATION
RW	RW	RAW WATER
PW	PW	POTABLE WATER
M	M	VAULT BOX
FH	FH	FIRE HYDRANT
W	W	MANHOLE
W	W	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
W	W	WELL
CS	CS	CURB STOP / CURB BOX

SANITARY SEWER

EXISTING	DESIGN	
SS	SS	SANITARY SEWER
FM	FM	SANITARY FORCEMAIN
COMB	COMB	SANITARY COMBINED SEWER
S	S	MANHOLE
CS	CS	COMBINED MANHOLE
VC	VC	VALVE CHAMBER
CO	CO	CLEANOUT
S	S	VALVE BOX
		FLOW DIRECTION
LS	LS	LIFT / PUMP STATION

COMMUNICATIONS / TELEPHONE

EXISTING	DESIGN	
CATV	CATV	CABLE
FO	FO	FIBRE OPTIC CABLE
T	T	TELEPHONE / LINE
UT	UT	UNDERGROUND TELEPHONE
C	C	COMMUNICATIONS VAULT BOX
T	T	TELEPHONE MANHOLE
T	T	TELEPHONE VAULT BOX
C	C	COMMUNICATIONS MANHOLE
T	T	TELEPHONE PEDESTAL

STORM DRAINAGE

EXISTING	DESIGN	
CP	CP	CULVERT (Ø AND TYPE)
D	D	STORM SEWER
CB	CB	CATCH BASIN
DCB	DCB	DOUBLE CATCH BASIN
DICB	DICB	DITCH INLET CATCH BASIN
CB	CB	CATCH BASIN / MANHOLE
LB	LB	LAWN BASIN
D	D	MANHOLE
STC	STC	STORMCEPTOR
OI	OI	OIL INTERCEPTOR
D	D	VALVE BOX
CI	CI	CULVERT INLET
CO	CO	CULVERT OUTLET
		HEADWALL
		DITCH FLOW

ELECTRICAL / POWER

EXISTING	DESIGN	
P	P	POWER / COMM / CONDUIT
OP	OP	OVERHEAD POWER
UP	UP	UNDERGROUND POWER
E	E	VAULT / HYDRO BOX
PB	PB	PULL BOX
J	J	JUNCTION BOX
TM	TM	TRANSFORMER VAULT MANHOLE
TP	TP	TRANSFORMER PAD
M	M	METER
E	E	MANHOLE
		LIGHT / LAMP STANDARD
		HYDRO / UTILITY POLE
		GUY WIRE
SIG	SIG	SIGNAL
SIG	SIG	SIGNAL WITH OVERHEAD ARM

MISCELLANEOUS

EXISTING	DESIGN	
X	X	FENCE
O	O	SILT FENCE
ABN		ABANDONED PIPE
		RAILWAY
		BOTTOM OF BANK
		TOP OF BANK
EW		EDGE OF WATER
		HEDGE
		BUILDING
		DITCH
		200 YEAR FLOOD EXTENTS
		ACCESS AND LAYDOWN AREA
		PROJECT EXTENTS
		PROJECT FOOTPRINT

MISCELLANEOUS

EXISTING	DESIGN	
MAXIMUS CREEK		CREEK (OVER 3 m WIDE) (WIDTH OF CREEK SHOWN TO SCALE)
TP	TP	TEST PIT
BH	BH	BORE HOLE
FP	FP	FLAG POLE
PM	PM	PARKING METER
MB	MB	MAILBOX
		BOULDER
		RAILWAY SIGNAL LIGHT
BO	BO	POST/BOLLARD (ANNOTATE AS REQUIRED)
		NO POST BARRIER / JERSEY BARRIER (SCALE AS REQUIRED)
		SIGN
		GATE
		BUSH
		TREE (DECIDUOUS) (SCALE AS REQUIRED)
		TREE (CONIFEROUS) (SCALE AS REQUIRED)
EL1000	100.000	SPOT ELEVATION
% 1 2	% 1 2	SLOPE
TITLE 200m N		GRID, CO-ORDINATE REGISTRATION

HATCH PATTERNS

- SEDIMENT REMOVAL
- BERM REPAIR
- EROSION PROTECTION
- DEBRIS REMOVAL
- CONSTRUCTION AREA
- EMBANKMENT REMOVAL

PLOT DATE: 2025-04-30 11:48:27 AM
SAVE DATE: 2025-03-14 10:13:34 AM SAVED BY: SHINH
DWG PATH: q:\2022\2632-08_standards\c3d & drawing standards\2632-08-g-002.dwg

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BC MINISTRY OF ENVIRONMENT AND PARKS

HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

SCALE: AS SHOWN

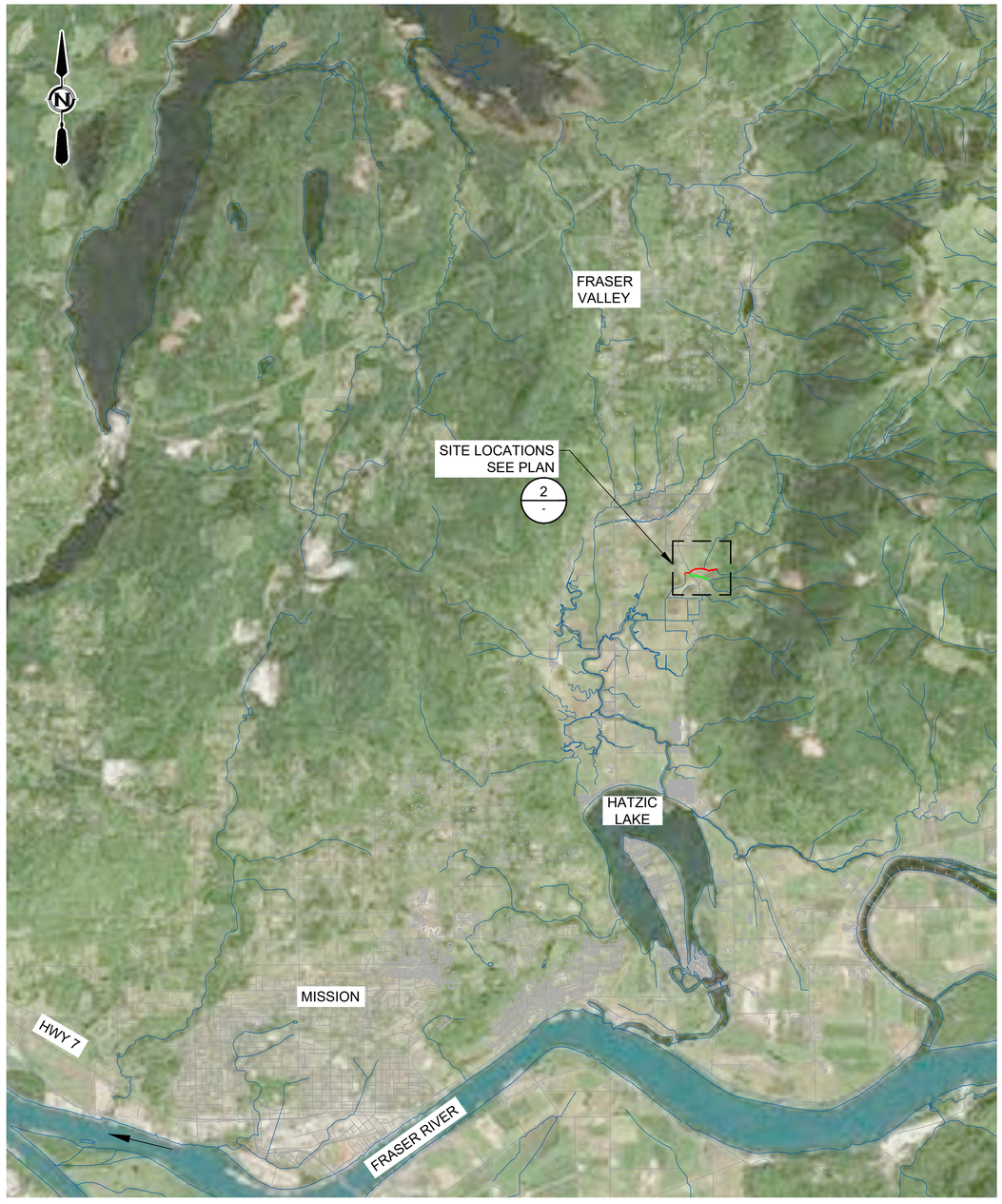
BRITISH COLUMBIA

GENERAL LEGEND

DRAWING	REVISION	SHEET
2632-08-G-002	3	2

IF NOT 50 mm ADJUST SCALES
50 mm

SCALE(S) SHOWN ARE INTENDED FOR ANSI D (22X34) SIZE DRAWINGS, TABLOID (11X17) SIZE DRAWINGS ARE 1/2 OF SCALE(S) SHOWN UNLESS NOTED OTHERWISE



1 - PLAN NTS



2 - PLAN 1:2000

PLOT DATE: 2025-04-30 11:48:58 AM
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DWG PATH: q:\20222-2632-08_standards\c3d & drawing standards\2632-08-g-003.dwg

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BC MINISTRY OF ENVIRONMENT AND PARKS

HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

SCALE: AS SHOWN

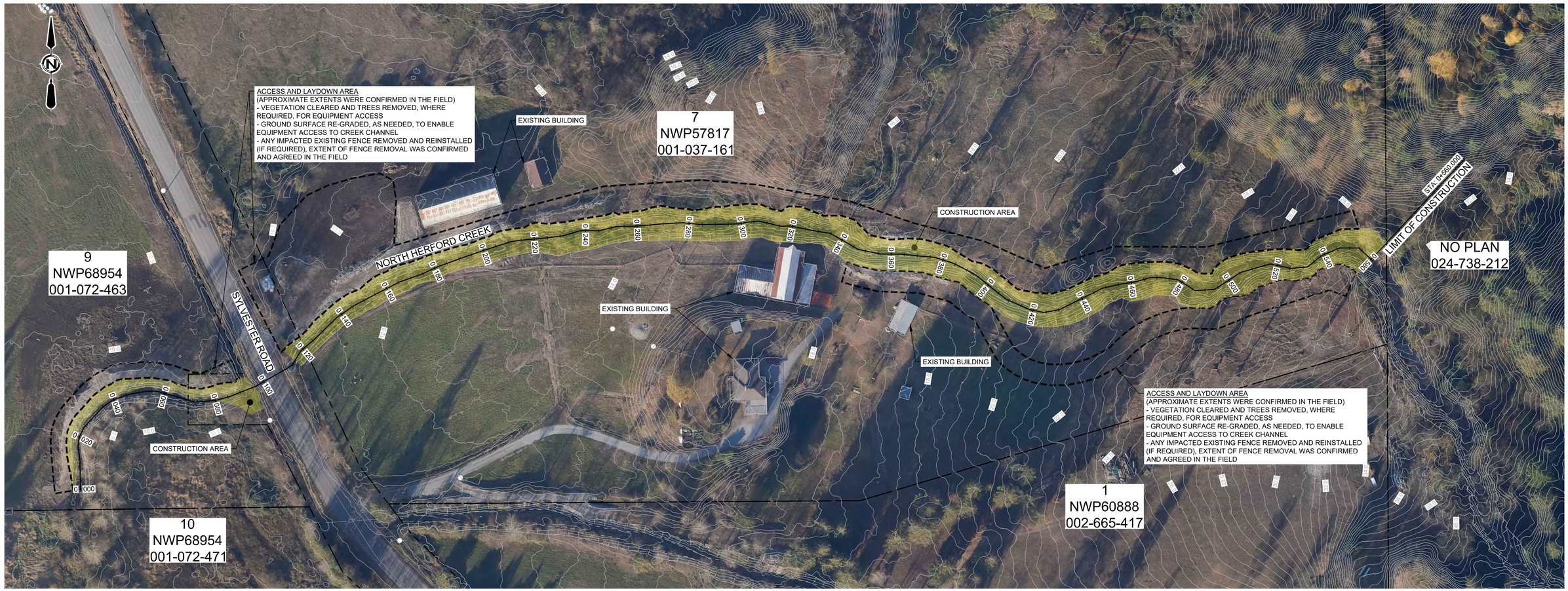
BRITISH COLUMBIA

GENERAL LOCATION PLAN
SCR34 AND SCR37

DRAWING	REVISION	SHEET
2632-08-G-003	3	3

IF NOT 50 mm ADJUST SCALES
50 mm

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PLOT DATE: 2025-04-30 11:50:05 AM
SAVE DATE: 2025-03-17 7:18:03 PM SAVED BY: SHINH
DWG PATH: q:\2022-2632-08_standards\c3d & drawing standards\2632-08-g-004.dwg

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BC MINISTRY OF ENVIRONMENT AND PARKS

HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

SCALE: 1:750

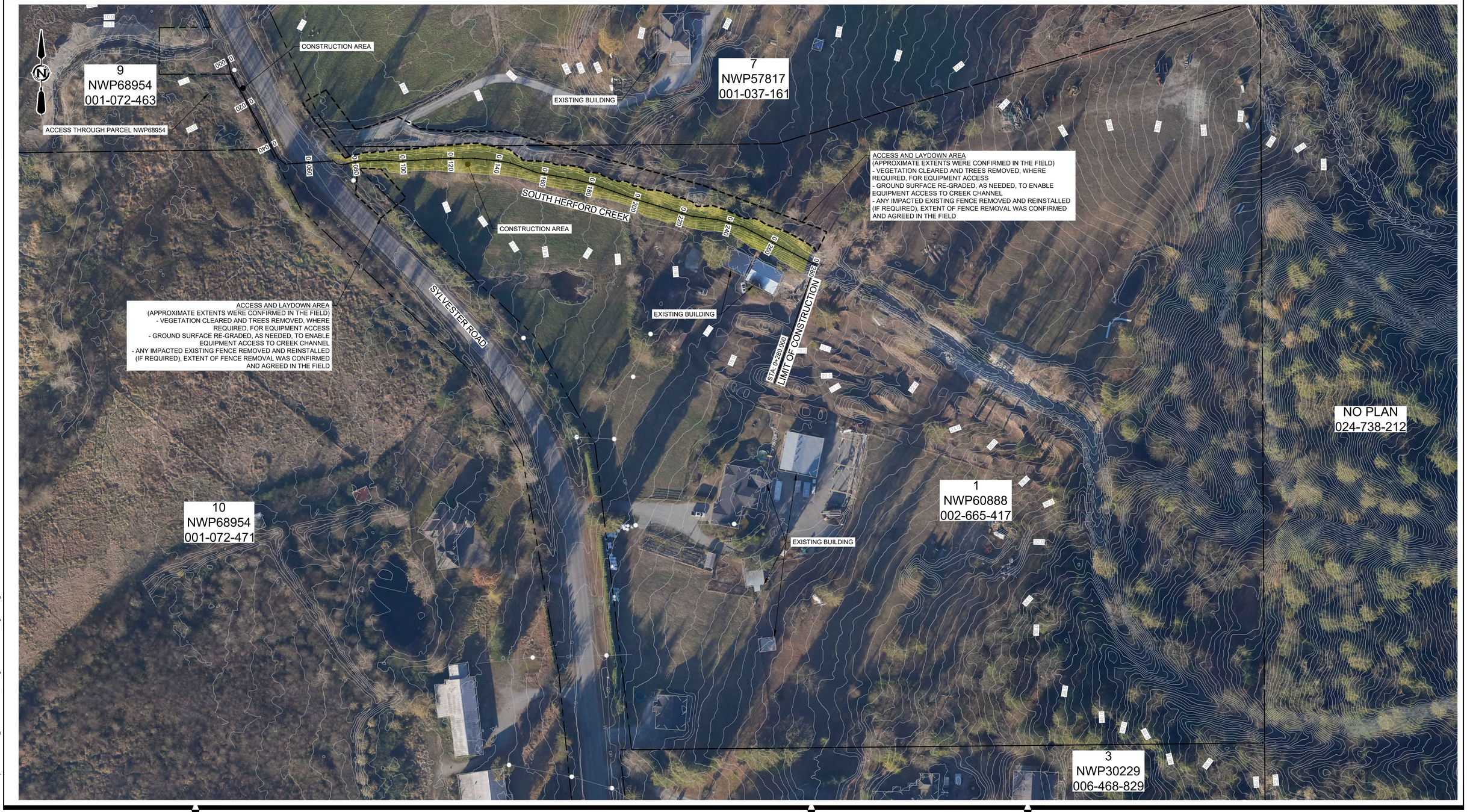
BRITISH COLUMBIA

GENERAL
SCR 37 PLAN
ACCESS AND LAYDOWN AREA

DRAWING	REVISION	SHEET
2632-08-G-004	3	4

IF NOT 50 mm ADJUST SCALES
50 mm

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SAVE DATE: 2025-03-17 7:36:16 PM SAVED BY: SHINH
DWG PATH: q:\2022\2632-08_standards\c3d & drawing standards\2632-08-g-005.dwg

Associated Engineering

BEST 5 MANAGED COMPANIES
Platinum member

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PERMIT NUMBER: 1000163
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BC MINISTRY OF ENVIRONMENT AND PARKS

HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

SCALE: 1:750

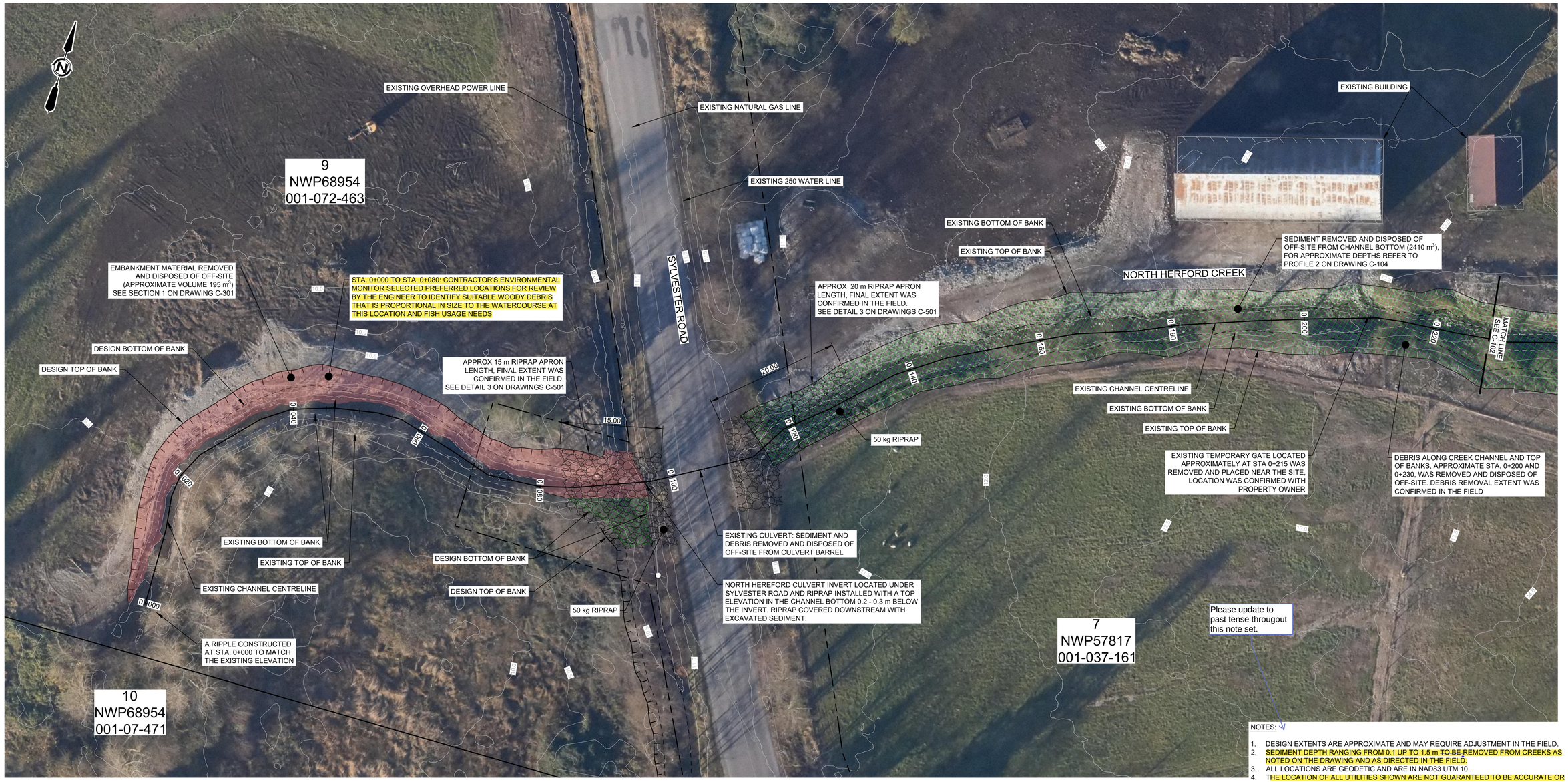
BRITISH COLUMBIA

GENERAL
SCR 34 PLAN
ACCESS AND LAYDOWN AREA

DRAWING	REVISION	SHEET
2632-08-G-005	3	5

IF NOT 50 mm ADJUST SCALES
50 mm

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NOTES:

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7. ALL DISTURBED AREAS TO BE TOPSOIL AND HYDROSEED.

PLOT DATE: 2025-04-30 11:52:20 AM
SAVE DATE: 2025-03-17 4:52:50 PM SAVED BY: SHINH
DWG PATH: o:\2022-2632-08\civil\model (for cad_civil3d only)\2632-08-c-101-103.dwg

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BC MINISTRY OF ENVIRONMENT AND PARKS

HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

SCALE: 1:300

BRITISH COLUMBIA

CIVIL
SCR37 PLAN
STA 0+000 TO STA 0+230

DRAWING	REVISION	SHEET
2632-08-C-101	3	6

IF NOT 50 mm ADJUST SCALES
50 mm

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PLOT DATE: 2025-04-30 11:52:44 AM
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BC MINISTRY OF ENVIRONMENT AND PARKS

HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

SCALE: 1:300

BRITISH COLUMBIA

CIVIL
SCR37 PLAN
STA 0+230 TO STA 0+450

DRAWING	REVISION	SHEET
2632-08-C-102	3	7

IF NOT 50 mm ADJUST SCALES
50 mm

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PLOT DATE: 2025-04-30 11:53:09 AM
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Platinum member

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BC MINISTRY OF ENVIRONMENT AND PARKS

HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

SCALE: 1:300

BRITISH COLUMBIA

CIVIL
SCR37 PLAN
STA 0+450 TO STA 0+640

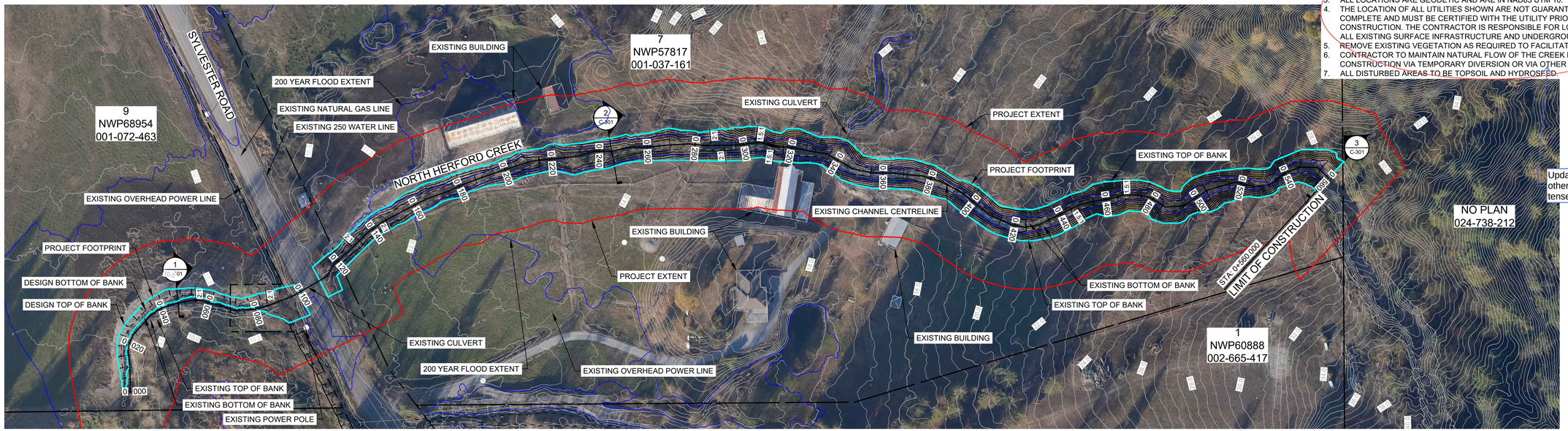
DRAWING	REVISION	SHEET
2632-08-C-103	3	8

IF NOT 50 mm ADJUST SCALES
50 mm

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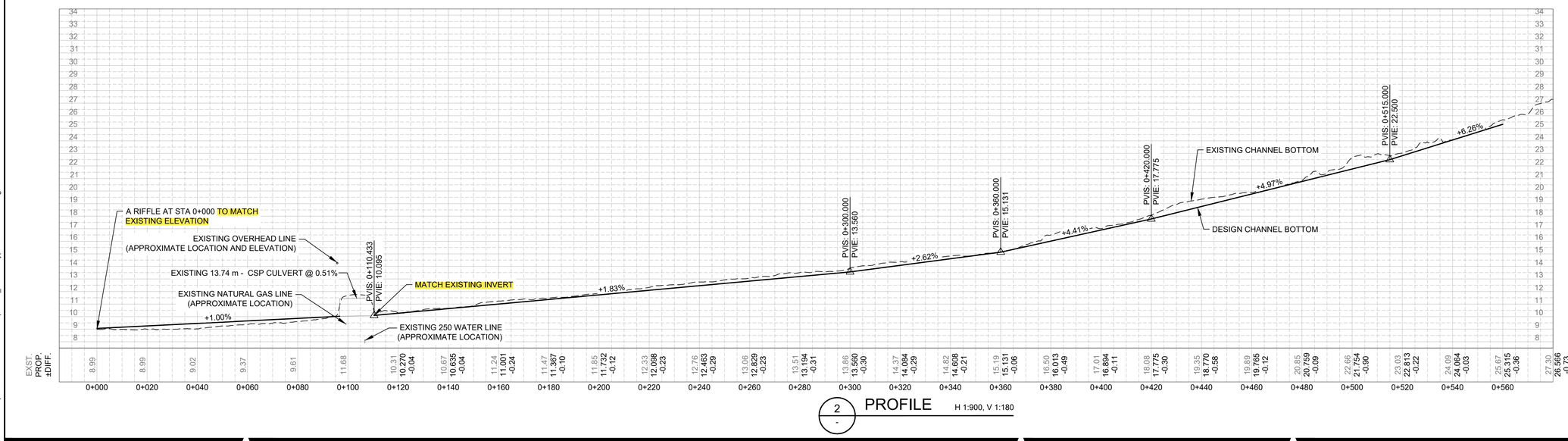
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1 / - PLAN 1:900

Update, similar to other pages. (Past tense.)



2 / - PROFILE H 1:900, V 1:180

PLOT DATE: 2025-04-30 11:54:57 AM
SAVE DATE: 2025-03-17 4:42:37 PM SAVED BY: SHINH
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BC MINISTRY OF ENVIRONMENT AND PARKS

HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

SCALE: AS SHOWN

BRITISH COLUMBIA

CIVIL
SCR37 PLAN / PROFILE
STA 0+000 TO STA 0+640

DRAWING	REVISION	SHEET
2632-08-C-104	3	9

IF NOT 50 mm ADJUST SCALES
50 mm

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PLOT DATE: 2025-04-30 11:55:59 AM
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BC MINISTRY OF ENVIRONMENT AND PARKS

HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

SCALE: 1:300

BRITISH COLUMBIA

CIVIL
SCR34 PLAN
STA 0+000 TO STA 0+210

DRAWING	REVISION	SHEET
2632-08-C-110	3	10

IF NOT 50 mm ADJUST SCALES
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PLOT DATE: 2025-04-30 11:56:33 AM
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DWG PATH: q:\2022\2632-08\civil\model (for cad_civil3d only)\2632-08-c-110-112.dwg

Associated Engineering

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REV	DATE	DESIGN	DRAWN	DESCRIPTION
3	2025MAY02	A. WIENS	H. SHIN	ISSUED FOR RECORD DRAWING
2	2024JUL10	A. WIENS	M. LEZON	ISSUED FOR CONSTRUCTION
1	2024MAR28	L. MEDINA	M. LEZON	ISSUED FOR RFP
0	2023DEC15	L. MEDINA	M. LEZON	ISSUED FOR REGULATORY PERMITTING

BC MINISTRY OF ENVIRONMENT AND PARKS

HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

SCALE: 1:300

BRITISH COLUMBIA

CIVIL
SCR34 PLAN
STA 0+210 TO STA 0+400

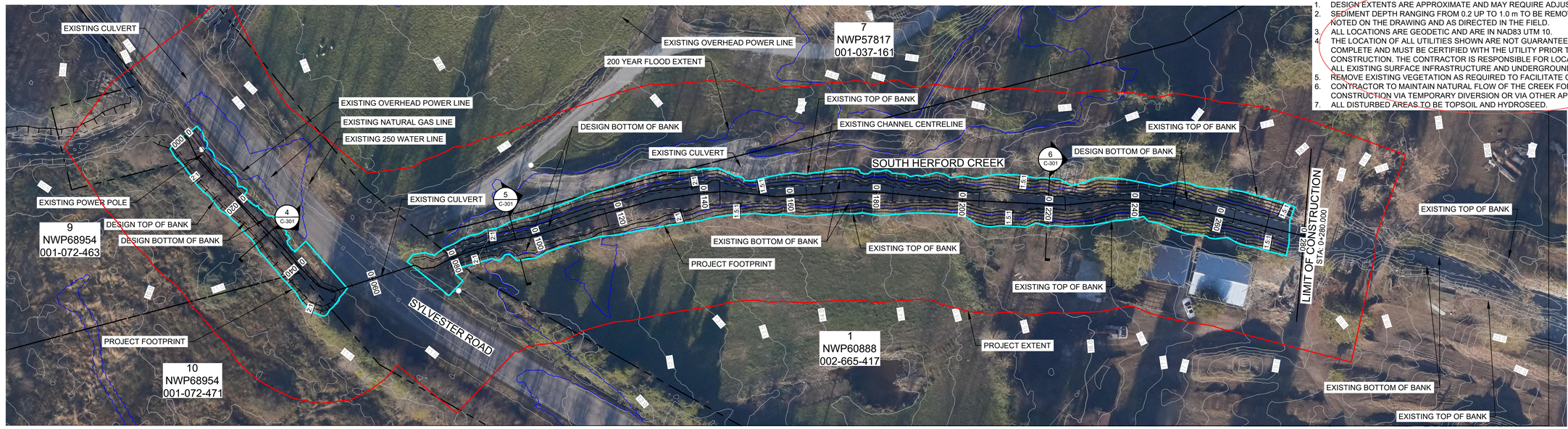
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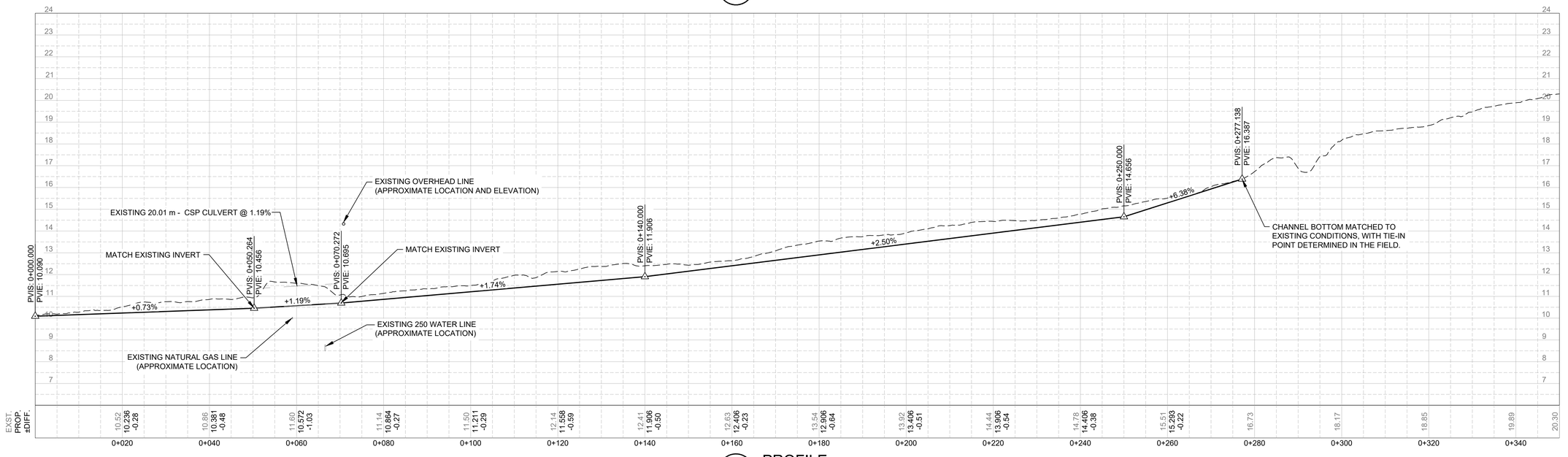
SCALE(S) SHOWN ARE INTENDED FOR ANSI D (22X34) SIZE DRAWINGS, TABLOID (11X17) SIZE DRAWINGS ARE 1/2 OF SCALE(S) SHOWN UNLESS NOTED OTHERWISE

NOTES:

1. DESIGN EXTENTS ARE APPROXIMATE AND MAY REQUIRE ADJUSTMENT IN THE FIELD.
2. SEDIMENT DEPTH RANGING FROM 0.2 UP TO 1.0 m TO BE REMOVED FROM CREEKS AS NOTED ON THE DRAWING AND AS DIRECTED IN THE FIELD.
3. ALL LOCATIONS ARE GEODETIC AND ARE IN NAD83 UTM 10.
4. 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 CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND CONFIRMING ALL EXISTING SURFACE INFRASTRUCTURE AND UNDERGROUND UTILITIES.
5. REMOVE EXISTING VEGETATION AS REQUIRED TO FACILITATE CONSTRUCTION.
6. CONTRACTOR TO MAINTAIN NATURAL FLOW OF THE CREEK FOR THE DURATION OF CONSTRUCTION VIA TEMPORARY DIVERSION OR VIA OTHER APPROVED METHODS.
7. ALL DISTURBED AREAS TO BE TOPSOIL AND HYDROSEED.



1 - PLAN 1:500



2 - PROFILE H 1:500, V 1:100

PLOT DATE: 2025-04-30 11:59:46 AM
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Platinum member

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ASSOCIATED ENGINEERING (B.C.) LTD.
PERMIT NUMBER: 1000163
Engineers & Geoscientists BC

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BC MINISTRY OF ENVIRONMENT AND PARKS

HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

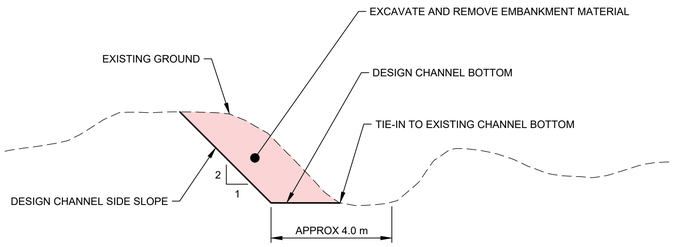
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BRITISH COLUMBIA

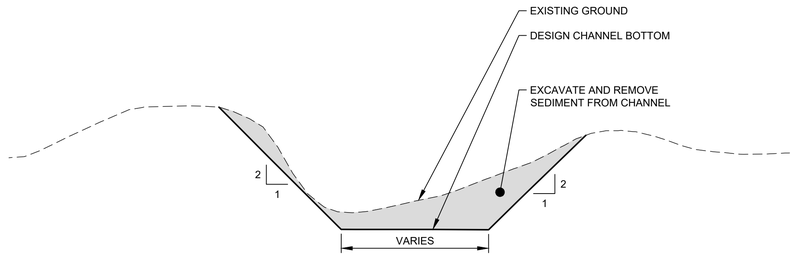
CIVIL
SCR34 PLAN / PROFILE
STA 0+000 TO STA 0+340

DRAWING	REVISION	SHEET
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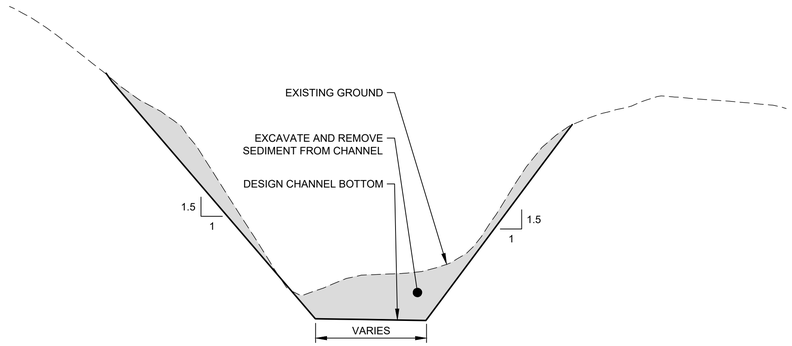
IF NOT 50 mm ADJUST SCALES
50 mm
SCALE(S) SHOWN ARE INTENDED FOR ANSI D (22X34) SIZE DRAWINGS, TABLOID (11X17) SIZE DRAWINGS ARE 1/2 OF SCALE(S) SHOWN UNLESS NOTED OTHERWISE



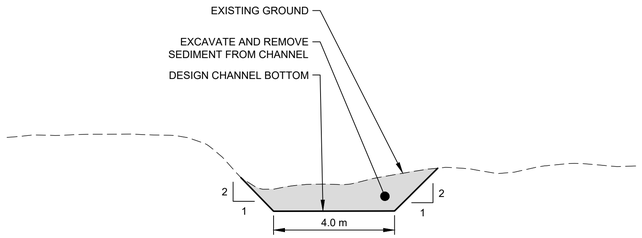
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SCR37 BETWEEN STA 0+000 AND 0+080



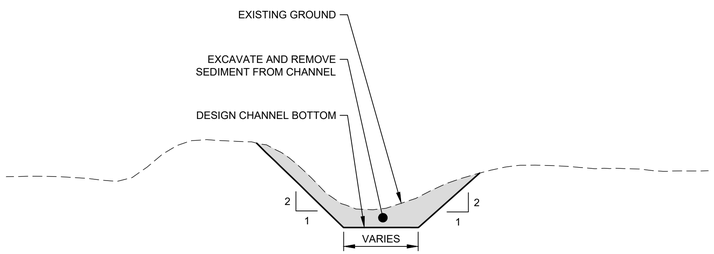
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SCR37 BETWEEN STA 0+115 AND 0+300



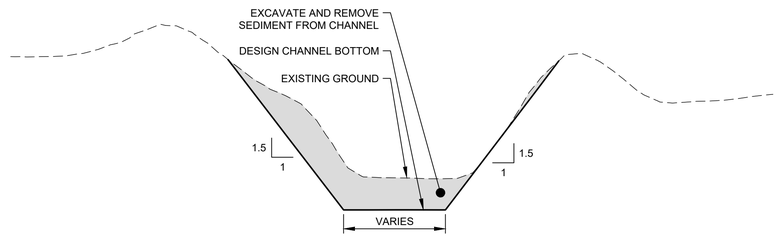
3 TYPICAL SECTION H 1:100, V 1:50
SCR37 BETWEEN STA 0+300 AND 0+560



4 TYPICAL SECTION H 1:100, V 1:50
SCR34 BETWEEN STA 0+000 AND 0+050



5 TYPICAL SECTION H 1:100, V 1:50
SCR34 BETWEEN STA 0+070 AND 0+140



6 TYPICAL SECTION H 1:100, V 1:50
SCR34 BETWEEN STA 0+140 TO 0+277.138

Suggest this is left as-is.

NOTES:

1. SEDIMENT REMOVAL AND CHANNEL ALTERATIONS TO HAVE FIELD-OVERSIGHT BY QUALIFIED ENGINEER AND QUALIFIED ENVIRONMENTAL PROFESSIONAL.
2. SEDIMENT DEPTH RANGING FROM 0.1 UP TO 1.5 m TO BE REMOVED FROM CREEKS AS NOTED ON THE DRAWING AND AS DIRECTED IN THE FIELD.

PLOT DATE: 2025-04-30 12:00:03 PM
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BC MINISTRY OF ENVIRONMENT AND PARKS

HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

SCALE: AS SHOWN

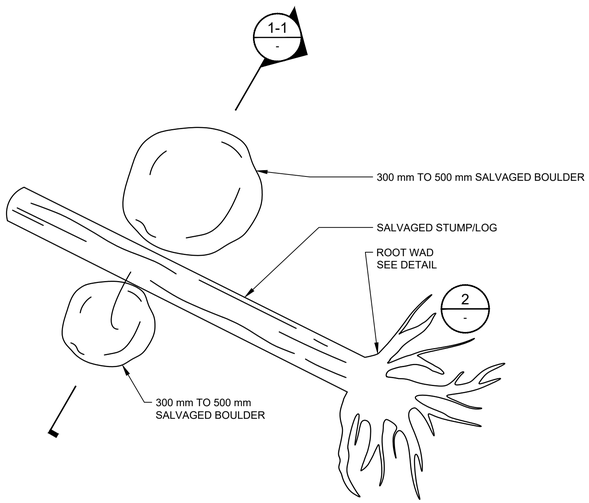
BRITISH COLUMBIA

CIVIL
SECTIONS
SCR34 AND SCR37

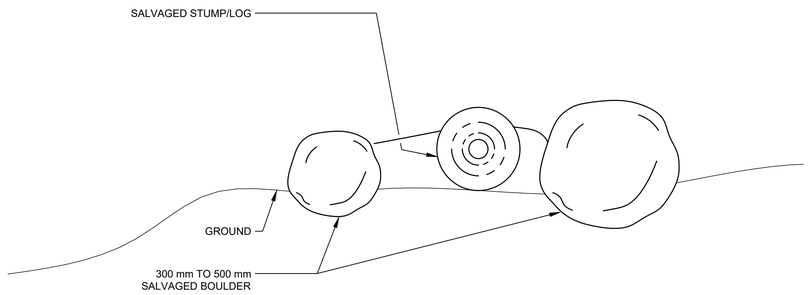
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IF NOT 50 mm ADJUST SCALES
50 mm

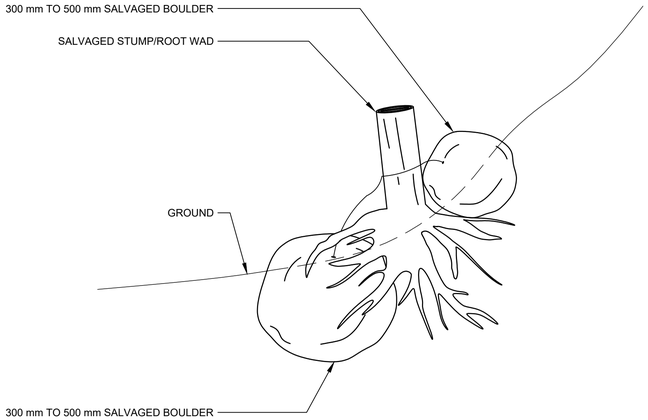
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1 TYPICAL DETAIL NTS
BOULDER CLUSTER



SECTION 1-1

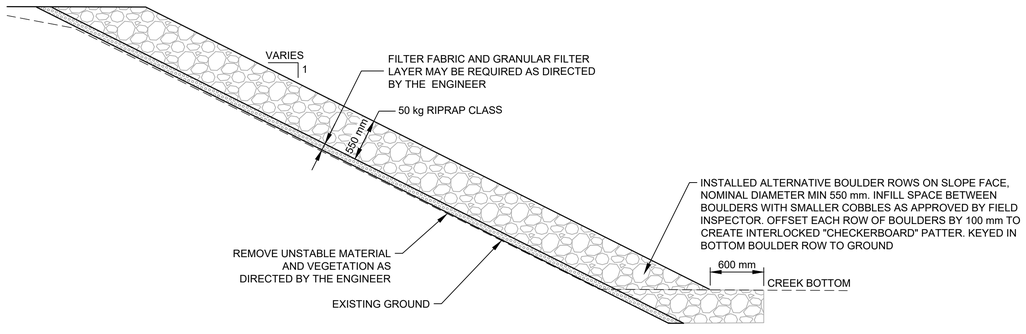


2 TYPICAL DETAIL NTS
ROOT WAD

Suggest these are left as is, as they are the directions that came with the typical details.

NOTES FOR TYPICAL DETAILS:

1. PLACEMENT OF HABITAT FEATURES:
   - 1.1. BOULDER CLUSTERS OR ROOT WAD SHOULD BE PLACED ADJACENT TO, OR PARTIALLY WITHIN, THE THALWEG. BOULDER CLUSTER OR ROOT WAD LOCATIONS TO BE CONFIRMED IN THE FIELD.
2. LARGE WOODY DEBRIS:
   - 2.1. LARGE WOODY DEBRIS SHALL BE COMPRISED OF MINIMUM 450 mm DIAMETER DOUGLAS-FIR OR SPRUCE LOG WITH BARK LEFT LARGELY INTACT AND ROOT WAD ATTACHED.
   - 2.2. LOGS SHALL BE 2.0 m TO 4.0 m IN LENGTH.
3. ROOT WAD:
   - 3.1. ROOT WADS SHALL PREFERABLY CONSIST OF DOUGLAS-FIR OR SPRUCE.
   - 3.2. ROOT WADS SHALL HAVE A MINIMUM ROOT MASS DIAMETER OF 2.0 m, WITH THE TRUNK CENTERED ON THE ROOT MASS.
   - 3.3. 20-30% OF THE ROOT MASS SHALL BE BURIED IN THE CHANNEL.
   - 3.4. ROOT WAD SHALL NOT EXTEND GREATER THAN 1/3 THE WIDTH OF THE STREAM CHANNEL.



3 TYPICAL SECTION NTS
EROSION PROTECTION

PLOT DATE: 2025-04-30 12:00:12 PM
SAVE DATE: 2025-03-17 4:01:12 PM SAVED BY: SHINH
DWG PATH: q:\2022\-2632-08\civil\model (for cad_civil3d only)\2632-08-c-501.dwg

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BC MINISTRY OF ENVIRONMENT AND PARKS

HATZIC EMERGENCY WORKS PROGRAM
SITES SCR34 AND SCR37
20222632-08 AND 11

SCALE: AS SHOWN

BRITISH COLUMBIA

CIVIL
DETAILS

DRAWING	REVISION	SHEET
2632-08-C-501	3	14

ENVIRONMENTAL MONITORING MEMORANDUM

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

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

DATE: 1 September 2024

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 – North Herford 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 a Raptor Survey, conducted on 19 August 2024 monitoring event, associated with the Hatzic Emergency Program – North Herford Creek Project (the 'project'; **Figure 1**).

Figure 1: Approximate Site Extents – identified in Red.



In July 2024, 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 – North Herford Creek Project, in Mission, BC.

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

Environmental Monitoring Summary

Date: 19 August 2024	
Time On & Off site:	10:00 – 12:10
Weather:	Cloudy 17°C
Precipitation:	No data (*Source: Environment Canada – Mission West Abbey*)
Environmental Monitor & QEP Supervisor:	Olga Grunlund & Chris Lee
Monitoring event description:	Raptor survey.

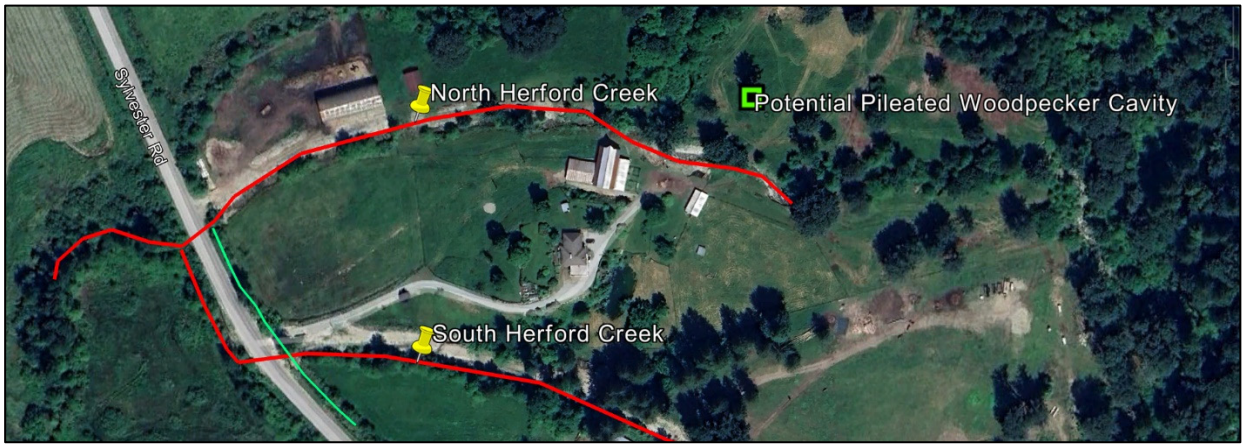
Environmental Monitoring Observations

10:00 | The Environmental Monitor (EM) arrived on site.

- During the site assessment of the South Herford Creek, the EM conducted a raptor survey, prior to proposed vegetation clearing / disturbance along the North Herford Creek. Note that minimal vegetation disturbance was proposed and no large trees were intended to be removed, as per the communications with the Site Superintendent.
- Standwatch surveys, as well as physical searches were conducted on both sides of North Herford creek.
- No raptor nests or raptor sign were observed within or adjacent to the project area.
- One (1) potential Pileated Woodpecker nesting cavity was noted approximately 30 m north from the creek (**Figure 2**). Note the cavity appears to be old and not used recent and was not in an area that was to be disturbed or requiring tree removal.
- A number of large Big-leaf Maples were noted adjacent to the creek.
- Tansy Ragwort was present on both sides of the creek.
- One (1) Great Blue Heron was foraging in the creek.

12:10 | EM left the site.

Figure 2: Potential Pileated Woodpecker nesting cavity, near the project area.



Monitoring Recommendations

1. Avoid removing mature trees along the creek, whenever possible. If any large trees are proposed for removal, additional survey may be required.
2. Avoid stockpiling material or staging / storing equipment near the potential Pileated Woodpecker cavity and do not remove the tree with potential woodpecker activity.
3. Remove Tansy Ragwort from the site prior to commencing vegetation clearing / grubbing. EM to confirm removal.

Photographs:

Photo 1: Tansy Ragwort present on both sides of the creek.



Photo 2: Large Maple Tree adjacent to the creek.



Photo 3: Potential Pileated Woodpecker nesting cavity.



Photo 4: Overview of the vegetation along the creek, near the eastern end of the project 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,



Olga Grunlund, EP, BC-CESCL
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: Paul Hague and Dianna Christopoulos
Associated Engineering
500-2889 E. 12 Avenue
Vancouver BC V5M 4T5

DATE: 1 September 2024

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 – North Herford Creek Project - AquaTerra Environmental Monitoring Memorandum #02

AquaTerra Environmental Ltd. ('AquaTerra') is pleased to provide Mission Contractors Ltd. ('Mission' Contractors') with this Environmental Monitoring Memorandum (the 'memo'), which includes a Raptor Survey, conducted on 23 August 2024 monitoring event, associated with the Hatzic Emergency Program – North Herford Creek Project (the 'project'; **Figure 1**).

Figure 1: Approximate Site Extents – identified in Red.



In July 2024, 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 – North Herford Creek Project, in Mission, BC.

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

Environmental Monitoring Summary

Date: 23 August 2024	
Time On & Off site:	08:20 – 10:00
Weather:	Intermittent rain 15°C
Precipitation:	No data (*Source: Environment Canada – Mission West Abbey*)
Environmental Monitor & QEP Supervisor:	Olga Grunlund & Chris Lee
Monitoring event description:	Environmental monitoring inspection and raptor survey on the west side of Sylvester Road.

Environmental Monitoring Observations

08:20 | The Environmental Monitor (EM) arrived on site.

- The flow bypass was set up, but not operational at the time of the monitoring event. Generator was positioned within a secondary containment tray.
- Large spill kit was present on site and fully stocked.
- Noxious Tansy Ragwort plants were observed; however, no ground disturbing works were occurring.
- Fish isolation fences had been installed at the upstream and downstream ends, for the upcoming fish salvage activities. The Contractor cleaned out accumulated material behind the fish isolation fences.
- No water quality issues were noted during this monitoring event. No instream, works were occurring.
- Appropriately sized screen was present around the pump intake.
- A raptor survey was conducted along North Herford Creek, on the west side of Sylvester Road. No nests were identified; however, small cavities (not suitable for Pileated Woodpeckers) were noted in snags – mainly along the left bank.

10:00 | EM left the site.

Monitoring Recommendations

1. Remove Tansy Ragwort from the site prior to commencing vegetation clearing / grubbing. EM to confirm removal.

Photographs:

Photo 1: Ransy Ragwort present within the project area.



Photo 2: Overview of the raptor survey area – west of Sylvester Road.



Photo 3: Fish screen in place at the downstream end.



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,



Olga Grunlund, EP, BC-CESCL
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: Paul Hague and Dianna Christopoulos
Associated Engineering
500-2889 E. 12 Avenue
Vancouver BC V5M 4T5

DATE: 15 September 2024

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 – North Herford Creek Project - AquaTerra Environmental Monitoring Memorandum #05

AquaTerra Environmental Ltd. ('AquaTerra') is pleased to provide Mission Contractors Ltd. ('Mission' Contractors') with this Environmental Monitoring Memorandum (the 'memo'), which includes a Raptor Survey, conducted on 07 September 2024 monitoring event, associated with the Hatzic Emergency Program – North Herford Creek Project (the 'project'; **Figure 1**).

Figure 1: Approximate Site Extents – identified in Red.



In July 2024, 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 – North Herford Creek Project, in Mission, BC.

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

Environmental Monitoring Summary

Date: 07 September 2024	
Time On & Off site:	14:00 – 15:10
Weather:	Sunny (27°C)
Precipitation:	No data (*Source: Environment Canada – Mission West Abbey*)
Environmental Monitor & QEP Supervisor:	Olga Grunlund & Chris Lee
Monitoring event description:	Environmental monitoring inspection.

Environmental Monitoring Observations

14:00 | The Environmental Monitor (EM) arrived on site.

- Bypass was in place and directing water around the work site. Discharge appeared clean and was directed in the channel, downstream of the work site. Pump intake was positioned within a fish screen box.
- Fish isolation fences were present at the upstream and downstream ends of the work site and functioning as intended.
- Two 2-inch pumps were noted at the downstream end of the work site, collecting and directing turbid water towards vegetation for infiltration. A minor amount of water was entering the ditch, and eventually into the creek, on the west side of the road.
- Water quality was tested on site. Background turbidity was 1.36 NTU. Turbidity at discharge from the temporary pipe, on the west side of Sylvester Road and north of the confluence of South and North Herford Creeks was 24.6 NTU. Turbidity in the North Hereford creek approximately 10 m downstream of the confluence, along the bank where slightly elevated water was noted was 5.36 NTU - compliant.
- One (1) Great Blue Heron and four (4) black bears (an adult with 3 cubs) were noted in the vicinity of the site and were not affected by construction activities.
- Large spill kit was present on site and stocked.

- Containment trays were observed under generators on site.
- No debris tracking was noted along the road.
- Excavated material from the creek was being stockpiled and spread directly north of the creek, in a designated area.

15:00 | Environmental Monitor left the site.

Monitoring Recommendations

- Release the trapped fish downstream of work site.

Photographs:

Photo 1: Bypass intake positioned within a screened pump intake.



Photo 2: Trapped fish in a small pool on site.



Photo 3: Overview of material removal from the creek.



Photo 4: Trash pumps were directing water to vegetation for infiltration. Looking west.



Photo 5: Overview of the confluence on the west side of 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,



Olga Grunlund, EP, BC-CESCL
Environmental Monitor
AquaTerra Environmental Ltd.

Digitally signed by Chris Lee
DN: cn=Chris Lee, o=AquaTerra Environmental Ltd., ou, email=chris@aquaterra.ca, c=CA
Date: 2024.09.15 15:06:20 -07'00'

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: Paul Hague and Dianna Christopoulos
Associated Engineering
500-2889 E. 12 Avenue
Vancouver BC V5M 4T5

DATE: 21 September 2024

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 – North Herford Creek Project - AquaTerra Environmental Monitoring Memorandum #06

AquaTerra Environmental Ltd. ('AquaTerra') is pleased to provide Mission Contractors Ltd. ('Mission' Contractors') with this Environmental Monitoring Memorandum (the 'memo'), which includes a Raptor Survey, conducted on 10 September 2024 monitoring event, associated with the Hatzic Emergency Program – North Herford Creek Project (the 'project'; **Figure 1**).

Figure 1: Approximate Site Extents – identified in Red.



In July 2024, 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 – North Herford Creek Project, in Mission, BC.

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

Environmental Monitoring Summary

Date: 10 September 2024	
Time On & Off site:	10:45 – 11:55
Weather:	Overcast (19^{o}C)
Environmental Monitor & QEP Supervisor:	Olga Grunlund & Chris Lee
Monitoring event description:	Environmental monitoring inspection.

Environmental Monitoring Observations

10:45 | The Environmental Monitor (EM) arrived on site.

- Background turbidity in the creek was 1.83 NTU and downstream of work site, on the west side of Sylvester Road, turbidity was 2.47 NTU. Turbidity was compliant with the CEMP and BC Water Quality Guidelines.
- Tansy Ragwort plants were observed in the next upstream section of the creek – upstream of the tributary. The Site Superintendent was notified of the locations and the recommendation to remove prior to ground disturbing activities in the area.
- The stream bypass was in place and functioning as intended. No scouring was observed at the discharge end.
- Pump intake was equipped with a fish screen. A fish screen was located downstream of the fish isolation fence and functioning as intended.
- Crew were working on grading the slopes per the engineering design. Weirs were in place.
- Large spill kit was available on site and stocked.
- Containment trays were present under pumps and generators on site.
- No leaks of drips were observed on site.
- No debris tracking was noted along Sylvester Road.
- Works on the west side of Sylvester Road were completed. No erosion or sedimentation issues were observed.

11:55 | The Environmental Monitor left the site.

Monitoring Recommendations

- Remove Tansy Ragwort plants and dispose of appropriately off site, prior to ground disturbance activities in the upstream section of the creek.

Photographs:

Photo 1: Bypass discharge at the downstream end of the work area.



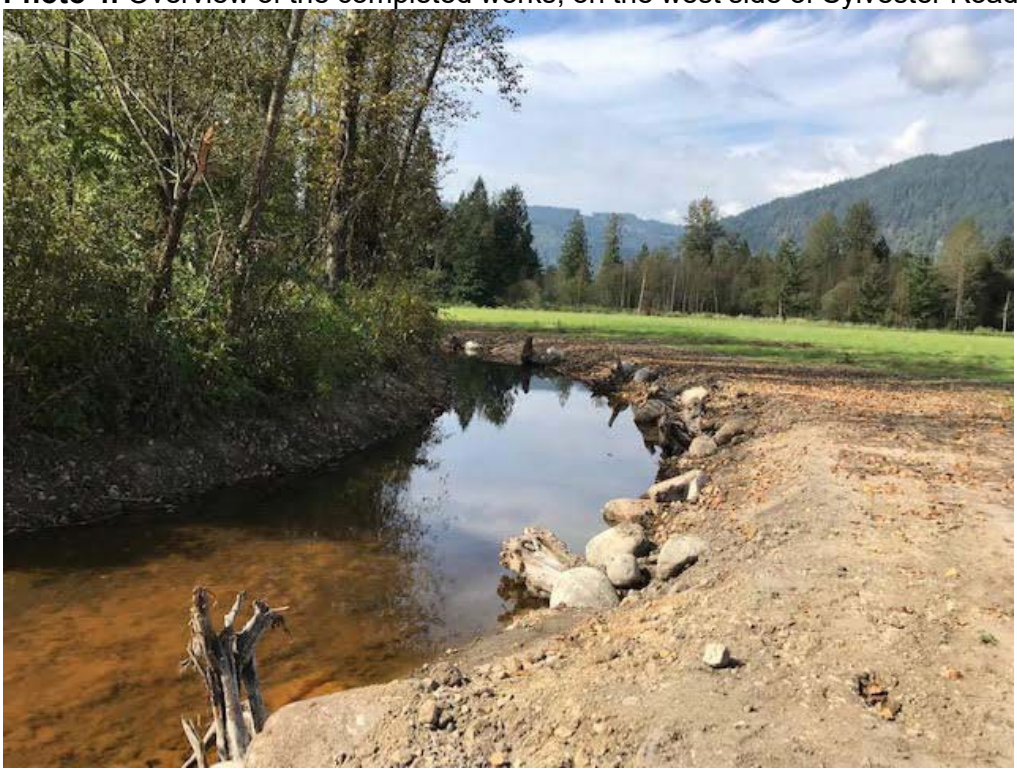
Photo 2: Active work area overview.



Photo 3: Sloping of the bank on the east side of Sylvester Road.



Photo 4: Overview of the completed works, on the west side of Sylvester 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,



Olga Grunlund, EP, BC-CESCL
Environmental Monitor
AquaTerra Environmental Ltd.

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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: Paul Hague and Dianna Christopoulos
Associated Engineering
500-2889 E. 12 Avenue
Vancouver BC V5M 4T5

DATE: 21 September 2024

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 – North Herford Creek Project - AquaTerra Environmental Monitoring Memorandum #07

AquaTerra Environmental Ltd. ('AquaTerra') is pleased to provide Mission Contractors Ltd. ('Mission' Contractors') with this Environmental Monitoring Memorandum (the 'memo'), which includes a Raptor Survey, conducted on 12 September 2024 monitoring event, associated with the Hatzic Emergency Program – North Herford Creek Project (the 'project'; **Figure 1**).

Figure 1: Approximate Site Extents – identified in Red.



In July 2024, 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 – North Herford Creek Project, in Mission, BC.

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

Environmental Monitoring Summary

Date: 12 September 2024	
Time On & Off site:	09:35 – 12:00
Weather:	Overcast (19°C)
Environmental Monitor & QEP Supervisor:	Olga Grunlund & Chris Lee
Monitoring event description:	Environmental monitoring inspection.

Environmental Monitoring Observations

09:35 | The Environmental Monitor (EM) arrived on site.

- A fish salvage was underway (by others). No instream works were occurring.
- Bypass was set up but not operational until the fish salvage was completed.
- A large spill kit remained on site and fully stocked.
- Containment trays were observed under parked equipment, a generator and a pump. No environmental issues were noted.
- Background turbidity in the creek was 2.31 NTU and downstream of the work site, turbidity was 1.14 NTU. Both were compliance with the CEMP and BC Water Quality Guidelines.
- No debris tracking was noted off site. The road remained clear of debris.
- No fugitive dust issues were noted during the monitoring event.
- Nine (9) plastic bags containing Tansy Ragwort from the previous section were disposed of off site, at Mission Landfill, as per the Site Superintendent.
- EM and the Contractor removed the previously identified Tansy Ragwort within the work area upstream of the tributary. The noxious plants were bagged for later disposal off site.
- Excavated material from the creek was stockpiled within the laydown area. No erosion or sedimentation issues were observed around the stockpile. No sediment migration was observed towards the nearby ditch, north of the creek.

12:00 | The Environmental Monitor left the site.

Monitoring Recommendations

- Ensure that removed Tansy Ragwort plants are disposed of appropriately off site.

Photographs:

Photo 1: Fish fences and bypass intake overview at the upstream end of the work site.



Photo 2: Containment tray under parked equipment.



Photo 3: Overview of the project area, west of Sylvester Road.



Photo 4: No sediment migration noted towards the ditch (blue line) from the stockpiled material within the 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,



Olga Grunlund, EP, BC-CESCL
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: Paul Hague and Dianna Christopoulos
Associated Engineering
500-2889 E. 12 Avenue
Vancouver BC V5M 4T5

DATE: 21 September 2024

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 – North Herford Creek Project - AquaTerra Environmental Monitoring Memorandum #08

AquaTerra Environmental Ltd. ('AquaTerra') is pleased to provide Mission Contractors Ltd. ('Mission' Contractors') with this Environmental Monitoring Memorandum (the 'memo'), which includes a Raptor Survey, conducted on 13 September 2024 monitoring event, associated with the Hatzic Emergency Program – North Herford Creek Project (the 'project'; **Figure 1**).

Figure 1: Approximate Site Extents – identified in Red.



In July 2024, 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 – North Herford Creek Project, in Mission, BC.

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

Environmental Monitoring Summary

Date: 13 September 2024	
Time On & Off site:	14:05 – 15:15
Weather:	Overcast (16°C)
Environmental Monitor & QEP Supervisor:	Olga Grunlund & Chris Lee
Monitoring event description:	Environmental monitoring inspection.

Environmental Monitoring Observations

14:05 | The Environmental Monitor (EM) arrived on site.

- A full stream bypass was in place and functioning as intended.
- The pump intake was equipped with a fish screen. No water quality issues were noted at the discharge end. A small diffuser was noted on the discharge end of the bypass.
- Fish screens were present at the upstream and downstream ends of the active work site and functioning as intended.
- Tansy Ragwort plants, previously identified and shown to the Site Superintendent, were removed and bagged for later disposal at a designated facility. The EM confirmed no more noxious plants were present in the work area.
- Jerry can and generators were positioned within a containment tray. Minor water was present in the tray. No hydrocarbon seen was observed.
- Large spill kit was present at the site and fully stocked.
- Fish mortality was noted in the dewatered portion of the channel, upstream of active work area – due to incomplete salvage, by others.
- Minor debris tracking was noted along the road.
- No water quality issues noted within the channel.
- Drip trays were noted under parked equipment on site.

15:15 | Environmental Monitor left the site.

Monitoring Recommendations

1. Ensure that removed Tansy Ragwort plants are disposed of appropriately off site.
2. Sweep tracked debris from the road by the end of the day.

Photographs:

Photo 1: Drip tray placed under parked equipment.



Photo 2: Jerry can and pump positioned within a containment tray.



Photo 3: Bagged Tansy Ragwort.



Photo 4: Overview of the downstream end of the work area.



Photo 5: Some salmonid mortalities were found in the channel after a completed fish salvage, by others.



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,



Olga Grunlund, EP, BC-CESCL
Environmental Monitor
AquaTerra Environmental Ltd.

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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: Paul Hague and Dianna Christopoulos
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500-2889 E. 12 Avenue
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DATE: 21 September 2024

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

Subject: Hatzic Emergency Program – North Herford Creek Project - AquaTerra Environmental Monitoring Memorandum #09

AquaTerra Environmental Ltd. ('AquaTerra') is pleased to provide Mission Contractors Ltd. ('Mission' Contractors') with this Environmental Monitoring Memorandum (the 'memo'), which includes a Raptor Survey, conducted on 16 September 2024 monitoring event, associated with the Hatzic Emergency Program – North Herford Creek Project (the 'project'; **Figure 1**).

Figure 1: Approximate Site Extents – identified in Red.



In July 2024, 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 – North Herford Creek Project, in Mission, BC.

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

Environmental Monitoring Summary

Date: 16 September 2024	
Time On & Off site:	09:40 – 10:25
Weather:	Sunny (19°C)
Environmental Monitor & QEP Supervisor:	Olga Grunlund & Chris Lee
Monitoring event description:	Environmental monitoring inspection.

Environmental Monitoring Observations

09:40 | The Environmental Monitor (EM) arrived on site.

- The Bypass remained in place. No change in location or operation was observed. No environmental issues were noted.
- No water quality issues were noted at the downstream end of the work area.
- The background turbidity in the creek was 0.48 NTU and downstream turbidity on the west side of Sylvester Road was 0.99 NTU. Both turbidity measurements were compliant with the CEMP and BC Water Quality Guidelines.
- Crew were working on installing rip rap along a section of the creek. No environmental issues were noted.
- Fish fences remained installed upstream and downstream of the work area and were functioning as intended.
- Pumps and generators remained in containment trays. No drips or leaks were observed at the time of the monitoring event.
- Minor debris tracking was noted on the road.
- A large spill kit remained on site and fully stocked.
- Silt fence was noted on site, and was functioning as intended.
- No sediment migration / erosion was observed around the stockpiled material within the laydown area.

10:25 | The Environmental Monitor left the site.

Monitoring Recommendations

- Sweep debris tracked onto Sylvester Road.

Photographs:

Photo 1: Overview of rip rap location in the creek.



Photo 2: Pump positioned within a containment tray.



Photo 3: Large spill kit present on site.



Photo 4: Debris tracking on 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,



Olga Grunlund, EP, BC-CESCL
Environmental Monitor
AquaTerra Environmental Ltd.

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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: Paul Hague and Dianna Christopoulos
Associated Engineering
500-2889 E. 12 Avenue
Vancouver BC V5M 4T5

DATE: 29 September 2024

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 – North Herford Creek Project - AquaTerra Environmental Monitoring Memorandum #10

AquaTerra Environmental Ltd. ('AquaTerra') is pleased to provide Mission Contractors Ltd. ('Mission' Contractors') with this Environmental Monitoring Memorandum (the 'memo'), which includes a Raptor Survey, conducted on 19 September 2024 monitoring event, associated with the Hatzic Emergency Program – North Herford Creek Project (the 'project'; **Figure 1**).

Figure 1: Approximate Site Extents – identified in Red.



In July 2024, 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 – North Herford Creek Project, in Mission, BC.

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

Environmental Monitoring Summary

Date: 19 September 2024	
Time On & Off site:	09:40 – 10:45
Weather:	Sunny (18°C)
Environmental Monitor & QEP Supervisor:	Olga Grunlund & Chris Lee
Monitoring event description:	Environmental monitoring inspection.

Environmental Monitoring Observations

09:40 | The Environmental Monitor (EM) arrived on site.

- A large spill kit was noted on site and fully stocked.
- Minor debris tracking was observed along Sylvester Road.
- Background turbidity was 0.23 NTU. Turbidity downstream of the confluence was 1.13 NTU [COMPLIANT].
- Stockpiled material remained present within the laydown area. No erosion or sedimentation issues were noted during this monitoring event.
- Six-inch bypass remained in place, directing clean water around the site. Pump intake was positioned inside a fish screen. Downstream end was equipped with a small diffuser. No scouring was observed at the downstream end of the active work area.
- Fish fences remained installed at the upstream and downstream ends of the work area.
- Sitl fence remained present on site.
- On the upstream end of the foot bridge, approximately 2 - 3-foot drop was observed.
- Excavator was loading the removed woody debris off site. Large round rock was being stockpiled on site.

10:45 | Environmental Monitor left the site.

Monitoring Recommendations

- Sweep debris tracked onto Sylvester Road.

Photographs:

Photo 1: Gradient change on the upstream end of the foot bridge.



Photo 2: Overview of the installed weirs.



Photo 3: Woody debris removed from site.



Photo 4: Overview of the work area – looking west.



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,



Olga Grunlund, EP, BC-CESCL
Environmental Monitor
AquaTerra Environmental Ltd.

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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: Paul Hague and Dianna Christopoulos
Associated Engineering
500-2889 E. 12 Avenue
Vancouver BC V5M 4T5

DATE: 29 September 2024

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 – North Herford Creek Project - AquaTerra Environmental Monitoring Memorandum #11

AquaTerra Environmental Ltd. ('AquaTerra') is pleased to provide Mission Contractors Ltd. ('Mission' Contractors') with this Environmental Monitoring Memorandum (the 'memo'), which includes a Raptor Survey, conducted on 20 September 2024 monitoring event, associated with the Hatzic Emergency Program – North Herford Creek Project (the 'project'; **Figure 1**).

Figure 1: Approximate Site Extents – identified in Red.



In July 2024, 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 – North Herford Creek Project, in Mission, BC.

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

Environmental Monitoring Summary

Date: 20 September 2024	
Time On & Off site:	07:30 – 10:00
Weather:	Sunny (17°C)
Environmental Monitor & QEP Supervisor:	Olga Grunlund & Chris Lee
Monitoring event description:	Environmental monitoring inspection.

Environmental Monitoring Observations

07:30 | The Environmental Monitor (EM) arrived on site.

- Background turbidity in the creek was 0.55 NTU. At the confluence, on the west side of Sylvester Road, turbidity was 1.66 NTU [COMPLIANT].
- Previously observed 2-3 foot grade difference on the upstream end of the foot bridge had been re-shaped.

07:50 | Bypass pump was turned off and re-watering of the creek, between the upstream end and the tributary confluence, commenced with the EM on-site.

- Water was slowly flowing downstream from the pump intake. Some water was flowing subsurface. Similar to the pre-works condition, where some areas appeared dry (on surface), subsurface flow was present contributing to downstream flows.
- Approximately 50 to 70 m downstream of the bypass pump intake, much of the surface flow disappeared; however, water continued flowing subsurface.

09:30 | Water quality in the creek, where water entered subsurface, was 4.88 NTU [COMPLIANT].

- Minor bank work was occurring on the South Herford Creek. Excavator was pulling material back (i.e., creating a more gradual slope) as per the design. No water quality issues were observed at the time of the monitoring event.
- EM observed some refuse, such as coffee cups, collected near the portable toilet.
- The road was clear of debris.
- Large spill kit remained on site.

10:00 | Environmental Monitor left the site.

Monitoring Recommendations

- Remove refuse from site prior to demobilization.

Photographs:

Photo 1: Re-shaped grade difference upstream of the foot bridge.



Photo 2: Clean water was flowing downstream, shortly after the bypass was turned off.



Photo 3: Access road on the south side of the creek.



Photo 4: Flow entering subsurface.



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,



Olga Grunlund, EP, BC-CESCL
Environmental Monitor
AquaTerra Environmental Ltd.

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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: Paul Hague 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

DATE: 21 August 2024

Subject: Hatzic Emergency Program – South Herford 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 – South Herford Creek Project (the 'project'; **Figure 1**).

Figure 1: Approximate Site Extents – identified in Red.



In July 2024, 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 – South Herford Creek 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: 12 August 2024	
Time On & Off site:	10:30 – 13:10
Weather:	Sunny (16.8°C)
Precipitation:	0.0 mm (*Source: Environment Canada – Mission West Abbey*)
Environmental Monitor & QEP Supervisor:	Olga Grunlund & Chris Lee
Monitoring event description:	Follow up bird survey and environmental monitoring event.

Environmental Monitoring Observations

10:30 | Environmental Monitor (EM) arrived on site.

- A final bird nesting survey was completed within and adjacent to the project area.
- Provincially noxious invasive vegetation (i.e., Tansy Ragwort) was identified on-site. Plants were flowering but not seeding. The observation was communicated to the site superintendent. The contractor pulled the plants (with the root) and bagged for proper disposal off site. The EM assessed the site, to ensure Tansy Ragwort plants were removed prior to commencing clearing / ground disturbance activities.
- A bypass pump, hoses and fish screen (for the intake) were present on site, but not yet deployed. Additional pumps were available for directing turbid water to vegetated area for infiltration, if required.
- Fish salvage crew was on site (to be completed by Leq'á:mel First Nation). Isolation fences had been installed.
- A large spill kit was present on site.
- Grubbing and vegetation removal (consisting of mostly Himalayan Blackberry and herbaceous plants) commenced while the EM was on site. No issues were observed or anticipated. No instream works were to occur until the bypass was in place and fish salvage completed.

13:10 | The EM departed the site.

Monitoring Recommendations

1. Ensure that bypass is in place prior to commencing instream works.
2. Dispose removed and bagged noxious weeds at a designated facility.

Photographs

Photo 1: Overview of the creek at the upstream end of works.



Photo 2: Removal and bagging of Tansy Ragwort.



Photo 3: Large spill kit noted on site.



Photo 4: Removal of vegetation along the creek.



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,

Olga Grunlund

Olga Grunlund, EP, BC-CESCL
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: Paul Hague and Dianna Christopoulos
Associated Engineering
500-2889 E. 12 Avenue
Vancouver BC V5M 4T5

DATE: 21 August 2024

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

Subject: Hatzic Emergency Program – South Herford 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 – South Herford Creek Project (the 'project'; **Figure 1**). This memo covers songbird nesting surveys on 07 & 09 August 2024 and environmental monitoring events on 13, 15 and 17 August 2024.

Figure 1: Approximate Site Extents – identified in Red.



In July 2024, 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 – South Herford Creek Project, in Mission, BC.

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

Bird Nest Survey Summary

Date: 07 August 2024	
Time On & Off site:	06:20 – 08:00
Weather:	Sun 14°C (High 29 °C / Low 16°C)
Precipitation:	0.0 mm (*Source: Environment Canada – Mission West Abbey*)
Environmental Monitor & QEP Supervisor:	Nicole Chin, Payton Bayly & Chris Lee
Monitoring event description:	Pre-disturbance bird survey.

Bird Nest Survey Observations

06:20 | The biologists arrived on site.

- A two-person bird survey was conducted within and adjacent to the project area, from STA 0+480 to 0+280.
- Minimal bird activity was observed in the survey area. A summary of the bird activity and observations is provided below.

07 August 2024		
Survey Areas:	South Herford Creek (**Figure 1**).	Personnel: Nicole Chin, Payton Bayly
Weather: Sun	Time: 06:20 – 08:00	Temp: 14°C (high 29°C /low 16°C)
Observations:	Steller's Jay (*Cyanocitta stelleri*)	2 – Perched and calling
	American Crow (*Corvus brachyrhynchos*)	2 – Flying over
	Common Raven (*Corvus corax*)	1 – Flying over

Summary: Minimal bird activity was noted in the trees and the areas adjacent to the survey area. No nests were located and no bird nesting behavior was observed.

08:00 | The biologists departed the site.

Photographs

Photo 1: Overview of the creek at the upstream end of works.

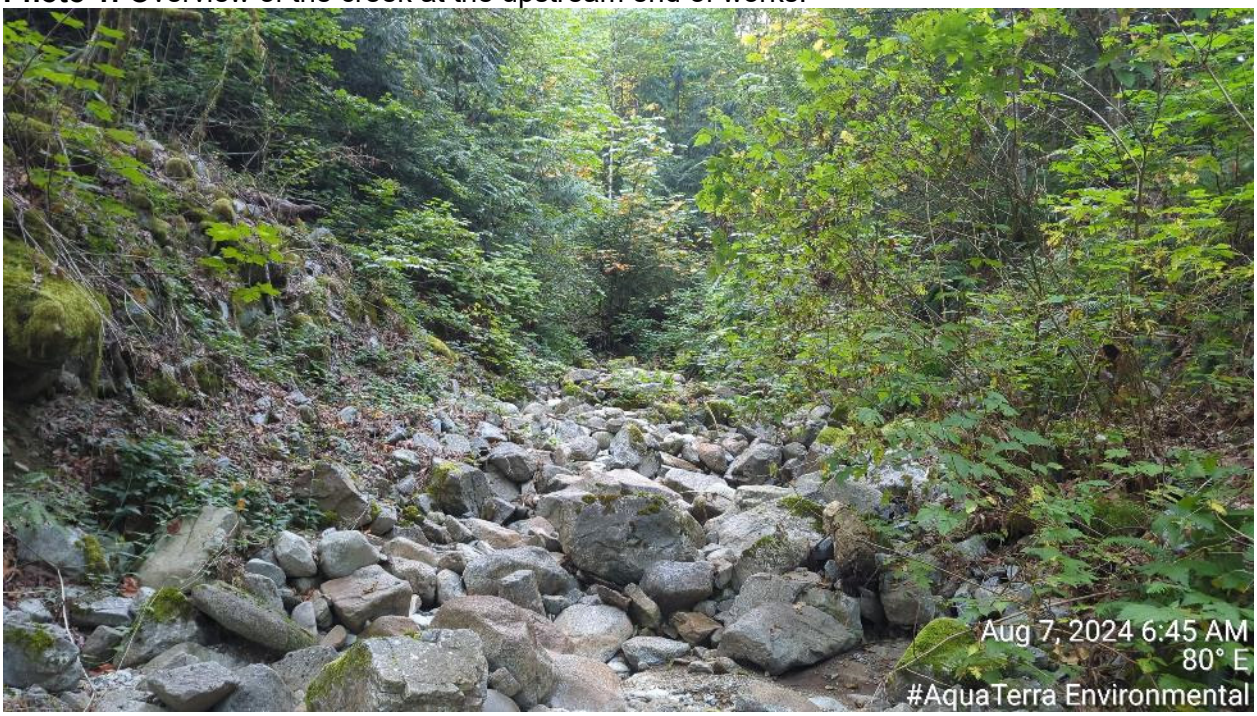


Photo 2: Site conditions at the downstream reach.



Bird Nest Survey Summary

Date: 09 August 2024	
Time On & Off site:	08:02 – 09:30
Weather:	Sun 19 °C (High 31°C / Low 16°C)
Precipitation:	0.0 mm (*Source: Environment Canada – Mission West Abbey*)
Environmental Monitor & QEP Supervisor:	Nicole Chin, Olga Grunlund & Chris Lee
Monitoring event description:	Pre-disturbance bird survey.

Bird Nest Survey Observations

08:02 | The biologists arrived on site.

- A two-person bird survey was conducted within and adjacent to the project area, from STA 0+280 to 0+000.
- The EM noted 'low' bird activity in the survey area. A summary of the bird activity and observations is provided below.

09 August 2024		
Survey Areas:	South Herford Creek (**Figure 1**).	Personnel: Nicole Chin, Olga Grunlund
Weather: Sun	Time: 08:02 – 09:30	Temp: 19°C (high 31°C /low 16°C)
Observations:	European Starling (*Sturnus vulgaris*)	2 – Perched and calling
	Cedar Waxwing (*Bombycilla cedrorum)*	2 – Foraging
	Black-capped Chickadee (*Poecile atricapillus*)	3 – Foraging
	Northern Flicker (*Colaptes auratus*)	1 – Perched and calling
	White crowned Sparrow (*Zonotrichia leucophrys*)	3 - Foraging
	Pine Siskin (*Spinus pinus*)	2 – Perched and calling
	American Robin (*Turdus migratorius*)	2 - Foraging

Summary: One (1) White crowned Sparrow was observed holding food by the wooden gate in the blackberry bushes; monitors were unable to determine if the individual was delivering food or foraging. One (1) inactive American Robin nest was in the rafters of the barn adjacent to the creek. No bird nests were located.

09:30 | The biologists departed the site.

Photographs

Photo 3: Site conditions at the upstream reach.

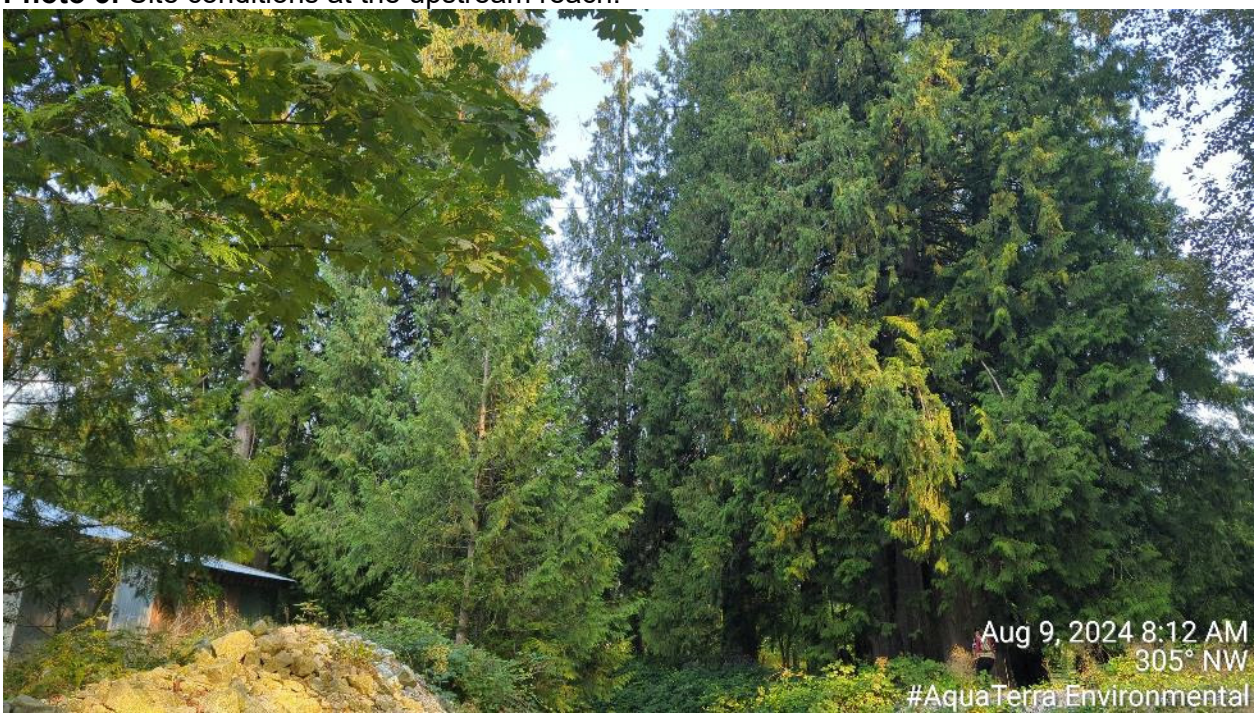


Photo 4: One (1) inactive American Robin nest, circled in red.



Photo 5: South Herford Creek, facing east.



Photo 6: South Herford Creek, facing west.



Environmental Monitoring Summary

Date: 13 August 2024	
Time On & Off site:	07:33 – 14:45
Weather:	Sun 17°C (High 20 / Low 15°C)
Precipitation:	0.0 mm (*Source: Environment Canada – Mission West Abbey*)
Environmental Monitor & QEP Supervisor:	Nicole Chin, Olga Grunlund, & Chris Lee
Monitoring event description:	Environmental monitoring during instream works.

Environmental Monitoring Observations

07:45 | The Environmental Monitor ('EM)' arrived on site. The EM participated in a walkthrough of the site with Mission Contractors.

08:09 | Leq'á:mel First Nation arrived on site to conduct the fish salvage.

08:54 | An excavator was used to dig a 1 meter by 1 meter sump in the creek bed.

09:06 | Mission Contractors crews set up and installed a pump in the sump. The pump was placed within a steel basket enclosed in metal mesh.

09:47 | An excavator was used to place soil and brush piles located on the creek banks into the bed of a rock truck for transport to the laydown area. Approximately three (3) loads were transported to the laydown area.

11:48 | Leq'á:mel First Nation crews and Mission Contractors took a break for lunch.

12:45 | Crews returned from lunch.

13:00 | Leq'á:mel First Nation continue fish salvage works.

14:45 | No excavation works occurred as the fish salvage was still on going. Excavation works were expected to commence after the fish salvage has been completed. The EM departed the site.

Monitoring Recommendations

No monitoring recommendations were noted during this monitoring period.

Outstanding Environmental Concerns

No outstanding environmental concerns were noted during this monitoring period.

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.

Photographs

Photo 7: Isolation net upstream of the sump, facing East.



Photo 8: Leq'á:mel First Nation crews conducting the fish salvage.



Photo 9: Crews removing brush and soil piles.



Environmental Monitoring Summary

Date: 15 August 2024	
Time On & Off site:	07:50 – 17:05
Weather:	Sun 10°C (High 18 °C / Low 8°C)
Precipitation:	0.0 mm (*Source: Environment Canada – Mission West Abbey*)
Environmental Monitor & QEP Supervisor:	Nicole Chin & Chris Lee
Monitoring event description:	Monitoring instream excavation works.

Environmental Monitoring Observations

07:50 | The EM arrived on site.

- Summary of works completed August 14, 2024, was provided to the EM:
  - The bypass pump was moved, and a new sump was dug approximately 50 m east of the original location to assist the localized dewatering to facilitate the fish salvage. The lower reaches of South Herford Creek beyond the isolated area were not fully dewatered as it was being fed by percolating ground water.
  - Leq'á:mel First Nation continued the fish salvage, and upon completion of the fish salvage the excavation works occurred from 0+280 east 30 meters to 0+250.

08:20 | Crews prepared the laydown area for delivery of materials.

- Instream works commenced in isolation of flow.
- The bypass hose was run through the neighboring farmers field parallel to South Herford Creek. The hose outflow was set up at the east side of the culvert at Sylvester Rd.
- The pond bypass pump was directed into a ditch.

10:41 | Mission Contractors received approval from the neighboring farmer to use their stockpile of large round rock. The AE Engineer on site confirmed that the round rocks were suitable to use for the construction of weirs in the creek. Crews transported the rocks to stockpile adjacent to the creek.

11:54 | The EM observed turbid water at the outflow hose by Sylvester Rd and tested the water turbidity:

- The bypass outflow hose on the east side of the culvert at Sylvester Rd: 48 NTU
- The west side of the culvert at Sylvester Rd: 5.01 NTU

12:07 | Turbid water from excavation works up stream of the pump was observed by the EM draining into the sump. Crews disconnected the bypass pump hose in the farmers field

and water was allowed to percolate down through the grass based on the turbidity noted to the EM and relayed to the crew.

- Works was paused and the bypass pump at the pond outflow was turned off to provide additional waterflow to South Herford Creek. The AquaTerra QEP was notified who consulted Mission Contractors personnel.

13:50 | The crew paused work for lunch.

14:20 | Works resumed.

15:08 | Continued excavation and construction of rock weir.

15:51 | The EM tested the water turbidity at multiple points and the following results were recorded:

- The east side of the culvert at Slyvester Rd: 40.0 NTU
- West of the culvert at Sylvester Rd: 35.5 NTU
- West of the culvert at Sylvester Rd 10 meters downstream: 32.2 NTU

- The AE environmental inspector noted concerns for reduced water flow in the creek that runs parallel to the west of Sylvester Rd. The inspector noted that a water license is required for any diversion of water from a creek, which the project does not have; however, Mission Contractors advised that this was not a formal diversion of flow, but intended to improve water quality via filtration through the vegetation prior to re-entry into the creek downstream. This methodology was affirmed by the EM and QEP, with the EM noting to the project QEP that flow was observed downstream of the active work area at all times.

16:10 | A new sump location was dug upstream of excavation works to mitigate turbidity issues. Crews waited for turbidity in the sump to clear prior to moving the pump.

16:35 | Turbidity was observed to be reduced in the new sump. During the pump set up in the new sump, an issue with the pump occurred and the pump was unable to start. The EM observed pooling water breach both sumps and flow downstream.

17:05 | The EM observed the breached water flow downstream and pass through the culvert under Sylvester Rd. The EM assessed the water turbidity in two areas.

- The east side of the culvert at Slyvester Rd: 5.37 NTU
- West of the culvert at Sylvester Rd 10 meters downstream: 21.1 NTU

- Crews stopped work for the day as they were unable to continue work without an operable pump.
- The EM departed the site.

Monitoring Recommendations

1. Works should be conducted downstream of sump pumps to avoid turbid water from entering the sump.
2. Ensure water directed though a bypass pump is redirected back downstream into the creek.

Outstanding Environmental Concerns

No outstanding environmental concerns were noted during this monitoring period.

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.

Two (2) non-conformance / non-compliance issues were observed during the prescribed monitoring period:

1. All works should be conducted downstream of sump pumps to avoid turbid water from entering the sump.
2. Ensure water directed though a bypass pump is redirected back downstream into the Creek.

No incidents occurred or were reported to AquaTerra personnel during the prescribed monitoring period.

Photographs

Photo 10: Pump set up in the sump.



Photo 11: Bypass pump set up on the east side of the culvert at Sylvester Rd.



Photo 12: Turbid water on the west side of the culvert at Sylvester Rd.



Environmental Monitoring Summary

Date: 17 August 2024	
Time On & Off site:	08:20 – 12:27
Weather:	Sun 17°C (High 30°C / Low 16°C)
Precipitation:	0.0 mm (*Source: Environment Canada – Mission West Abbey*)
Environmental Monitor & QEP Supervisor:	Nicole Chin & Chris Lee
Monitoring event description:	Monitoring instream excavation works.

Environmental Monitoring Observations

08:32 | The EM arrived on site.

- Summary of works completed August 16, 2024, was provided to the EM:
  - Crews excavated material out of the Creek from STA 0+200 to 0+000 to the design profile.
- All observed generators and fuel cans were protected within secondary containment trays.

- Two (2) large, fully stocked spill kits were on site: one (1) by South Herford Creek, and one (1) at the laydown area.
- One (1) main bypass pump was active. The hose outflow was situated at the culvert on the east side of Sylvester Rd.
- Two (2) smaller pumps located approximately 10 meters downstream of the main bypass pump, were catching additional waterflow and pumping back up to the main sump area.
- The pond bypass pump was pumping into an adjacent ditch.
- One (1) additional pump was situated approximately 3 meters up from the culvert at Sylvester Rd. in a pool of turbid water. There was no observed flow into or out of the pooled water. The turbid water was pumped into the adjacent farmer's field.

08:57 | Water turbidity was assessed and recorded:

- The bypass pump outflow at the culvert at Sylvester Rd: 2.24 NTU

09:05 | Crews constructed a second weir.
09:24 | Construction of a third weir.
09:33 | Construction of third weir complete.
09:50 | Construction of fourth weir.
10:18 | Fourth weir complete.
11:11 | Additional round rock was relocated to creek by crews.
11:15 | Construction of fifth weir.
12:08 | Lunch break.
12:18 | Lunch complete, works resume.
12:27 | The EM visually checked the water at the bypass pump outflow at the culvert at Sylvester Rd and departed the site.

Monitoring Recommendations

No monitoring recommendations were noted during this monitoring period.

Outstanding Environmental Concerns

No outstanding environmental concerns were noted during this monitoring period.

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.

Photographs

Photo 13: South Herford Creek, facing west.



Photo 14: The main bypass pump, facing west.



Photo 15: Two (2) smaller pumps feeding water upstream to main bypass pump, facing east.



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, Dip Tech, BC-CESCL
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: Paul Hague and Dianna Christopoulos
Associated Engineering
500-2889 E. 12 Avenue
Vancouver BC V5M 4T5

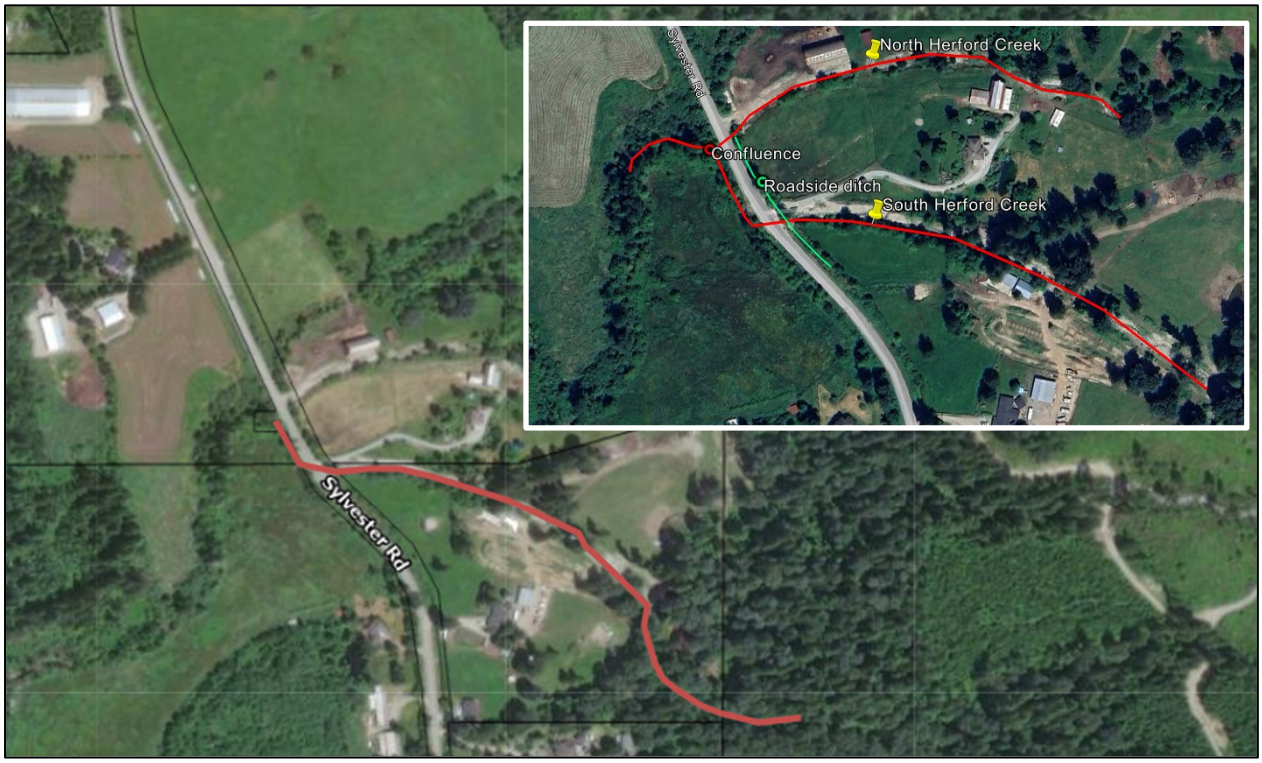
DATE: 23 August 2024

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 – South Herford Creek Project - AquaTerra Environmental Monitoring Memorandum #03

AquaTerra Environmental Ltd. ('AquaTerra') is pleased to provide Mission Contractors Ltd. ('Mission' Contractors') with this Environmental Monitoring Memorandum (the 'memo'), which includes Environmental Monitoring observations and recommendations for 19 August 2024 monitoring event, associated with the Hatzic Emergency Program – South Herford Creek Project (the 'project'; **Figure 1**).

Figure 1: Approximate Site Extents – identified in Red.



In July 2024, 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 – South Herford Creek Project, in Mission, BC.

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

Environmental Monitoring Summary

Date: 19 August 2024	
Time On & Off site:	10:00 – 12:10
Weather:	Cloudy 17°C
Precipitation:	No data (*Source: Environment Canada – Mission West Abbey*)
Environmental Monitor & QEP Supervisor:	Olga Grunlund & Chris Lee
Monitoring event description:	Environmental monitoring during instream works.

Environmental Monitoring Observations

07:45 | The Environmental Monitor (EM) arrived on site.

- Background turbidity in the creek: 1.08 NTU.
- Turbidity on the west side of Sylvester Road: 1.60 NTU.
- Bypass was in place directing clean water around the work site. Discharge hose was placed in the culvert under the road. Pump intake was equipped with a screened cage. Additional clean water from the creek (within the work site) was being pumped to the bypass intake. No environmental issues with the bypass were note during this monitoring event.
- Bypass generator was positioned within a containment tray.
- Isolation fences were in place.
- Weirs were installed. Some clean water was pooling behind the weirs.
- Two - 2” hoses were used to direct turbid water from the work site to the north, to settle turbidity and redirect cleaner water back towards the creek.
- No debris tracking was observed along the road.
- Pump and a jerry can were positioned at top of bank of the creek, within a containment tray.
- Large spill kit was present on site.

11:00 | Water quality at confluence between North and South Herford Creeks, on the west side of the road was 16.1 NTU. Turbid water from the work site (one of the pumps) was being pumped to the vegetated roadside ditch on the east side of the road, and entering the North Herford Creek, approximately 60 m from the discharge point. Refer to **Figure 1** for location details. The water quality was 5.80 NTU approximately 20 m downstream of the confluence of North and South Herford Creeks and was deemed to be compliant.

- A pump was set up under supervision of the EM to direct water from the roadside ditch to the field, to avoid turbid water entering the North Herford Creek, in addition to moving the pump discharge away from the ditch, per EM's recommendation.

11:35 | Water quality at confluence between North and South Herford Creeks was 7.32 NTU and 11.3 NTU approximately 20 m downstream.

12:00 | Water quality at confluence between North and South Herford Creeks was 2.17 NTU.

12:10 | EM left the site.

Monitoring Recommendations

1. Move the hose, directing turbid water from the site, away from the roadside ditch, towards the field for infiltration (completed immediately).

Outstanding Environmental Concerns

No outstanding environmental concerns were noted during this monitoring period.

Photographs:

Photo 1: Bypass pump intake at the upstream end of the project area.



Photo 2: Overview of the project area – looking west.



Photo 3: One of the hoses used to direct turbid water for filtration.



Photo 4: Minor spike in turbidity downstream of North Herford Creek – looking west.



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,



Olga Grunlund, EP, BC-CESCL
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: Paul Hague and Dianna Christopoulos
Associated Engineering
500-2889 E. 12 Avenue
Vancouver BC V5M 4T5

DATE: 23 August 2024

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

Subject: Hatzic Emergency Program – South Herford Creek Project - AquaTerra Environmental Monitoring Memorandum #04

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 – South Herford Creek Project (the 'project'; **Figure 1**).

Figure 1: Approximate Site Extents – identified in Red.



In July 2024, 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 – South Herford Creek Project, in Mission, BC.

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

Environmental Monitoring Summary

Date: 21 August 2024	
Time On & Off site:	07:35 – 11:40
Weather:	Cloudy 16°C (High 18°C / Low 12°C)
Precipitation:	5.1 mm (*Source: Environment Canada – Mission West Abbey*)
Environmental Monitor & QEP Supervisor:	Nicole Chin & Chris Lee
Monitoring event description:	Monitoring instream works within the ditch parallel to Slyvester Rd.

Environmental Monitoring Observations

07:35 | The Environmental Monitor ('EM') arrived on site.

- One (1) large bypass pump protected within a ¼" mesh basket (suitable mesh size given fish salvage target species) at South Herford Creek culvert (the east side of the culvert) was set up with the outflow hose placed at the North Herford Creek culvert (the east side of the culvert), to ensure waterflow within North Herford Creek.
- Two (2) 2" bypass pumps were located on the west side of the culvert at South Herford Creek (within the isolated area) were pumping the remaining pooled water out of the ditch. Only one (1) pump was protected within a metal ¼" mesh basket.
- One (1) 2" bypass pump located at North Herford Creek (west of Sylvester Rd) within the isolated area was pumping pooled turbid water northward towards a farmer's field for filtration. The pump did not have fish screen protection; however, the EM was advised that this pump was in a reach of the creek that had been salvaged and as such, no fish were anticipated to be present.
- One (1) Honda generator was active and placed on top of spill pads by the top of the bank by Sylvester Rd.

- One (1) Honda generator was observed active and within a spill tray on the bank by the confluence of North and South Herford Creek.

08:23 | Some shrubs on the bank were pruned back for access to the creek.

08:40 | Removal of instream material commenced.

10:00 | Coffee break.

10:28 | Work resumed.

10:45 | Crews installed geotextile fabric on the banks of the channel.

11:39 | The first load of riprap was transported to the ditch for installation.

11:40 | The EM departed the site.

Monitoring Recommendations

1. Place drip trays under heavy equipment (generators, excavators, heavy machinery, etc.) to mitigate the risk of potential spills or leakages.
2. Bypass pumps should be protected with fish screen / baskets.

Outstanding Environmental Concerns

No outstanding environmental concerns were noted during this monitoring period.

Photographs

Photo 1: One (1) bypass pump within a mesh basket on the east side of the culvert in South Herford Creek.



Photo 2: Outflow at North Herford Creek (east side of the culvert), facing east.



Photo 3: One (1) Honda generator within a spill tray at the confluence of North and South Herford Creek.



Photo 4: One (1) Honda generator placed on top of spill pads.



Photo 5: Installation of geotextile material on the channel banks.



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.

Two (2) non-conformance / non-compliance issues were observed during the prescribed monitoring period:

1. Place drip trays under heavy equipment (generators, excavators, heavy machinery, etc.) to mitigate the risk of potential spills or leakages.
2. Bypass pumps should be protected with fish screen / baskets.

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, Dip Tech, BC-CESCL
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: Paul Hague and Dianna Christopoulos
Associated Engineering
500-2889 E. 12 Avenue
Vancouver BC V5M 4T5

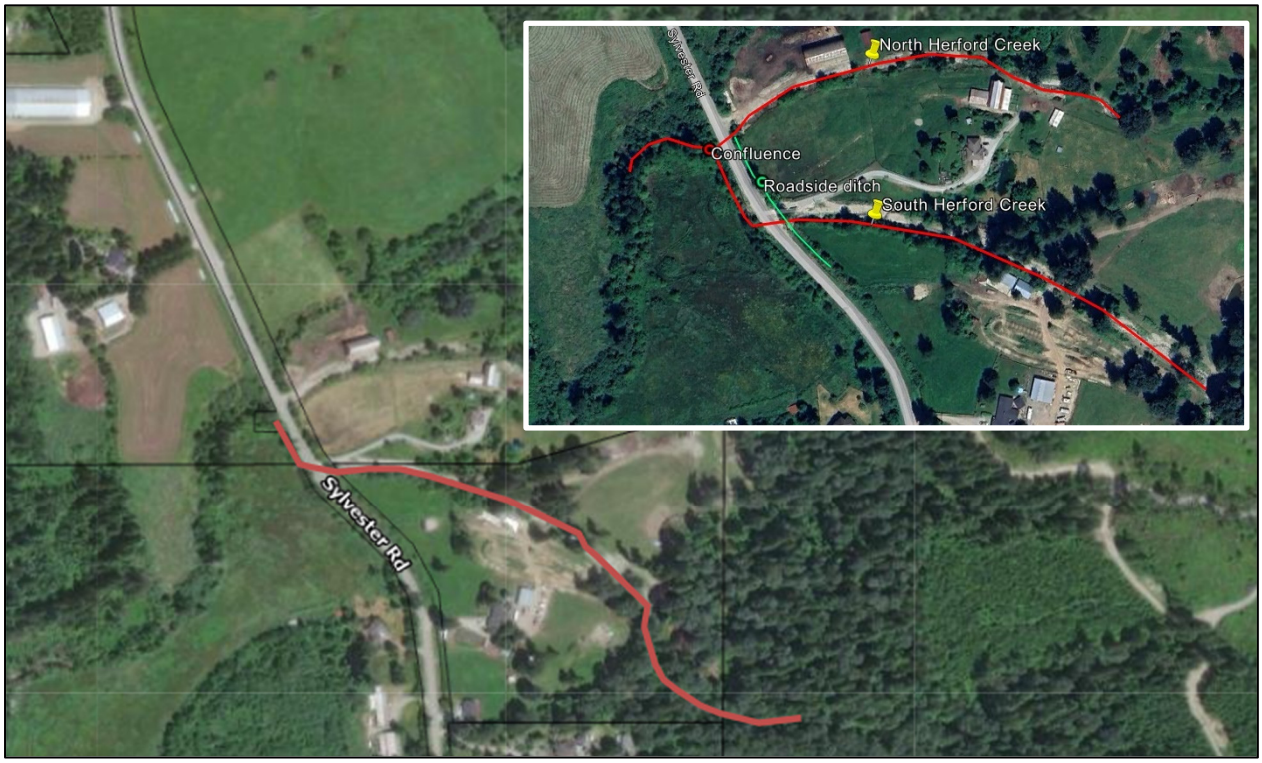
FROM: Chris Lee, M.Sc., R.P. Bio., QEP, BC-CESCL
Olga Grunlund EP, BC-CESCL
AquaTerra Environmental Ltd.
PO Box 18120
Port Moody V3H 0A2

DATE: 1 September 2024

Subject: Hatzic Emergency Program – South Herford 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 Environmental Monitoring observations and recommendations for 23 August 2024 monitoring event, associated with the Hatzic Emergency Program – South Herford Creek Project (the 'project'; **Figure 1**).

Figure 1: Approximate Site Extents – identified in Red.



In July 2024, 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 – South Herford Creek Project, in Mission, BC.

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

Environmental Monitoring Summary

Date: 23 August 2024	
Time On & Off site:	08:20 – 10:00
Weather:	Rain 15°C
Precipitation:	No data (*Source: Environment Canada – Mission West Abbey*)
Environmental Monitor & QEP Supervisor:	Olga Grunlund & Chris Lee
Monitoring event description:	Environmental monitoring inspection

Environmental Monitoring Observations

08:20 | The Environmental Monitor (EM) arrived on site.

- Sloped (right) bank was exposed along the creek. No erosion or sedimentation issues were observed during the monitoring event.
- Background turbidity in the creek: 1.59 NTU.

08:45 | Water quality at the confluence was 3.28 NTU. Water quality approximately 20 m downstream of the confluence was 2.55 NTU.

- Large corrugated steel pipe was placed in the ditch, on the north side of the confluence and west side of Sylvester Road. A minor amount of water was present in the ditch; however no notable flow was observed.
- No bypass was in place. No instream work was occurring in the creek. Large angular rock was being placed along a section of the creek, above the elevation of the water. No water quality issues were noted at the time of the monitoring event.
- A large spill kit was present on site.
- Jerry cans and a pump were positioned on a company vehicle.
- Sylvester Road was clear of debris.

- Fish isolation fence was installed for upcoming fish salvage (near the confluence and at the western end of the project). The Contractor cleaned the accumulated debris behind the fish fences at the confluence and 60 m downstream of the confluence.
- Works in the creek, on the west side of the road, were completed.

10:00 | EM left the site.

Monitoring Recommendations

1. Conduct a fish and amphibian salvage around the corrugated steel pipe, prior to infilling the culvert.

Outstanding Environmental Concerns

No outstanding environmental concerns were noted during this monitoring period.

Photographs:

Photo 1: Corrugated steel pipe positioned north of the confluence in the western ditch.



Photo 2: Overview of both creeks, at the confluence, looking east.



Photo 3: Overview of South Herford Creek, west of the road, looking north.



Photo 4: Rip rap placement along a section of the creek, above water.



Photo 5: Upstream end of the work area. The creek was dry.



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,



Olga Grunlund, EP, BC-CESCL
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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9333 Manzer Street
Mission BC V4S 1K2

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

DATE: 1 September 2024

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

Subject: Hatzic Emergency Program – South Herford Creek Project - AquaTerra Environmental Monitoring Memorandum #06

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 – South Herford Creek Project (the 'project'; **Figure 1**).

Figure 1: Approximate Site Extents – identified in Red.



In July 2024, 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 – South Herford Creek Project, in Mission, BC.

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

Environmental Monitoring Summary

Date: 27 August 2024	
Time On & Off site:	07:35 – 11:38
Weather:	Cloudy 12°C (High 17°C / Low 9°C)
Precipitation:	5.1 mm (*Source: Environment Canada – Mission West Abbey*)
Environmental Monitor & QEP Supervisor:	Nicole Chin & Chris Lee
Monitoring event description:	Leq'á:mel First Nation fish salvage. No instream works occurred.

Environmental Monitoring Observations

07:35 | The Environmental Monitor ('EM') arrived on site.

- One (1) 6" bypass pump at the east side of the culvert by Sylvester Rd was pumping water approximately 250-300 meters downstream past the isolation net, maintaining downstream water flow.
- Two (2) 2" bypass pumps at the confluence of North and South Herford Creek on the west of Sylvester Rd was pumping water approximately 250-300 meters downstream past the isolation net.
- One (1) bypass pump was observed on the bank and protected within a spill tray.
- One (1) large metal culvert was observed within the ditch sitting in water. The area was isolated by two (2) isolation nets and had been salvaged by Leq'á:mel First Nation per the EM recommendations.
- One (1) Honda generator was observed active and within a spill tray on the bank by the confluence of North and South Herford Creek.

08:37 | Water turbidity was tested at the bypass pump set up at the confluence of North and South Herford Creel: 0.75 NTU.

- Leq'á:mel First Nation commenced seine netting of the creek.

- One (1) excavator was observed inactive with spill tray protection at South Herford Creek.

10:04 | Leq'á:mel First Nation continued the fish salvage in North Herford Creek.

11:30 | Heavy rainfall and hail, fish salvage was paused.

11:30 | The EM departed the site.

Monitoring Recommendations

1. Place drip trays under heavy equipment (generators, excavators, heavy machinery, etc.) to mitigate the risk of potential spills or leakages.
2. Bypass pumps should be protected with fish screen / baskets.

Outstanding Environmental Concerns

No outstanding environmental concerns were noted during this monitoring period.

Photographs

Photo 1: Isolation net set up and bypass pumps, at the west side of Sylvester Rd.



Photo 2: Bypass pump discharge, past STA 0+000.



Photo 3: Isolation net and bypass pump set up, at North Herford Creek.



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.

Two (2) non-conformance / non-compliance issues were observed during the prescribed monitoring period:

1. Place drip trays under heavy equipment (generators, excavators, heavy machinery, etc.) to mitigate the risk of potential spills or leakages.
2. Bypass pumps should be protected with fish screen / baskets.

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, Dip Tech, BC-CESCL
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: Paul Hague and Dianna Christopoulos
Associated Engineering
500-2889 E. 12 Avenue
Vancouver BC V5M 4T5

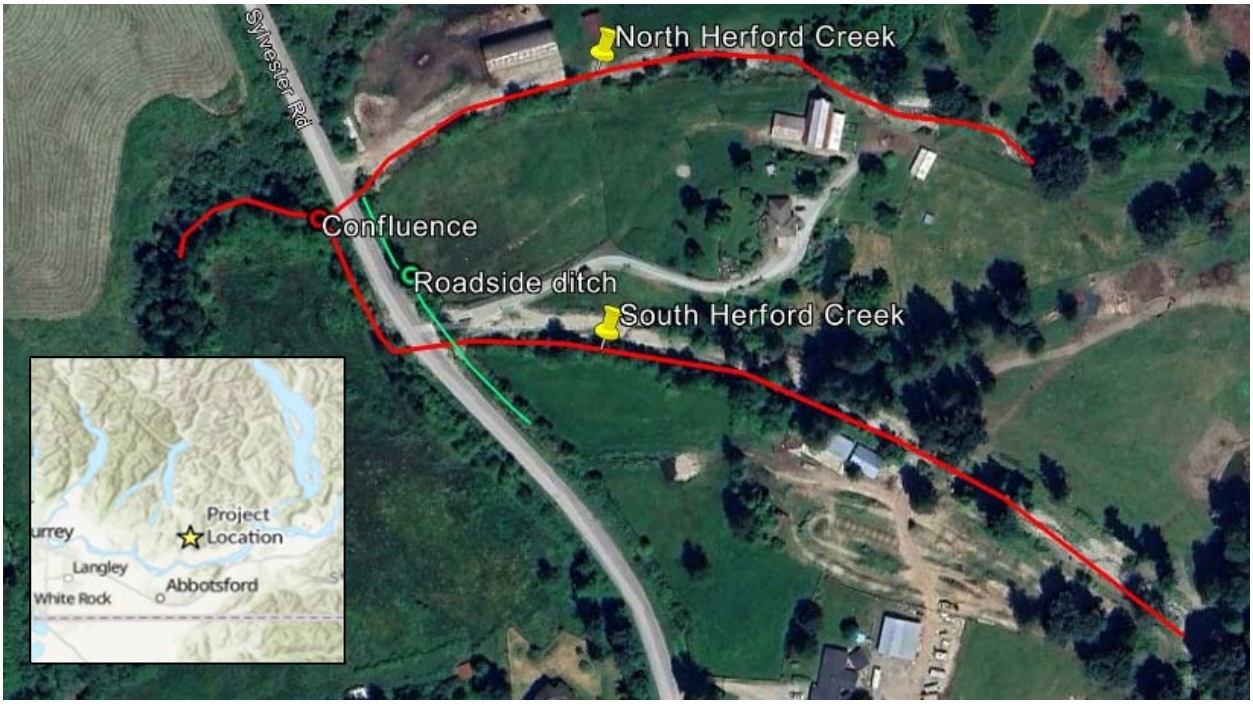
DATE: 5 September 2024

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

Subject: Hatzic Emergency Program – North & South Herford Creek Project - AquaTerra Environmental Monitoring Memorandum #07

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 – South Herford Creek Project (the 'project'; **Figure 1**).

Figure 1: Approximate Site Extents – identified in Red.



In July 2024, 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 – South Herford Creek Project, in Mission, BC.

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

Environmental Monitoring Summary

Date: 28 August 2024	
Time On & Off site:	07:45 – 12:00
Weather:	Cloudy 12°C (High 21°C / Low 9°C)
Precipitation:	0.0 mm (*Source: Environment Canada – Mission West Abbey*)
Environmental Monitor & QEP Supervisor:	Nicole Chin & Chris Lee
Monitoring event description:	Continuation of the fish salvage by Leq'á:mel First Nation. Instream works commenced.

Environmental Monitoring Observations

07:45 | The Environmental Monitor ('EM') arrived on site.

- To the west of Slyvester Road, three (3) bypass pumps were set up at the confluence of North and South Herford Creek pumping water approximately 250 meters downstream, with the outflow hose past STA 0+000.
- In North Herford Creek to the east of Sylvester Road, one (1) 6-inch bypass pump was pumping water approximately 300 meters downstream, with the outflow hose past STA 0+000.
- One (1) metal culvert and access road had been installed off Sylvester Road.

08:00 | Leq'á:mel First Nation continued the fish salvage.

08:04 | Water turbidity tested at the confluence of North and South Herford: 1.32 NTU.

08:09 | One (1) excavator moved to STA 0+000 in preparation of works.

09:32 | Instream works commenced at STA 0+000. Instream material was removed by excavator and transported to the laydown area by rock truck.

09:50 | Leq'á:mel First Nation continued the fish salvage.

11:40 | Mission Contractor crews assisted the fish salvage with dewatering of small pools of water within the reach with a 3" pump.

12:00 | The EM departed the site.

Monitoring Recommendations

No monitoring recommendations were issued during this monitoring period.

Outstanding Environmental Concerns

No outstanding environmental concerns were noted during this monitoring period.

Photographs

Photo 1: Isolation nets set up with bypass pumps, to the west side of Sylvester Rd.



Photo 2: A sheen was detected on the surface of pooled water in North Herford. It was determined to be naturally occurring.



Photo 3: Removal of material from the creek by excavator.



Photo 4: Leq'á:mel First Nation fish salvage.



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. Monitoring Recommendations. No monitoring recommendations were issued during this 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, Dip Tech, BC-CESCL
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: Paul Hague and Dianna Christopoulos
Associated Engineering
500-2889 E. 12 Avenue
Vancouver BC V5M 4T5

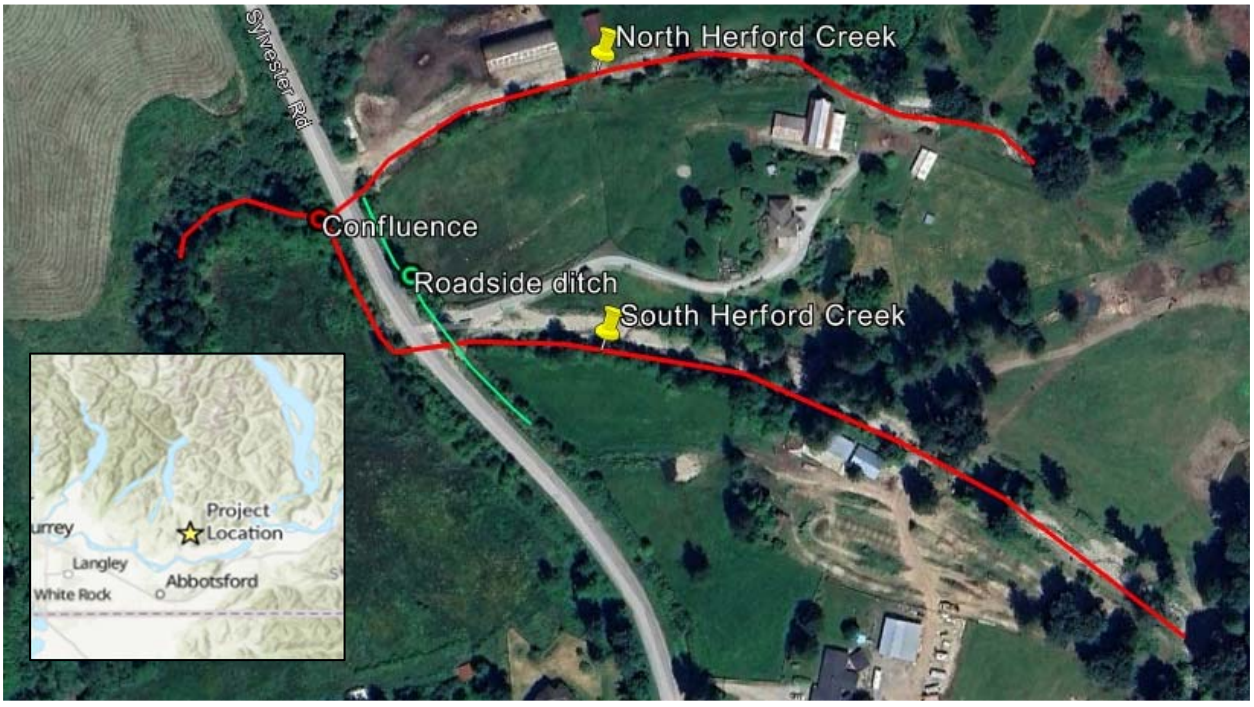
DATE: 9 September 2024

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

Subject: Hatzic Emergency Program – North & South Herford Creek Projects - AquaTerra Environmental Monitoring Memorandum #08

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 – Herford Creek Project (the 'project'; **Figure 1**).

Figure 1: Approximate Site Extents – identified in Red.



In July 2024, 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 – Herford Creek Project, in Mission, BC.

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

Environmental Monitoring Summary

Date: 30 August 2024	
Time On & Off site:	07:49 – 12:25
Weather:	Sun 15°C (High 28°C / Low 13°C)
Precipitation:	0.0 mm (*Source: Environment Canada – Mission West Abbey*)
Environmental Monitor & QEP Supervisor:	Nicole Chin & Chris Lee
Monitoring event description:	Removal on in stream material.

Environmental Monitoring Observations

07:49 | The Environmental Monitor ('EM') arrived on site.

- Installation of riprap at the western side of North Herford Creek (west of Sylvester Road) had been completed.
- Isolation netting at the confluence of North and South Herford Creeks, and at STA 0+000 were kept in place.
- One (1) six-inch bypass pump in North Herford Creek (east of the culvert) was kept in place. The creek was dry downstream of the bypass pump and east of the culvert, the creek was dry.

08:24 | One (1) excavator was active on the banks west of Sylvester Road smoothing out excavator tracks in the dirt.

- One (1) rock truck, one (1) excavator, one (1) small John Deere cart, and one (1) lamp standard were inactive in the laydown area.

08:38 | One (1) blue generator was loaded onto a trailer for removal offsite.

08:56 | Three (3) bypass pumps, one (1) large fish basket, and one (1) gas powered pump were removed from the confluence of North and South Herford Creeks by excavator.

09:10 | Crews manually swept track out off Slyvester Road.

- Shrubs by the east side of the culvert at North Herford Creek were removed for access to the creek.

09:26 | One (1) excavator entered the creek bed downstream of the six-inch bypass pump in North Herford.

09:28 | Commenced removal of instream material by excavator. Material was loaded into a rock truck for stockpiling in the laydown area. A total of five (5) load of material were removed from the creek bed.

10:00 | Crews took a break.

10:32 | Work resumed.

10:45 | Crews installed geotextile fabric onto the banks by the culvert at North Herford Creek.

11:11 | One (1) Pacific Chorus frog (*Pseudacris regilla*) was found on the bank by the geotextile fabric and relocated to STA 0+000.

11:20 | Continued removal of instream material.

11:37 | Completed installation of geotextile fabric on north and south banks.

11:43 | Installation of riprap commences.

12:25 | The EM departed the site.

Monitoring Recommendations

No monitoring recommendations were issued during this monitoring period.

Outstanding Environmental Concerns

No outstanding environmental concerns were noted during this monitoring period.

Photographs

Photo 1: Isolation net set up at the confluence of North and South Herford Creek.



Photo 2: Isolation net at STA 0+00.



Photo 3: Completed works west of Sylvester Road.

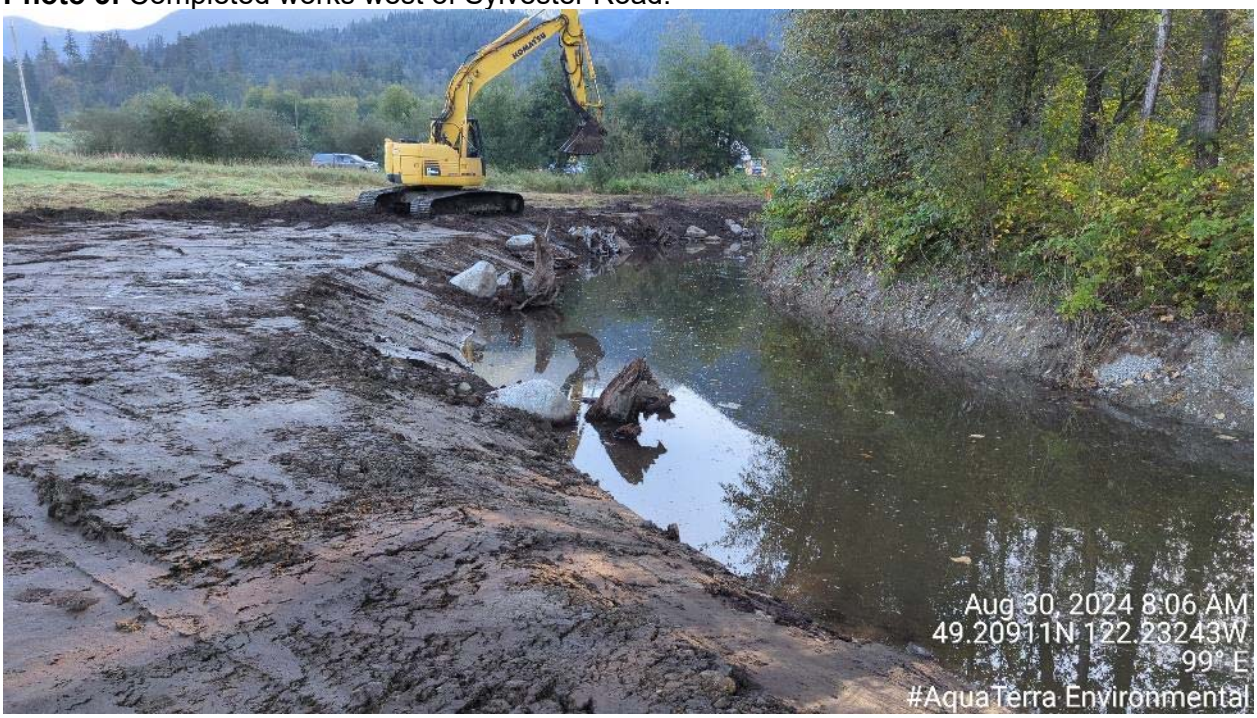


Photo 4: North Herford Creek was dry downstream of the six-inch bypass pump.



Photo 5: Removal of instream material in North Herford Creek.



Photo 6: Completion of geotextile fabric installation.



Photo 7: Installation of riprap within the creek.



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 monitoring recommendations were issued during this 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, Dip Tech, BC-CESCL
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: Paul Hague and Dianna Christopoulos
Associated Engineering
500-2889 E. 12 Avenue
Vancouver BC V5M 4T5

DATE: 6 September 2024

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

Subject: Hatzic Emergency Program – North Herford Creek Project - AquaTerra Environmental Monitoring Memorandum #03

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 – Herford Creek Project (the 'project'; **Figure 1**).

Figure 1: Approximate Site Extents – identified in Red.



In July 2024, 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 – Herford Creek Project, in Mission, BC.

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

Environmental Monitoring Summary

Date: 04 September 2024	
Time On & Off site:	12:19 – 13:45
Weather:	Sun 23°C (High 28°C / Low 16°C)
Precipitation:	0.0 mm (*Source: Environment Canada – Mission West Abbey*)
Environmental Monitor & QEP Supervisor:	Nicole Chin & Chris Lee
Monitoring event description:	No works occurring, fish salvage conducted by Leq'á:mel First Nation.

Environmental Monitoring Observations

12:21 | The Environmental Monitor ('EM') arrived on site.

- Leq'á:mel First Nation fish salvage crews were on lunch break.
- One (1) excavator, one (1) Volvo rock truck, and one (1) John Deere cart were inactive at the laydown area. Both the excavator and Volvo rock truck were appropriately protected with spill trays placed beneath the engines.
- The John Deere cart did not have a spill tray placed beneath it.
- Three (3) isolation nets were installed on North Herford Creek.
    - One (1) net was located approximately 10 meters upstream of the culvert by Sylvester Rd.
    - One (1) net was installed halfway between Sylvester Rd and STA 0+360.
    - One (1) net was placed at STA 0+360.
- One (1) six-inch pump was inactive and within a mesh fish basket at STA 0+360.
- At STA 0+360, one (1) excavator was inactive with a spill tray beneath the engine.
- Shrubs and vegetation on both the north and south banks of North Herford Creek had been cut back for access to the creek.

- From STA 0+000 to 0+140, six (6) bags of Tansy ragwort (*Jacobaea vulgaris*) were removed from North Herford Creek banks on 26 august 2024 with documentation / photographs provided to AquaTerra.

13:45 | The EM departed the site.

Monitoring Recommendations

No environmental monitoring recommendations were issued during this monitoring period.

Outstanding Environmental Concerns

No outstanding environmental concerns were noted during this monitoring period.

Photographs

Photo 1: Completed riprap installation at the Sylvester Rd culvert at North Herford Creek.

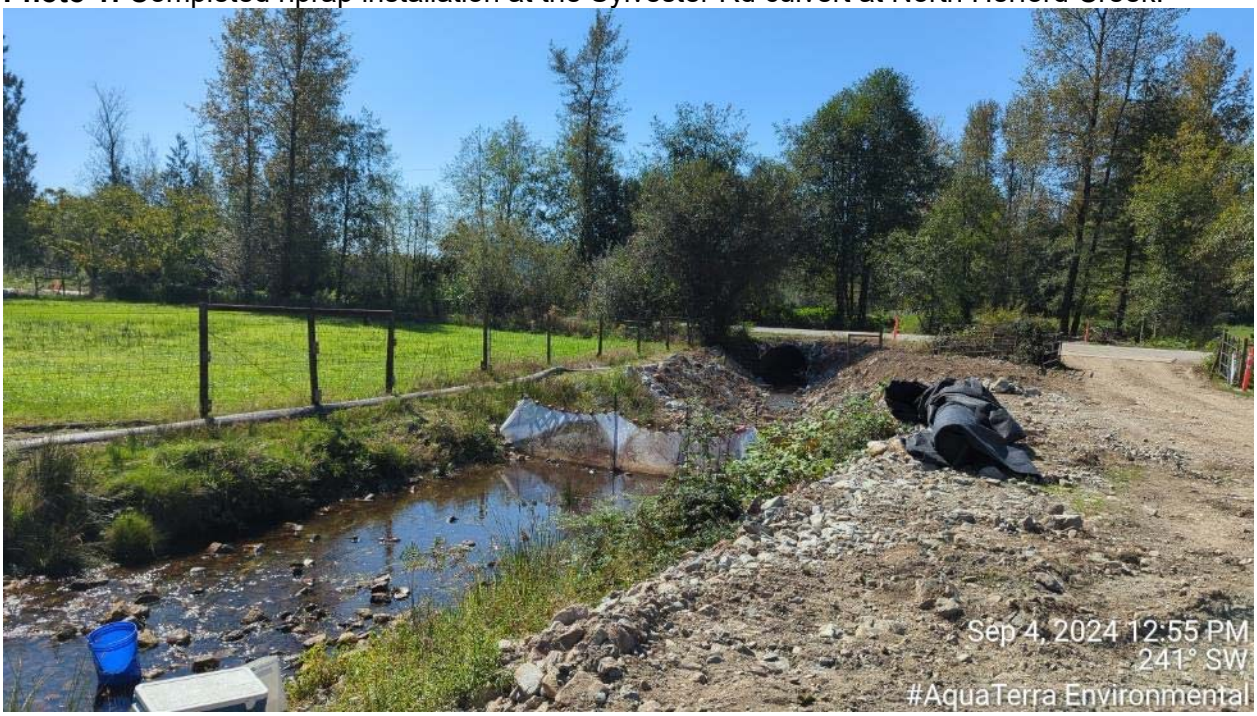


Photo 2: Leq'á:mel First Nation fish salvage crews.



Photo 3: One (1) inactive six-inch pump within a fish basket at STA 0+360.



Photo 4: One (1) inactive excavator protected with a spill tray at STA 0+360.



Photo 5: One (1) excavator and one (1) Volvo rock truck with spill tray coverage. One (1) John Deere cart without a spill tray.



Photo 6: Tansy Ragwort bagged for removal.



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 environmental monitoring recommendations were issued during this 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, Dip Tech, BC-CESCL
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: Paul Hague and Dianna Christopoulos
Associated Engineering
500-2889 E. 12 Avenue
Vancouver BC V5M 4T5

DATE: 6 September 2024

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

Subject: Hatzic Emergency Program – North Herford Creek Project - AquaTerra Environmental Monitoring Memorandum #04

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 – Herford Creek Project (the 'project'; **Figure 1**).

Figure 1: Approximate Site Extents – identified in Red.



In July 2024, 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 – Herford Creek Project, in Mission, BC.

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

Environmental Monitoring Summary

Date: 06 September 2024	
Time On & Off site:	10:58 – 14:25
Weather:	Sun 26°C (High 32°C / Low 16°C)
Precipitation:	0.0 mm (*Source: Environment Canada – Mission West Abbey*)
Environmental Monitor & QEP Supervisor:	Nicole Chin & Chris Lee
Monitoring event description:	No works occurring, fish salvage conducted by Leq'á:mel First Nation.

Environmental Monitoring Observations

10:58 | The Environmental Monitor ('EM') arrived on site.

- A fish salvage continued to be conducted by Leq'á:mel First Nation crews.
- At 10:45 the bypass pump within a fish basket located at STA 0+360 was started and actively pumping water. The outflow hose was directed to the culvert at Sylvester Rd.
- One (1) excavator, one (1) Volvo rock truck, and one (1) John Deere cart were inactive at the laydown area. Both the excavator and Volvo rock truck were appropriately protected with a spill tray placed beneath the engine.
    - The John Deere cart did not have a spill tray placed beneath it.
- At STA 0+360 one (1) excavator was inactive with a spill tray beneath the engine.
- Between STA 0+140 and 0+340, four (4) bags of Tansy ragwort (*Jacobaea vulgaris*) were removed from North Herford Creek on September 03, 2024.

12:29 | Water was no longer flowing downstream of the bypass pump at STA 0+360. Fish salvage efforts continued.

12:45 | One (1) two-inch pump was set up downstream of STA 0+360 to assist the dewatering of smaller isolated pools during the fish salvage.

14:18 | The fish salvage was completed.

14:25 | The environmental monitor departed the site. No new observations or issues were observed or noted by the EM relative to the previous event.

Monitoring Recommendations

No environmental monitoring recommendations were issued during this monitoring period.

Outstanding Environmental Concerns

No outstanding environmental concerns were noted during this monitoring period.

Photographs

Photo 1: One (1) active bypass pump at STA 0+360.



Photo 2: The fish salvage with the electro fisher.



Photo 3: The bypass outflow hose situated at the culvert by Sylvester Rd.



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 environmental monitoring recommendations were issued during this monitoring period.

No incidents occurred or were reported to AquaTerra personnel during the prescribed monitoring period. No new issues or notable observations were noted relative to the previous EM inspection event.

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, Dip Tech, BC-CESCL
Environmental Monitor
AquaTerra Environmental Ltd.

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

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:	**Location (Or Closest Address): South Herford, Sylvester Rd**
Date: August 13, 2024 **Time: in: 8:30am-5**	
Monitor Name: Melissa Friesen	**Signature:**
Meetings: Met Jon (Mission Contractors)	
Meeting Participants: Jon M, Emilia Hale, Justin and Myself.	
Contractor(s) On Site: Jon M	**Name of Construction Representative Present: Mission Contractors, Leq'a:mel Guardians**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 20 Degrees	
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐	
Completed Construction Activities (Since Last Visit): **cleared along the creek making access for machinery, set up a generator and a pump in a pool North of the culvert that leads to south Herford Creek.**	
Construction Activities: preparing for excavating creek, salvaging by Leq'a:mel Guardians.	**Photos:**
Construction Equipment Being Used: Salvaging in the creek using an electro-fisher.	**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			**Leq'a:mel Guardians kept water turbidity to a minimum**	
Temperature	x			13.2 c	
DO				85.4	
pH			X		
Conductivity	x			44.0	
Other					

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Silt Fencing	x		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			Fuel in vehicle containment storage	
Other					
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	x			The machines are in good condition.	
Initial Cleaning (Mud, Seeds)	x			Machines are clean	
Other					
Waste Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Sanitary Facilities	X				
Solid Waste & Recycling	x			Garbage is taken away daily bag located next to spill kit	
Special Waste & Hazardous Materials			x		
Other					
Atmosphere	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Dust	x				
Air Quality	X				
Other					
Vegetation Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Invasive Plants	x				
Other					

General Observations & Comments (Wildlife, New Sensitive Features, etc.):	**Photos:**
Trout, Coho found in creek	

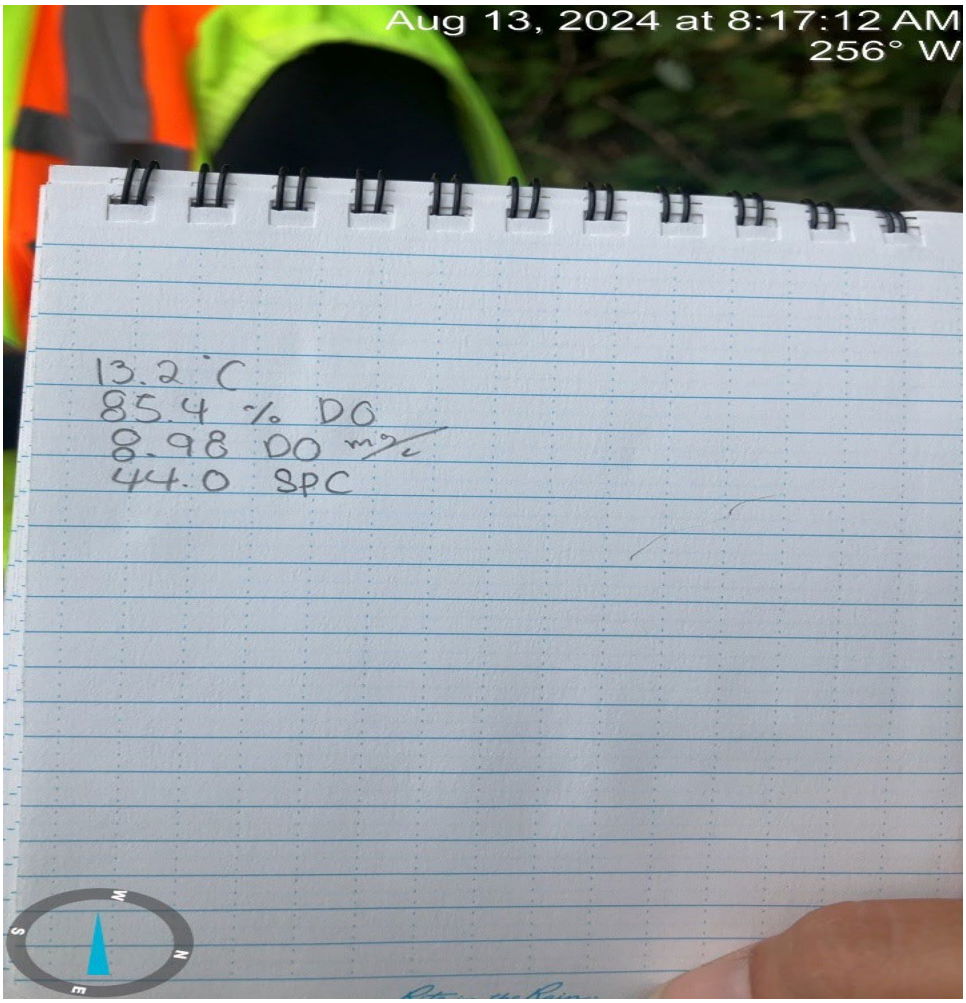
Other Comments: Fish Numbers were collected by Justin and given to Tina.	**Photos:**

Upcoming Construction Events:

Finish salvaging so the crew can start excavating the creek.

Incident Report Required? **Yes** ☐ **No** ☒

tested water before electrofishing.
I was part of the salvage crew and didn't get pictures for the day.



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:	**Location (Or Closest Address): South Herford, Sylvester Rd**
Date: August 14, 2024 **Time: in: 7:30 am-3:30 pm**	
Monitor Name: Melissa Friesen	**Signature:**
Meetings: Met Jon (Mission Contractors)	
Meeting Participants: Jon M, Emilia Hale, Justin and Myself.	
Contractor(s) On Site: Jon M	**Name of Construction Representative Present: Mission Contractors, Leq'á:mel Guardians**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 24 Degrees	
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐	
Completed Construction Activities (Since Last Visit): **Cleared along the creek making access for machinery, set up a generator and a pump in a pool North of the culvert that leads to south Herford Creek.**	
Construction Activities: preparing for excavating/removing bedload from the creek, salvaging by Leq'a:mel Guardians. Emilia and I finished Salvaging the creek at 10 am. Jon started the pump (once we gave him the all-clear) to start dewatering the creek. All guardians including the juniors arrived to ensure no fish were left stranded in the creek.	**Photos:**
Construction Equipment Being Used: Salvaging in the creek using an electro-fisher. Dip netting when dewatering.	**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			**Leq'a:mel Guardians kept water turbidity to a minimum**	
Temperature	x			13.2 c	
DO				85.4	
pH			X		
Conductivity	x			44.0	
Other					

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Silt Fencing	x		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			Fuel in vehicle containment storage	
Other					
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	x			The machines are in good condition.	
Initial Cleaning (Mud, Seeds)	x			Machines are clean	
Other					
Waste Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Sanitary Facilities	X				
Solid Waste & Recycling	x			Garbage is taken away daily bag located next to spill kit	
Special Waste & Hazardous Materials			x		
Other					
Atmosphere	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Dust	x				
Air Quality	X				
Other					
Vegetation Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Invasive Plants	x				
Other					

General Observations & Comments (Wildlife, New Sensitive Features, etc.):	**Photos:**
Trout, Coho found in creek	

Other Comments: Fish Numbers were collected by Justin and Charlize and given to Tina.	**Photos:**

Upcoming Construction Events:

Excavating the south Herford Creek.

Incident Report Required? **Yes** ☐ **No** ☒

Natural Resource Department: Daily Environmental Monitoring Report

Leq'á:mel First Nation

43101 Leq'á:mel Way, Deroche BC V0M 1G0
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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:	**Location (Or Closest Address): South Herford, Sylvester Rd**
Date: August 15, 2024 **Time: in: 9am-5:30pm**	
Monitor Name: Melissa Friesen	**Signature:**
Meetings: Met Jon (Mission Contractors)	
Meeting Participants: Jon M, and Myself.	
Contractor(s) On Site: Jon M	**Name of Construction Representative Present: Mission Contractors, Leq'á:mel**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 25 Degrees	
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐	
Completed Construction Activities (Since Last Visit): **Salvaged creek. Added pump to dewater creek.**	
Construction Activities: Removing bedload from the creek.	**Photos:**
Construction Equipment Being Used: Komat'su Excavator and Volvo 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					

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Silt Fencing	x		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			Fuel in vehicle containment storage	
Other					
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	x			The machines are in good condition.	
Initial Cleaning (Mud, Seeds)	x			Machines are clean	
Other					
Waste Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Sanitary Facilities	X				
Solid Waste & Recycling	x			Garbage is taken away daily bag located next to spill kit	
Special Waste & Hazardous Materials			x		
Other					
Atmosphere	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Dust	x				
Air Quality	X				
Other					
Vegetation Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Invasive Plants	x				
Other					

General Observations & Comments (Wildlife, New Sensitive Features, etc.):	**Photos:**

Other Comments: The pump malfunctioned, the water returned to the creek, the isolation fencing was still up so the creek stayed clear of fish. Nicole was on-site and took a reading for turbidity. She felt confident that the water returning to the area we hadn't salvaged was safe for the fish.	**Photos:**

Upcoming Construction Events:

Excavating the south Herford Creek.

Incident Report Required? **Yes** ☐ **No** ☒

Natural Resource Department: Daily Environmental Monitoring Report

pic 1: Creek Dry and ready for excavation



Pic 2: Excavator Removing bedload.



Pic 3: Nicole's is camera ready, helping with the pump.



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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:	**Location (Or Closest Address): South Herford, Sylvester Rd**
Date: August 16, 2024 **Time: in: 9am-5:30pm**	
Monitor Name: Melissa Friesen	**Signature:**
Meetings: Met Jon (Mission Contractors)	
Meeting Participants: Jon M, and Myself.	
Contractor(s) On Site: Jon M, Jim (Operator)	**Name of Construction Representative Present: Mission Contractors, Leq'á:mel**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 25 Degrees	
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐	
Completed Construction Activities (Since Last Visit): **Salvaged creek. Added pump to dewater creek.** **The pump malfunctioned, the water returned to the creek, the isolation fencing was still up so the creek stayed clear of fish. Nicole was on-site and took a reading for turbidity. She felt confident that the water returning to the area we hadn't salvaged was safe for the fish.**	
Construction Activities: Removing bedload from the creek. Discussions over the culvert in the creek, Jon and Joon (AE) agreed on a plan to put in multiple weirs to make up the meter distance from the bottom of the creek to the culvert.	**Photos:**
Construction Equipment Being Used: Komat'su Excavator and Volvo 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					

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Silt Fencing	x		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			Fuel in vehicle containment storage	
Other					
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	x			The machines are in good condition.	
Initial Cleaning (Mud, Seeds)	x			Machines are clean	
Other					
Waste Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Sanitary Facilities	X				
Solid Waste & Recycling	x			Garbage is taken away daily bag located next to spill kit	
Special Waste & Hazardous Materials			x		
Other					
Atmosphere	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Dust	x				
Air Quality	X				
Other					
Vegetation Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Invasive Plants	x				
Other					

General Observations & Comments (Wildlife, New Sensitive Features, etc.):	**Photos:**
While excavating I was looking out for any cultural finds, nothing was seen or reported by crew at this time.	

Other Comments:	**Photos:**

Upcoming Construction Events:

Excavating the south Herford Creek.

Incident Report Required? **Yes** ☐ **No** ☒

Pic 1: Excavating the creek.



Pic 2: Culvert and excavated creek.



Pic 3: Measuring the Distance from bottom of creek to culvert.



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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:	**Location (Or Closest Address): South Herford, Sylvester Rd**
Date: August 17, 2024 **Time: in: 9am-2:30pm**	
Monitor Name: Melissa Friesen	**Signature:**
Meetings: Met Jon (Mission Contractors)	
Meeting Participants: Jon M, and Myself.	
Contractor(s) On Site: Jon M, Marco	**Name of Construction Representative Present: Mission Contractors, Leq'á:mel**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 30 Degrees	
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐	
Completed Construction Activities (Since Last Visit): Continued to divert the creek and remove the bedload, material is staying on-site as per the owner's request. **Removing bedload from the creek. Discussions over the culvert in the creek, Jon and Joon (AE) agreed on a plan to put in multiple weirs to make up the meter distance from the bottom of the creek to the culvert.**	
Construction Activities: Added another pump just before the culvert that goes under Sylvester RD. Brought in big Boulders to build the weirs today. Weirs were put in by Jon and Marco. AE and Jon seem to be happy with how it came together and ended the day early once they were in.	**Photos:**
Construction Equipment Being Used: Komat'su Excavator and Volvo 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					

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Silt Fencing	x		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			Fuel in vehicle containment storage	
Other					
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	x			The machines are in good condition.	
Initial Cleaning (Mud, Seeds)	x			Machines are clean	
Other					
Waste Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Sanitary Facilities	X				
Solid Waste & Recycling	x			Garbage is taken away daily bag located next to spill kit	
Special Waste & Hazardous Materials			x		
Other					
Atmosphere	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Dust	x				
Air Quality	X				
Other					
Vegetation Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Invasive Plants	x				
Other					

General Observations & Comments (Wildlife, New Sensitive Features, etc.):	**Photos:**
While excavating I was looking out for any cultural finds, nothing was seen or reported by the crew at this time.	

Other Comments:	**Photos:**

Upcoming Construction Events:

Excavating the south Herford Creek.

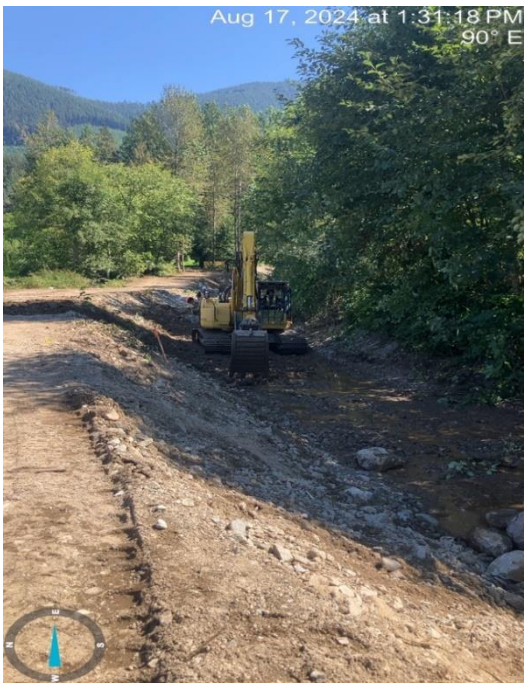
Incident Report Required? **Yes** ☐ **No** ☒

Natural Resource Department: Daily Environmental Monitoring Report

Pic 1: Ground water and run off collecting in the creek. Pic 2: Pump added to removed water. Pic 3: Starting to work on the weirs in the creek.

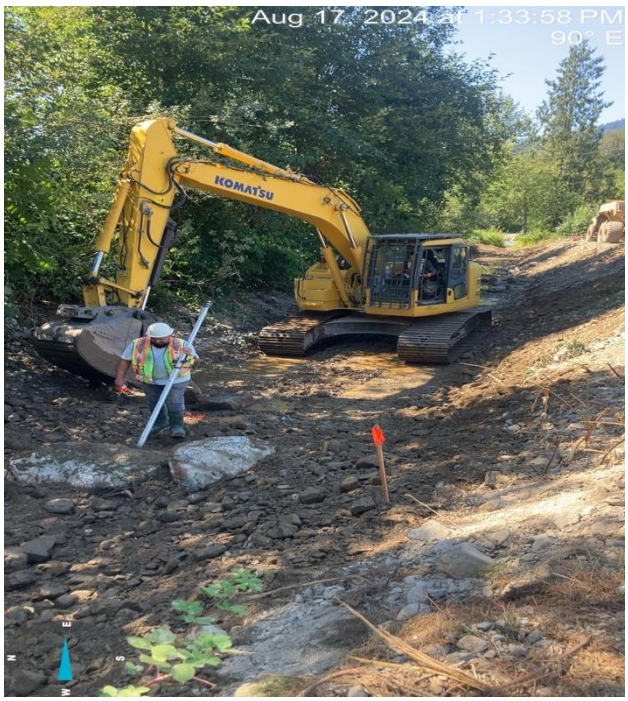






Pic 4: Adding boulders for the weir.

Pic 5: Adding boulders placed by excavator, last weir added for the day.





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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:	**Location (Or Closest Address): South Herford, Sylvester Rd**
Date: August 19, 2024 **Time: in: 8:30-3:30pm**	
Monitor Name: Melissa Friesen	**Signature:**
Meetings: Met Jon (Mission Contractors)	
Meeting Participants: Jon M, and Myself.	
Contractor(s) On Site: Jon M, Marco, Jim (Operator)	**Name of Construction Representative Present: Mission Contractors, Leq'á:mel**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 25 Degrees	
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐	
Completed Construction Activities (Since Last Visit): Excavating creek and adding Weirs, big boulders were places for the weirs to help with fish habitat and easier access to culvert.	
Construction Activities: Excavating the last section before the culvert of south Herford. Adding 20 meters of rip-rap	**Photos:**
Construction Equipment Being Used: Komat'su Excavator and Volvo 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					

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Silt Fencing	x		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			Fuel in vehicle containment storage	
Other					
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	x			The machines are in good condition.	
Initial Cleaning (Mud, Seeds)	x			Machines are clean	
Other					
Waste Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Sanitary Facilities	X				
Solid Waste & Recycling	x			Garbage is taken away daily bag located next to spill kit	
Special Waste & Hazardous Materials			x		
Other					
Atmosphere	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Dust	x				
Air Quality	X				
Other					
Vegetation Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Invasive Plants	x				
Other					

General Observations & Comments (Wildlife, New Sensitive Features, etc.):	**Photos:**
While excavating I was looking out for any cultural finds, nothing was seen or reported by the crew at this time.	

Other Comments:	**Photos:**

Upcoming Construction Events:

Excavating the south Herford Creek.

Incident Report Required? **Yes** ☐ **No** ☒

pic 1, excavating and placing filter fabric.

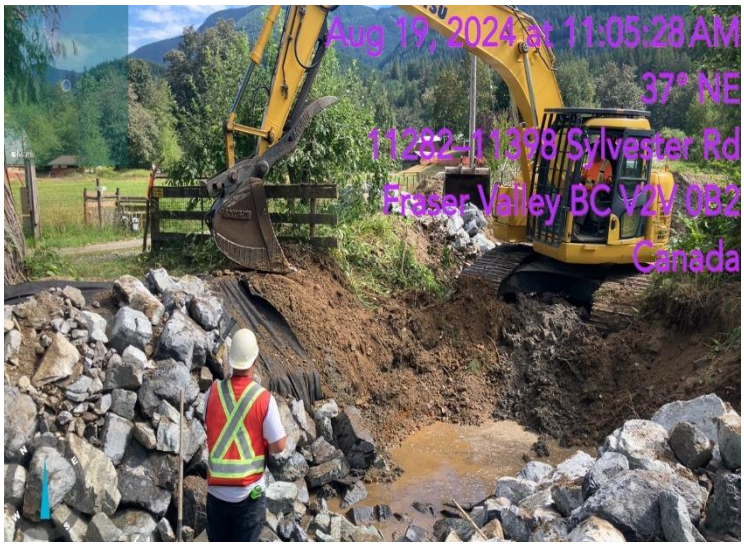


Pic 2, making sure the depth is correct with a laser level



pic 3 and 4 , excavating and adding the riprap





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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:	**Location (Or Closest Address): South Herford, Sylvester Rd**
Date: August 20, 2024 **Time: in:**	
Monitor Name: Melissa Friesen	**Signature:**
Meetings: Met Jon (Mission Contractors)	
Meeting Participants: Jon M, and Myself.	
Contractor(s) On Site: Jon M, Marco, Jim (operator)	**Name of Construction Representative Present: Mission Contractors, Leq'á:mel**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 22 Degrees, partly cloudy.	
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐	
Completed Construction Activities (Since Last Visit): Excavated south Herford Creek. Added weirs to the creek. (South Herford) excavated material and added 20 meters of riprap.	
Construction Activities: Fish Salvaged a section of south Herford, Parrell to Sylvester Rd. Pumps were added at the end of the day to dewater the section of the creek, and Guardians scoured the creek for any fish left behind.	**Photos:**
Construction Equipment Being Used: Komat'su Excavator and Volvo 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					

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Silt Fencing	x		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			The machines are in good condition.	
Initial Cleaning (Mud, Seeds)	x			Machines are clean	
Other					
Waste Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Sanitary Facilities	X				
Solid Waste & Recycling	x			Garbage is taken away daily bag located next to spill kit	
Special Waste & Hazardous Materials			x		
Other					
Atmosphere	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Dust	x				
Air Quality	X				
Other					
Vegetation Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Invasive Plants	x				
Other					

General Observations & Comments (Wildlife, New Sensitive Features, etc.):	**Photos:**
No cultural finds currently. Guardians have been on the lookout since work started.	

Other Comments:	**Photos:**

Upcoming Construction Events:

Excavating south Herford after the salvage was complete and added 50 meters of riprap.

Incident Report Required? **Yes** ☐ **No** ☒

Natural Resource Department: Daily Environmental Monitoring Report

Leq'á:mel First Nation

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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:	**Location (Or Closest Address): South Herford, Sylvester Rd**
Date: August 21, 2024 **Time: in: 8am -2pm**	
Monitor Name: Melissa Friesen	**Signature:**
Meetings: Met Jon (Mission Contractors)	
Meeting Participants: Jon M, and Myself.	
Contractor(s) On Site: Jon M, Marco, Jim (operator)	**Name of Construction Representative Present: Mission Contractors, Leq'á:mel First Nation**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 20 Degrees, partly cloudy.	
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐	
Completed Construction Activities (Since Last Visit): Excavated south Herford Creek. Added weirs to the creek. (South Herford) excavated the culvert running under Sylvester Rd. Removed materials and added 20 meters of riprap. Fish Salvaged a section of south Herford, Parrell to Sylvester Rd. Pumps were added at the end of the day to dewater the section of the creek, and Guardians scoured the creek for any fish left behind.	
Construction Activities: Excavated south Herford section running parallel to Sylvester Rd. Adding 50 meters of riprap.	**Photos:**
Construction Equipment Being Used: Komat'su Excavator and Volvo 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					

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Silt Fencing	x		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			The machines are in good condition.	
Initial Cleaning (Mud, Seeds)	x			Machines are clean	
Other					
Waste Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Sanitary Facilities	X				
Solid Waste & Recycling	x			Garbage is taken away daily bag located next to spill kit	
Special Waste & Hazardous Materials			x		
Other					
Atmosphere	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Dust	x				
Air Quality	X				
Other					
Vegetation Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Invasive Plants	x				
Other					

General Observations & Comments (Wildlife, New Sensitive Features, etc.):	**Photos:**

Other Comments: oil was spotted in the water; it wasn't coming from machines or pumps. Looks as though it was coming from run-off from the road. Nicole used spill pads to soak up the oil. **Honda generator was placed on top of spill pads, Nicole from Aqua Terra, stressed her concern. Jon assured Nicole and me, they would get more spill trays for tomorrow.**	**Photos:**

Upcoming Construction Events:

Continuing to excavate south Herford Creek and adding 50 meters of riprap.

Incident Report Required? **Yes** ☐ **No** ☒

Natural Resource Department: Daily Environmental Monitoring Report

Pic 1, removing trees for access.



Pic 2, adding filter fabric and riprap



Pic 3 and 4 oil runoff from the road. Nicole used spill

Pads nbnbbbbnnbbbbbbbbbbbbbbbbbbbbto remove the oil.





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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:	**Location (Or Closest Address): Herford Creek**
Date: Oct 3, 2024 **Time: 8am – 9am**	
Monitor Name: Samantha Mitchell	**Signature: Sam M**
Meetings: Morning tailgate.	
Meeting Participants: Everyone on site	
Contractor(s) On Site: Mission Contracting.	**Name of Construction Representative Present: John from Mission Contracting.**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Sunny, a high of 17	
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐	
Completed Construction Activities (Since Last Visit): Ground material has been steadily removed	
Construction Activities: Removing ground materials. There was a net that LFN had missed the day we thought all equipment had been removed, I removed the last net.	**Photos: See all**
Construction Equipment Being Used: Excavator and dump trucks.	**Photos:**

Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)

Boundary Flagging	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
General Construction			X		
Riparian Zone(s)			X		
Env. Sensitive Features			X		
Other					
Water Quality	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Turbidity			X		
Temperature			X		
DO			X		
pH			X		
Conductivity			X		
Other					

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Silt Fencing			X		
Bank Stabilization			X		
Soil Stockpiles			X		
Drainage & Diversions			X		
Detention Facilities			X		
Other					
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Spill Kits/SPER Plan	X				
Fuel Storage	X				
Other					
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	X				
Initial Cleaning (Mud, Seeds)	X				
Other					
Waste Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Sanitary Facilities	X				
Solid Waste & Recycling	X				
Special Waste & Hazardous Materials	X				
Other					
Atmosphere	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Dust	X				
Air Quality	X				
Other					
Vegetation Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Invasive Plants	X				
Other					

General Observations & Comments (Wildlife, New Sensitive Features, etc.):	**Photos:**

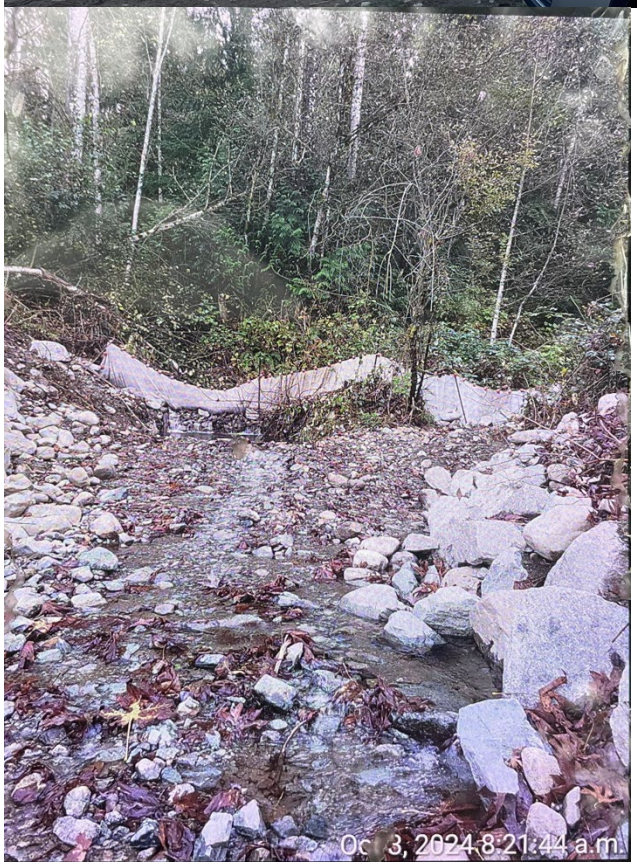
Other Comments:	**Photos:**

Upcoming Construction Events:
Still more dirt to remove from the stockpile.
They will bring in topsoil and seed for the dyke next week.

Incident Report Required? **Yes** ☐ **No** ☒

Natural Resource Department: Daily Environmental Monitoring Report





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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:	**Location (Or Closest Address): Herford**
Date: Oct 8, 2024 / **Time: 1 Hr, 2 site walks (30 Mins)**	
Monitor Name: Samantha Mitchell	**Signature: Sam M**
Meetings:	
Meeting Participants: Everyone on site	
Contractor(s) On Site: Mission Contracting	**Name of Construction Representative Present:**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): High of 15c	
Ground Conditions: Dry ☐ Wet ☒ Saturated ☐	
Completed Construction Activities (Since Last Visit): They have cleaned up and removed some equipment from the site.	
Construction Activities: Loading trucks with materials to take off-site. They took many loads to the house across the road.	**Photos: See all**
Construction Equipment Being Used: Komatsu PC300LC excavator. 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					

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Silt Fencing			X		
Bank Stabilization			X		
Soil Stockpiles	X				
Drainage & Diversions			X		
Detention Facilities			X		
Other					
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Spill Kits/SPER Plan	X				
Fuel Storage	X				
Other					
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	X				
Initial Cleaning (Mud, Seeds)	X				
Other					
Waste Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Sanitary Facilities	X				
Solid Waste & Recycling	X				
Special Waste & Hazardous Materials	X				
Other					
Atmosphere	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Dust	X				
Air Quality	X				
Other					
Vegetation Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Invasive Plants	X				
Other					

General Observations & Comments (Wildlife, New Sensitive Features, etc.):	**Photos:**
No cultural finds.	

Other Comments:	**Photos:**

Upcoming Construction Events: **Wednesday, Oct 9th, they will be laying topsoil on dyke.**

Incident Report Required? **Yes** ☐ **No** ☒

Natural Resource Department: Daily Environmental Monitoring Report









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Report Number:	**Location (Or Closest Address): Herford**
Date: Oct 9, 2024 **Time: 1hr**	
Monitor Name: Samantha Mitchell	**Signature: Sam M**
Meetings:	
Meeting Participants: Everyone on site	
Contractor(s) On Site: Mission Contracting	**Name of Construction Representative Present: John Mission Contracting**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): sun and cloud high of 14c	
Ground Conditions: Dry ☐ Wet ☒ Saturated ☐	
Completed Construction Activities (Since Last Visit):	
Construction Activities: Trucks are loading materials to take off the site. A skid steer showed up at 9 a.m. At 11:40, boulders were loaded off the site. All the materials were removed from the site, and topsoil was delivered. They are putting in a barbed wire fence near the culvert and one near the barn.	**Photos: See all**
Construction Equipment Being Used: Komatsu PC300LC excavator. Dump truck. Deere 329D skid steer	**Photos:**

Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)

Boundary Flagging	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
General Construction			X		
Riparian Zone(s)			X		
Env. Sensitive Features			X		
Other					
Water Quality	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Turbidity			X		
Temperature			X		
DO			X		
pH			X		
Conductivity			X		
Other					

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Silt Fencing			X		
Bank Stabilization			X		
Soil Stockpiles	X				
Drainage & Diversions			X		
Detention Facilities			X		
Other					
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Spill Kits/SPER Plan	X				
Fuel Storage	X				
Other					
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	X				
Initial Cleaning (Mud, Seeds)	X				
Other					
Waste Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Sanitary Facilities	X				
Solid Waste & Recycling	X				
Special Waste & Hazardous Materials	X				
Other					
Atmosphere	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Dust	X				
Air Quality	X				
Other					
Vegetation Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Invasive Plants	X				
Other					

General Observations & Comments (Wildlife, New Sensitive Features, etc.):	**Photos:**
No Cultural finds at this time.	

Other Comments:	**Photos:**

Upcoming Construction Events:
Laying topsoil and seed.

Incident Report Required? **Yes** ☐ **No** ☒

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Report Number:	**Location (Or Closest Address): Herford**
Date: Sept 23, 2024 **Time: 8:30 – 2:30 See other comments**	
Monitor Name: Samantha Mitchell	**Signature: Sam M**
Meetings:	
Meeting Participants: Everyone on site	
Contractor(s) On Site: Mission Contractors LTD	**Name of Construction Representative Present: John**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Rainy and overcast. Foggy. 15c	
Ground Conditions: Dry ☐ Wet ☒ Saturated ☐	
Completed Construction Activities (Since Last Visit): All the excavating of the creek is completed. This morning before I arrived, John had accidentally ripped a power line out of the ground with the excavator. He talked to the home owner and is calling in an electrician. Bottom right photo.	

Construction Activities: I took down the 3 remaining net fences. Hauling the material removed from the job site. 4th at11:25. Leave at 11:43. 5th 12:38. Dump-truck driver fixed the electrical connection to the dump trailer at 12:50 Left 1:04. 6th 2:05arrive. The last one of the day. They only have the one dump truck, seems like it comes once an hour.	**Photos: See all**
Construction Equipment Being Used: Excavator, 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					

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Silt Fencing			X		
Bank Stabilization			X		
Soil Stockpiles	X				
Drainage & Diversions			X		
Detention Facilities			X		
Other					
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Spill Kits/SPER Plan	X				
Fuel Storage	X				
Other					
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	X				
Initial Cleaning (Mud, Seeds)			X		
Other					
Waste Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Sanitary Facilities	X				
Solid Waste & Recycling	X				
Special Waste & Hazardous Materials	X				
Other					
Atmosphere	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Dust	X				
Air Quality	X				
Other					
Vegetation Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Invasive Plants	X				
Other					

General Observations & Comments (Wildlife, New Sensitive Features, etc.):	**Photos:**

Other Comments:	**Photos:**
7am to 8:30 was spent cleaning nets at Legasy with Anna and Megan.	

Upcoming Construction Events: They will be back tomorrow 7am loading the dump truck again, and the electrician will come in the morning as well.

Incident Report Required? **Yes** ☐ **No** ☐

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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:		**Location (Or Closest Address): Herford**
Date: Sept 24, 2024	**Time: 7am – 12:30 9-9:30am Legace , 12:30 fish walk. Until 2:30**	
Monitor Name: Samantha Mitchell		**Signature: Sam M**
Meetings:		
Meeting Participants: Everyone on site		
Contractor(s) On Site: Mission Contracting, Mint (flagger Renay), Lindsay Ventures(Dumptruck) , Pro-Teck Surveys. Associated Engineering(June). Triple M investments(dumptruck) , Trueline power.		**Name of Construction Representative Present: John From Mission Contracting**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Foggy morning, Sun And cloud, high of 25c.		
Ground Conditions: Dry ☐ Wet ☒ Saturated ☐		
Completed Construction Activities (Since Last Visit):		

Construction Activities: Hauling materials out. 7am 2 trucks loaded. 3d truck 7:27 is Lindsay Ventures which came to pick up the pile of brush and they also ran over the fence/gate, the owners drove up and looked at it right away. Dirt pile being removed was estimated 2000 Surveyors came to survey the creek to see how much was removed. They had come 2 months ago before the project started. Electrician arrived at 11:20. 11:40, mission contracting found time to fix the fence.	**Photos: See all**
Construction Equipment Being Used: Excavator, 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		

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				
Other					

General Observations & Comments (Wildlife, New Sensitive Features, etc.): I walked along the channels that were salvaged and are now opened back up and the fish are making their way back in.	**Photos:**

Other Comments:	**Photos:**

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









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