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Deroche Creek Long Term Recovery Solution

2025 Completion Report

Final Report
April 28, 2026
KWL Project No. 2838.003

Prepared for:
BC Ministry of Environment and Parks
and
Northwest Hydraulic Consultants Ltd.

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1. Introduction

1.1 Purpose of Report

This report documents the completion of the long-term flood recovery solution on Deroche Creek in Deroche BC. Design work stared in 2023, and construction completion occurred in spring 2026. This work was completed as a recovery solution to the November 2021 Atmospheric River.

1.2 Background

Sedimentation impacts occurred in this area resulting from the November 2021 atmospheric storms and subsequent flooding events. This was a regional flood event resulting from multiple atmospheric rivers through southwest BC. PricewaterhouseCoopers (PwC) is working with the Ministry of Environment and Parks (ENV) to assess the sedimentation impacts of the atmospheric river (AR) events that occurred in November and December 2021. Northwest Hydraulic Consultants Ltd. (NHC) has been engaged by ENV to provide hydrotechnical assessment and planning services in response to the AR events.

Leq'a:mel First Nation (LFN) identified the lower reaches of the Deroche Creek alluvial fan as having been impacted by sedimentation during the AR events. The affected area was subsequently assigned site identification code: S-CR-30. NHC assessed sedimentation concerns within S-CR-30 in October 2021. The site was identified as a having high public health and safety, infrastructure, and environmental risk, and the Deroche Creek Emergency Sediment Removal Project (the Project) was initiated.

LFN is the Owner of the Project. Funding for the Project is being provided jointly by the province represented by Emergency Management BC (EMBC), and the Federal Government represented by Indigenous Services Canada (ISC). Project coordination and management is being provided by the ENV and their agent PwC. NHC is the prime consultant and engineer-of-record, responsible for the technical aspects, and is under contract as retained by Ministry of Environment and Parks (ENV). NHC retained Kerr Wood Leidal Associates Ltd (KWL) to lead environmental permitting and monitoring as well provide professional construction services including contract administration and field reporting.

The first phase of work was completed in the fall of 2022. This work included restoration to the site through removal of sediment, protection of trees, and creation of new channels. The contractor for these 2022 works was Summit Earthworks Inc. In the winter of 2024 Drake Resources undertook a second phase of work involving permitted tree removal in support of the works as described in this Completion Report.

NHC produced a design brief in 2024 (see Appendix B) for a second phase of work. The report herein describes this second phase of work in summer 2025.

1.3 Location

The project is located in Deroche, BC, a small community located approximately 9 km Northwest of Chilliwack, BC. The project site is shown on Figure 1-1.

Table 1-1: Location Summary

Site ID	CR-30
Site Description	Deroche Creel from North Nicomen Rd. (Lucy-Harris) Bridge downstream to Taylor Road (Reach 2) and from Taylor Rd. to the mouth of the Creek at Nicomen Slough (Reach 1). See Figure 1-1 attached
Location	Upstream end of Site CR-30 at Lucy-Harris Bridge: 49.186513° N, -122.075816° W
Local Authority	Leq'a:mel First Nation; CP Rail; MoTI
Waterbody	Deroche Creek (Alluvial Fan) and Nicomen Slough



Figure 1-1: Location Map

1.4 Site Condition

Post 2021 AR

During the 2021 AR events Site S-CR-30 experienced sediment aggradation that elevated the streambed by 0.5 m to 1.5 m along its length. The depth of aggradation was confirmed by comparing a pre-construction survey conducted in November 2022 with a pre-AR surface that had been developed in October 2020.

Risk assessment was performed by NHC to determine impacts of the AR to the Deroche Creek system. Assessment indicated that aggradation reduced the flow capacity of the channel and bridge openings, specifically at the MoTI's Taylor Road Bridge, increasing the likelihood of inundation in overbank areas, road and bridge overtopping, and erosion damage.

2022 Works

Works were completed in 2022 to restore the site to pre-AR conditions as nearly as practical; this involved sediment removal, tree protection and removal, bank raising, and construction of new channels in the alluvial fan. For detailed description of works see the 2022 Completion Report in Appendix F.

1.5 Scope

The scope of work for this project generally included the following items:

- Project Management
- Contract administration
- Rights holders and Stakeholders Coordination
- Environmental Planning
- Permitting
- Construction Management and Inspection

1.6 Project Team

The NHC project team included:

- Engineer of Record – Des Goold, PEng
- Project Engineer– Andy Huang, EIT
- Project Engineer– Haley Oosterman, EIT

The LFN team included:

- Senior Planning Officer – Benafshaw Dashti, RPP, MCIP
- Guardian Coordinator – Melissa Friesen
- Interim Lands Manager – Rick MaKamey
- Natural Resources Manager – John Tao
- Fisheries Technician – Morgan LaPointe

The KWL subconsultant team included:

- Program Manager – Crystal Campbell, PEng (BC)
- Project Manager and Contract Administrator– Brett Barker, Dip. BAdm, AScT (BC)
- Qualified Environmental Professional – Janice Kwo, RP Bio (BC)
- Field Inspector – Luke Komisarski, EIT (BC)
- Field Inspector – Tierra Parminter, EIT (BC)
- Field Inspector – Sebastian Latrielle, Engineering Co-op Student

The WSP subconsultant team included:

- Project Manager – Carter McNaught, PEng

Additional subconsultants included the following:

- Arcadis – Contamination Testing

The general contractor for the work was Timbro Contracting., with the following key staff:

- Project Manager – G. Andres Murillo
- Project Coordinator – Tyson West
- Site Superintendent – Travis Neels

Project direction from ENV was provided by:

- Project Sponsor – Amy Vallarino
- Operations Manager – Thyren Jacobs

The above parties shared reoccurring meetings weekly along with the Contractor for the duration of the project.

2. Design

2.1 Design Objective

The design objective was to continue restoration of the site to pre-AR conditions, increase channel volume in anticipation of future sediment deposition, and construct environmental enhancement structures; this involved the following:

- Construction of habitat enhancement structures south of Taylor Road Bridge; including:
    - excavation of 3 fan channels;
    - construction of 2 pile deflectors;
    - excavation of the west branch of Deroche Creek adjacent to Fan Channels 4a and 4b, and;
    - construction of a Large Woody Debris Reef along the Nicomen Dike.
- Channel deepening, widening, armoring, and enhancement between the CKPCR Railway bridge and Tayor Road Bridge; including:
    - armoring of the basin entrance and exit;
    - riprap placement;
    - grade Control Spines;
    - low Flow Pilot Channel, and;
    - rootwads Cabled to Ballast Boulders.

For detailed information on design objectives see the Deroche Creek Design Brief (NHC, 2025) in Appendix A.

Table 2-1: Description of Completed Works

Section	Type	Drawing Reference	Location (STA)	Description
Large Woody Debris (LWD) Reef	Large Woody Debris (LWD)	009/010	0+020 to 0+040	A Large Woody Debris Reef was constructed along the Nicomen Dike on No. 7 highway
Fan Channels	Habitat Enhancement – Fan Channel	009/010	0+000 to 0+098	Excavation of Fan Channels 4a and 4b, placement of habitat rootwads
	Habitat Enhancement – Fan Channel	009/010	0+000 to 0+056	Excavation of Fan Channels 1 and 2, placement of habitat rootwads
Pile Deflectors	Habitat Enhancement	003/ 005	1+000 to 1+025	Pile driving of 8 Douglas Fir piles, placement of LWD fill for Pile Deflector 1
	Habitat Enhancement	003/ 005	2+000 to 2+045	Pile driving of 14 Douglas Fir piles, placement of LWD fill for Pile Deflector 2
Deroche Creek West Branch	Habitat Enhancement	003	10+000 to 10+120	Excavation of sediment in the west branch of Deroche Creek to connect Fan Channels 4a and 4b
	Earthworks – Grading	005	0+215 to 0+235	Taylor Bridge channel grade control with 500mm void filled boulders
	Earthworks – Channel Armoring	005	0+215	Tie-in of riprap on north side of Taylor Road bridge
	Earthworks – Channel Armoring	005	0+235	Tie-in of riprap on south side of Taylor Road bridge
Sediment Basin	Access	004/006	5+090	Installation of a swing gate and sign for maintenance access to the creek
	Access	004/006	5+000 to 5+020	Installation of a geocell lined equipment access ramp
	Earthworks – Channel Armoring	004/006-007	0+300 to 0+320	Installation of geotextile and 250-KG riprap on each side of the channel. Installation of 900mm void-filled boulders
	Earthworks - Excavation	004/ 006-007	0+320 to 0+530	Bulk excavation of the basin, and installation of substrate filled Type I rock
	Earthworks – Grade Control Spines	004/006	0+350 to 0+500	Installation of grade control spines (1m deep by 3.5m wide trench, refilled with Type II rock) every 30~40m
	Earthworks – Channel Armoring	004/006-007	0+530 to 0+550	Installation of geotextile and 500-KG riprap on each side of the channel. Installation of 900mm void-filled boulders
	Earthworks - Excavation	004/006-007	4+000 to 4+240	Excavation of a low-flow pilot channel
	Habitat Enhancement	004-006	4+020 to 4+220	Installation of habitat boulders and ballasted rootwads in the low-flow channel

3. Permitting & Approvals

3.1 First Nations Consultation

Design and construction works were completed with direct input from LFN, who provided Guardians as environmental site monitoring for the duration of the works.

3.2 Environmental

The works were completed under the following permits and approvals which are in Appendix D:

- Fisheries and Oceans Canada – *Fisheries Act* Authorization.
- Fisheries and Oceans Canada – Scientific License for fish salvage activities for federally-regulated fish species.
- BC Ministry of Water, Land and Resource Stewardship – *Water Sustainability Act* Change Approval for Works In and About a Stream.
- BC Ministry of Water, Land and Resource Stewardship – Scientific Fish Collection Permit for fish salvage activities for provincially-regulated fish species.
- BC Ministry of Water, Land and Resource Stewardship – General Wildlife Permit for potential salvage of amphibians during construction.

All project permits and approvals were provided to the Contractor before commencement of construction. An environmental management plan was prepared by KWL and provides overarching guidance, sets out the requirements, and measures that will be adopted to avoid, minimize, and mitigate the potential adverse environmental impacts of the Project.

Fisheries and Aquatic Resources

Deroche Creek and Nicomen Slough support populations of coho (*Oncorhynchus kisutch*) and chum salmon (*Oncorhynchus keta*). Deroche Creek was dry at the time of construction, and no fish salvage was conducted. A fish salvage was completed in Nicomen Slough prior to the construction of the LWD reef. Three sculpin (*Cottus spp.*) and two northern pikeminnow (*Ptychocheilus oregonensis*) were captured and relocated. Bass (*Micropterus spp.*) and pumpkinseed (*Lepomis gibbosus*), which are invasive, were captured and humanely euthanized. No salmonids were captured.

3.3 Archaeological

Summit Earthworks prepared a Leq'a:mel First Nation Permit Report[1] included in Appendix P.

The works were completed under the following permits and approvals which are in Appendix D:

- Leq'a:mel First Nation – Approval under Nation's Environmental Assessment Law (2018).
- Leq'a:mel First Nation – Permit under Nation's Soil Transport, Deposit, and Removal Law (2020).
- Leq'a:mel First Nation – Archaeological Permit for site investigation and, if required, alteration.

3.4 Other Approvals

Land access agreements from the property owners, and BC Hydro, where the project is located were obtained for the 2025 project works. These access agreements are included in Appendix G.

[1] Leq'a:mel First Nation Permit Report Archaeological Assessment Deroche Creek, Phase 1 (LFNIUP# 2023-003, October 2, 2023, Summit Earthworks, October 31, 2023

4. Construction

4.1 Contract Award

The work was tendered under a competitive process posted on Bid Central. KWL managed the tendering posting, process and opening on behalf of LFN and ENV. The Contract Documents were based on CCDC 4 Contract Documents. The KWL project team provided the technical specifications, detailed design drawings from NHC, and supporting documents.

Two addendums were issued to tenderers as follows:

- Addendum #1 issued on December 18, 2024
- Addendum #2 issued on January 6, 2025

Ten contractors responded to the Invitation to Tender, with Timbro Contracting being the low bidder ($2,986,917.58 excluding GST).

The contract was awarded to Timbro Construction Ltd., the lowest compliant submission. The following supporting procurement documents are enclosed in Appendix E and includes:

- Timbro Construction Tender Submission
- Notice of Award (NoA)

The key procurement dates are summarized as follows:

- Initial Tender: June 2024
- Secondary Tender: November 11, 2025
- Optional Site Meeting: December 9, 2024
- Enquiries Deadline: January 2, 2025
- Tender Close: January 17, 2025
- Notice of Award: February 20, 2025
- Notice to Proceed: Issued March 5, 2025

4.2 Approach to Construction

Initial tree clearing was undertaken by Drake Resources Feb/Mar 2024 as a direct award contract by LFN. This initial clearing work was undertaken to comply with permit requirements and to help expedite the major in stream works contract with Timbro. Timbro mobilized to site on June 9, 2025. The channel restoration portion of construction, including sediment removal, channel widening and deepening, and large woody debris installation was completed between June 22 and October 14. The remaining work on the site included live staking, and tree and shrub installations which were completed between October 3 and November 26, 2024.

4.3 Changes During Construction

Lot 8-3-3

Disposal of excavated sediment was initially planned for Lot 8-3-3, ~200m west of the sediment basin. The location of sediment disposal was changed to the Bodner Pit in the first week of construction. Preliminary works that had been completed before this change were reverted to reinstate Lot 3-3-3 back to pre-construction conditions.

Fan Channels

Fan Channels 1 and 2 were moved, joined together, and connected to the main channel to avoid stranding during low water levels. Fan Channel 3 was removed from the project scope. Fan Channel 4b was added to the project scope.

Site Instructions and Change Orders

Table 4-1 provides a further summary of changes from the detailed design drawings that were implemented during construction due to the site and environmental conditions and technical considerations. Site Instructions can be found in Appendix H, and in the summary Table 4-2 below. These documents are formal directives prepared by KWL for the contractor to provide clarification, address issues or modify the original contract documents. Change Orders, listed below and located in Appendix F, provide documentation on any changes to the scope of work, contract price or project schedule.

Table 4-1: Site Instruction List

SI-##	Title	Description
1	Test Pits	Confirm the location and orientation for excavating the two soil sampling pits in the Contract.
2	Pile Refusal	Clarify procedure if pile reaches refusal during pile driving.
3	Addendums After Tender Close	Include four appendices that were not available at time of Tender.
4	Drawing Revisions	Update discrepancies on drawing sheet 5 and 6.
5	Brace Logs/LWD Fill	Clarify expectations for Brace Logs and LWD Fill.
6	Number of Rootwads	20 WRC Rootwad Stems required for the project.
7	Alternate to WRC Rootwad Stems	Alternate utilization of the WRC rootwad stems within the low flow channel of the Sediment Basin.
8	Fan Channel 4/Deroche Creek West Branch	Directions for grading of Fan Channel 4/ Deroche Creek West Branch.
9	LFN Soil Permit Amendment	Temporarily move up to 773 m^3 of Soil from Fan Channel 4 to the identified Laydown Area.
10	Reef Wood Filler	Short wood pieces should be placed within the interior of the assembly. Long and complex pieces should correspondingly be placed on the outside perimeter.

Fourteen Change Orders (CO) were issued during the project, a summary of which is listed in the Table 4-2 below:

Table 4-2: Change Order List

Change Order	Description
CO 1	Overtime adjustment for initial delay in work
CO 2	Summarized costs due to pause of works by owner
CO 3	Excavated material offsite and volume adjustment
CO 4	Reinstate Lot 8-3-3 back to original condition
CO 5	Work in CPKCR RoW
CO 6	Import Root Wads
CO 7	Spread Material at Bodner Pit
CO 8	Fan 4 Excavation
CO 9	LWD Import Fill
CO 10	Lot 8-3-3 Preparation at Start of Contract Before Abandonment of Lot 8-3-3
CO 11	Replacement Import Douglas Fir Piles and Redo Strapping
CO 12	Bridge Bed Excavation Disposal Location Change (Formerly Lot 8-3-3)
CO 13	Delay Due to Pile Species Change
CO 14	Bodner Pit Contaminated Material Disposal

4.4 Construction Monitoring

KWL provided daily construction inspection services from June to October 2025, and intermittent inspection services as needed throughout the planting work from October to December 2025. All instream works were monitored by a KWL Qualified Environmental Professional (QEP) and/or environmental monitor (EM). During inspections, the inspectors and/or monitors worked with the contractor to ensure the work met the requirements of the design. Field inspection reports and site instructions are included in Appendix H.

4.5 Environmental Monitoring During Construction

LFN Guardians conducted daily environmental monitoring under supervision of Janice Kwo, R.P.Bio (BC), the QEP at KWL. The QEP conducted on-site environmental monitoring during key construction activities. Between the Guardians and QEP, daily site inspections were completed to verify that Project works complied with the conditions included in all applicable environmental legislation, permits and approvals, and BMPs.

All works below the top of bank were monitored by an EM. Turbidity was monitored directly upstream (US; baseline conditions), and then immediately downstream of the work area during all in-stream works. Downstream measurements were twice each day, when necessary, and more frequently if a release of turbidity was observed. Minimal induced turbidity was identified during construction due to the water bypass allowing for work to be conducted in the dry.

During inspections, the EM documented the following items related to compliance with the environmental permits and implementation of BMPs:

- Location(s) of maintenance activities.
- Weather conditions.
- Environmental protection measures and materials on site.
- Condition of site equipment and their set up.
- Storage and handling of fuel and hazardous/waste products.
- Discussions with construction supervisors and staff.
- Any environmental deficiencies, incidents, concerns, recommendations, and/or required actions.

Mitigation Measures

All construction activities were carried out in accordance with the *Requirements and Best Management Practices for Making Changes In and About a Stream in British Columbia*. (Government of British Columbia, 2022) Some key environmental mitigation measures for the construction activities were provided as follows:

- A full-time environmental monitor was present on site during all in-stream works.
- Tree clearing occurred outside the breeding bird nesting season (March 1 to August 31).
- Instream works were completed in the reduced risk instream work window for the area (August 1–September 15).
- Isolation measures were installed in Nicomen Slough prior to the construction of the LWD reef. A fish salvage was conducted in the work area. Native species were relocated outside the work area and invasive species were humanely euthanized. No salmonids were captured.
- Erosion and sediment control measures were utilized as required to prevent the sedimentation of adjacent waterbodies.
- All machinery operating below the high water mark had biodegradable hydraulic fluid and grease.

Environmental Incidences

August 27 – The pile driving machine developed an internal oil leak near the northernmost end of Pile Deflector #2. This oil was fully contained within the machines collection sump and swamp pads with no oil entering the environment. Even though there was no environmental impact this incident needed to be identified and brought to the attention of all. It was determined that this machine was not using biodegradable oil. The machine was immediately removed from the slough area; the leak repaired and had its oil flushed and replaced with biodegradable oil.

4.6 Project Completion

- Timbro made formal written request to Kerr Wood Leidal Associates Ltd. (KWL) for an assessment of Substantial Performance on February 2, 2025.
    - After review and as of February 11, 2025, KWL confirmed all Works are Substantially Performed in accordance with the British Columbia Builders Lien Act (BCBL Act) and in accordance with Article 16-Substantail Performance of the Major Works Contract.
    - A Notice of Completion was posted on site by Timbro February 11, 2025.
- At the time of Substantial Performance there were some deficiencies, and their estimated value was calculated to be $37,137.60 for item 04.01.03. In accordance with the Major Works Contract, this deficiency was doubled and will be held back from payment until satisfactory completion of the deficiency. A Deficiency Holdback List detailing a list of all Works that have been completed or considered deficient was prepared and submitted to ENV.
- There are no outstanding claims by the Owner or the Contractor at time of Substantial Completion.

As of the date of this Completion Report Substantial Performance has been attained by the Contractor however Total Performance of the Contract will not happen until April 8th, 2026, when all deficiencies are complete. The Substantial Performance document is located in Appendix I.

- As of April 15, 2026, KWL confirmed plantings were fully complete and accepted by KWL in accordance with the Major Works Contract.

4.7 Summary of Key Dates

Table 4-3: Summary of Key Dates

Date	Activity
Feb /March 2024	Tree clearing by Drake Resources under separate contract.
Feb/March 2025	First stage mobilization for Grubbing/Clearing by Timbro.
June 9, 2025	Second stage mobilization for major works by Timbro.
June 10 – June 22, 2025	Pause of works.
June 22 – October 14, 2025	Sediment removal, channel armoring, large woody debris installation.
October 3 – November 26, 2025	Live staking and tree and shrub installations.
October 14, 2025	Timbro Demobilization.
February 2, 2025	Timbro made formal written request for assessment of Substantial Performance.
February 11, 2025	KWL confirmed all Works are Substantially Performed. A Notice of Completion was posted on site by Timbro.
April 15, 2025	KWL confirmed plantings were fully complete and accepted.

6. Operation and Maintenance of the Sediment Basin

For guidelines and recommendations of continued maintenance of the Deroche Creek area, see the Operation and Maintenance Manual (NHC, 2026).

7.

7. Environmental Effectiveness Monitoring

Environmental effectiveness monitoring will over a multi-year period post-construction to fulfil the terms outlined in the DFO *Fisheries Act* Authorization. It is intended to assess whether the proposed offsetting works (LWD reef, fan channels, and planting) are achieving their expected outcomes as per the offsetting plan. Aquatic habitat will be monitored in the summer and fall in years 1, 2, 3, and 5 following construction. Riparian restoration monitoring will occur in years 1, 2, 3, 5, 7, and 10 following construction. For each of these monitoring years, am inspection report should be created to document the site observations, any information received during the inspection, any need for repairs or maintenance, and any other issues arising from the inspection. Relevant photographs should be included in the inspection report.

Environmental effectiveness monitoring will assess fish passage, fish use of created rearing habitat, and survivorship of planted stock in the riparian area. Reporting will be submitted to DFO.

Report Submission

Prepared by:

KERR WOOD LEIDAL ASSOCIATES LTD.



Luke Komisarski, EIT (BC)
Junior Civil Engineer

Reviewed by:



Brett Barker, Dip BAdm, AScT (BC)
Project Manager

Statement of Limitations

This document has been prepared by Kerr Wood Leidal Associates Ltd. (KWL) for the exclusive use and benefit of the recipient for the subject project purpose.

This document represents KWL's professional judgement based on the information available at the time of its completion and as appropriate for the project scope of work. Services performed in developing the content of this document have been conducted in a manner consistent with that level and skill ordinarily exercised by members of the professions currently practicing under similar conditions. No warranty, express or implied, is made.

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Revision History

Revision #	Date	Status	Revision	Author
0	April 28, 2026	Final		LSK/BB

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Appendix A

NHC Design Brief

KERR WOOD LEIDAL ASSOCIATES LTD.
consulting engineers

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NHC Reference 3007814

May 27, 2024

BC Ministry of Environment and Climate Change Strategy
Flood Debris Management Secretariat
PO Box 9360 Stn Prov Govt
Victoria, BC V8W 9M2

Attention: Amy Vallarino, Senior Project Manager
Copy to: Carter McNaught, Project Manager (WSP)
Via email: Amy.Vallarino@gov.bc.ca
carter.mcnaught@wsp.com

Re: **Deroche Creek Recovery Solution Project**
Final Hydrotechnical Design Report Rev.0

Dear Amy:

1 Project Location

The Deroche Creek Long-Term Solution Project (the Project) encompasses Reaches 1 and 2 on the lower alluvial fan shown on Sheet 002 of the attached drawing package.

- Downstream end of Project at Nicomen Slough: E. 567704.63, N 5448149.07
- Upstream end of Project at the eastern edge of the Canadian Pacific Kansas City Railway right-of-way: E 567363.45, N. 5448567.09

The Project footprint lies on both reserve and non-reserve land. Property boundaries are shown on the drawings.

2 Background

The BC Ministry of Environment and Climate Change Strategy (ENV) is assessing and addressing the impacts of sediment introduced during the November 2021 Atmospheric River Event (ARE). ENV is coordinating and planning assessments, response and recovery work related to sedimentation impacts of the atmospheric river (AR) events that occurred in November and December 2021. The ENV Program is broken into three phases:

- ENV Phase 1 – Assessments
- ENV Phase 2 – Emergency Work (AR response)

- ENV Phase 3 – Long-term Solutions (AR recovery)

Northwest Hydraulic Consultants (NHC) has been engaged to provide hydrotechnical services for the ENV Program, including ENV Phase 3 works for the Project. Previously, in the fall of 2022, NHC provided hydrotechnical design services for the Deroche Creek Emergency Sediment Removal Project as part of Phase 2.

NHC's workplan for The Project under ENV Phase 3 is broken into additional phases as follows:

- Phase 2.2 – Detailed Assessment and Design
- Phase 3 – Development of Work Packages for Construction
- Phase 4 – Field Engineering and Contract Administration

Leq'a:mel First Nation (LFN) is the Owner of the Project. For portions of the work occurring on-reserve, LFN is also the governing authority, pursuant to the Leq'á:mel Land Code.

Funding for the Project will be provided jointly by the BC Ministry of Emergency Management and Climate Readiness (EMCR) and by Indigenous Services Canada (ISC). NHC is the engineer-of-record for the Project. Kerr Wood Leidal and Associates Ltd. (KWL) is providing environmental services, contract administration and construction management services. WSP Global (WSP) is providing project management and coordination services, and Summit Earthworks (Summit) will provide Archaeological services.

3 Scope of the Project

The scope of the Project includes the following major work items as shown on the attached set of drawings:

- Construction of two, timber-pile supported, large woody debris (LWD) Deflectors extending out from Taylor Road into Nicomen Slough, located west of the creek in Reach 1 (Downstream of Taylor Road).
- Construction of a sediment basin in Reach 2 (between Taylor Road and North Nicomen Road), including: armouring of the inlet/ outlet of the basin for grade control and bank stabilization
- Armouring of the channel bed at the Taylor Road Bridge to prevent future degradation due to the presence of the sediment basin.

In addition there will be habitat offsetting works constructed, including:

- Construction of a complexed, low-flow channel along the eastern boundary of the Sediment Basin; and modification of the basin geometry to help encourage and concentrate low flows within that channel;
- Construction of an LWD Reef where Nicomen Slough interfaces with the Nicomen Dike in Reach 1; and

- Excavation of off-channel rearing habitat on the Deroche Fan within Reach 1, complexed with LWD, and with the excavated material side-cast to “mounds” that will be revegetated with native plant species.

4 Design Codes and References

The following design codes and reference documents are the basis for the hydrotechnical design:

- BC MoTI Standard Specifications for Highway Construction (2020)
    - Primarily for the specification of rock riprap classes and quality parameters, where applicable.
- TAC Guide to Bridge Hydraulics (2004)
    - For scour estimation and rock sizing procedures.
- Professional Practice Guidelines – Legislated Flood Assessments in a Changing Climate in BC (V2.1; EGBC, 2018)
- Report: Deroche Creek Geomorphological Assessment and Hydrotechnical Scoping. A report prepared for Mott MacDonald Canada Ltd. and the BC Ministry of Transportation and Infrastructure in March 2021 (restricted use).
    - Some outcomes of this reporting provide and early design basis for the Deroche Creek Long-term Solutions Project.

5 Deroche Creek

5.1 Basin overview

Deroche Creek is located in the Coast Mountains of British Columbia, on the northern side of the Fraser Valley, approximately 15 km east of the community of Mission. The creek drains a watershed area of 8.1 km^2 (Figure 1) and flows into Nicomen Slough, a relict side channel of the Fraser River that now only carries local flow, as the inflow from the main river channel was cut off by the Nicomen Island Dike System in the 1920s.

The Deroche Creek alluvial fan, on which the Deroche community and the Project is located, began forming around 10,000 years ago during the last deglaciation when large amounts of water remobilized the loose sediments on the slopes upstream and glaciers retreated from the Fraser valley—allowing material to begin accumulating on the valley bottom.

The area is part of the Sto:lo Territory. The Leq'á:mel never ceded or surrendered their governing authority over these areas and still assert their jurisdiction as an Indigenous Government. While Leq'á:mel has a recognized self-governing authority over their reserve lands, the Leq'á:mel people do

not condone the establishment of Indian Reserves and continue to exercise their Indigenous rights throughout “Solh Temexw - Our Territory” (McGlenn, 2023).

Large impacts on the landscape occurred after the colonization by European settlers in the 19th century. As the area offered both access to the railway and good farming opportunities, dikes were constructed on the Fraser River floodplain to claim more land for colonial farming.

The watershed also has a history of harmful logging practices, with clear-cut logging reportedly affecting 40 percent of the upper watershed (Hayco, 2000). The Leq'á:mel people never consented to any logging or other resource extractions in their Territory. Between the 1960s and 1980s, clear-cutting caused sediment accumulation in the channel crossing the fan as cutting roads and clearing vegetation mobilized sediment from the basin. Better forest management guidelines to reduce landslide hazards due to logging were only introduced with the Forest Practices Code in 1995 (Chilliwack Forest District, 2006).

Today, logging activity in the Deroche Creek Watershed is greatly reduced and supervised with a stronger focus on reducing landslides and sediment-related hazards (FPS, 2011).

5.1.1 Geologic History

The bedrock geology underlying the basin consists of rocks formed during the middle Jurassic as andesitic volcanic deposits (flows and ejecta) intermixed with sedimentary rocks (Hayco, 2000). The weathering of these underlying rocks creates fine material, likely increasing geohazards in the watershed as fine stratigraphic layers can provide slip surfaces for landslides. Notably, neighboring watersheds show less volcanic and more plutonic base rock (Hayco, 2000), probably causing the Deroche Creek watershed to be relatively more active in sediment transport.

Glacial till from ice ages is also present, transported into the area as a wide range of rock type and sediment sizes. During the deglaciation, the formation of lakes behind the retreating glaciers caused the deposition of finer sediment towards the Fraser Valley, and channelized flow began forming the Deroche Creek fan on top of these lake deposits (Hayco, 2000). During the Holocene, the Fraser River floodplain interacted with the Deroche Fan going through phases when fan deposits overlayed the floodplain and vice versa.

Weathered bedrock and glacial till formed a veneer of relatively fine sediment in the watershed. While the deglaciation caused a lot of that material to be transported downstream, vegetation growing in the warmer climate of the Holocene stabilized the slopes. Recent logging related impacts, such as road construction and reduced vegetation cover decreased slope stability, are now reactivating more of those sediment sources.

Figure 1. Deroche Creek Watershed

Terrain stability is already low in areas where steep, deeply cut valleys are filled with relatively fine sediment. Prolonged and/ or intense rainfall events, like those of the November 2021 ARE, can cause the slipping of sediment in these locations, initiating landslides. While this is a natural phenomenon, human impacts can increase the number of landslides. For example, poorly constructed logging roads can lead to inadequate drainage, causing landslide initiation points (FPS, 2011).

When large runoff events occur, the sediment mass movement can convert to a highly mobile movement type likes debris flows or debris floods. Several historical debris flows and debris floods have occurred in the watershed, including in 1962 or 1963 and November 1989, but the future likelihood for events to reach the Deroche Creek fan has been deemed low in the past (Hayco, 2000). More contemporary studies are underway (by Others) to re-assess the likelihood of geo-hazards in the face of a changing climate.

5.2 Alluvial Fan

Localized bank erosion can shift the channel laterally across the fan and impact land near the creek. However, because of sedimentation patterns and the convex shape of alluvial fans, avulsions are the primary mode of channel migration in this environment. An avulsion is a process where a fluvial channel rapidly changes its course into a different channel or creates a new channel. On a settled alluvial fan, the danger of avulsion is that there might be little indication of the location and timing.

Avulsions occur when some mechanism (e.g., sediment accumulation, large wood blockage, or breaching of a levee) causes the flow to spill out of the channel on to the surface of the fan and find a steeper path away from the previously elevated channel. Given the characteristic scale of these potential blocking mechanisms, avulsions are plausible anywhere the fan surface is within approximately 2 m of the channel bed elevation (Rapp & Abbe, 2003). The Creek has a history of avulsions following such blockages (Hayco, 2000), and future occurrences should be expected. Such an avulsion would tend to follow locally low pathways that radiate away from the creek and could result in a new creek channel crossing North Nicomen Road, North Deroche Road, Lougheed Highway, or other local roads at locations up to 600 m away from the current bridge crossings (Figure 2).

Preferential sediment accumulation near the top of the alluvial fan has resulted in the formation of a concave channel profile, where the gradient of the Creek decreases with increasing distance downstream. Locally, gradients range from more than 0.1 m/ m to as little as 0.0003 m/ m. The average gradient decreases from 0.08 m/m near the fan apex to 0.01 m/m in the lowest reach above Nicomen Slough (Figure 2).

5.3 Nicomen Slough

Nicomen Slough formed as a natural meander arm of the Fraser River, forming Nicomen Island in between the two water bodies. A dike constructed on the northern end of Nicomen Slough cut off the

Fraser River flow in the 1920s (NHC, 2000). Nicomen Island was flooded in 1948, leading to dike improvements in 1949-1950 (NHC, 2000). Near Deroche, Nicomen Slough is between 170 m and 250 m wide and Deroche Creek has formed a delta spanning the whole width of the Slough (Figure 2).

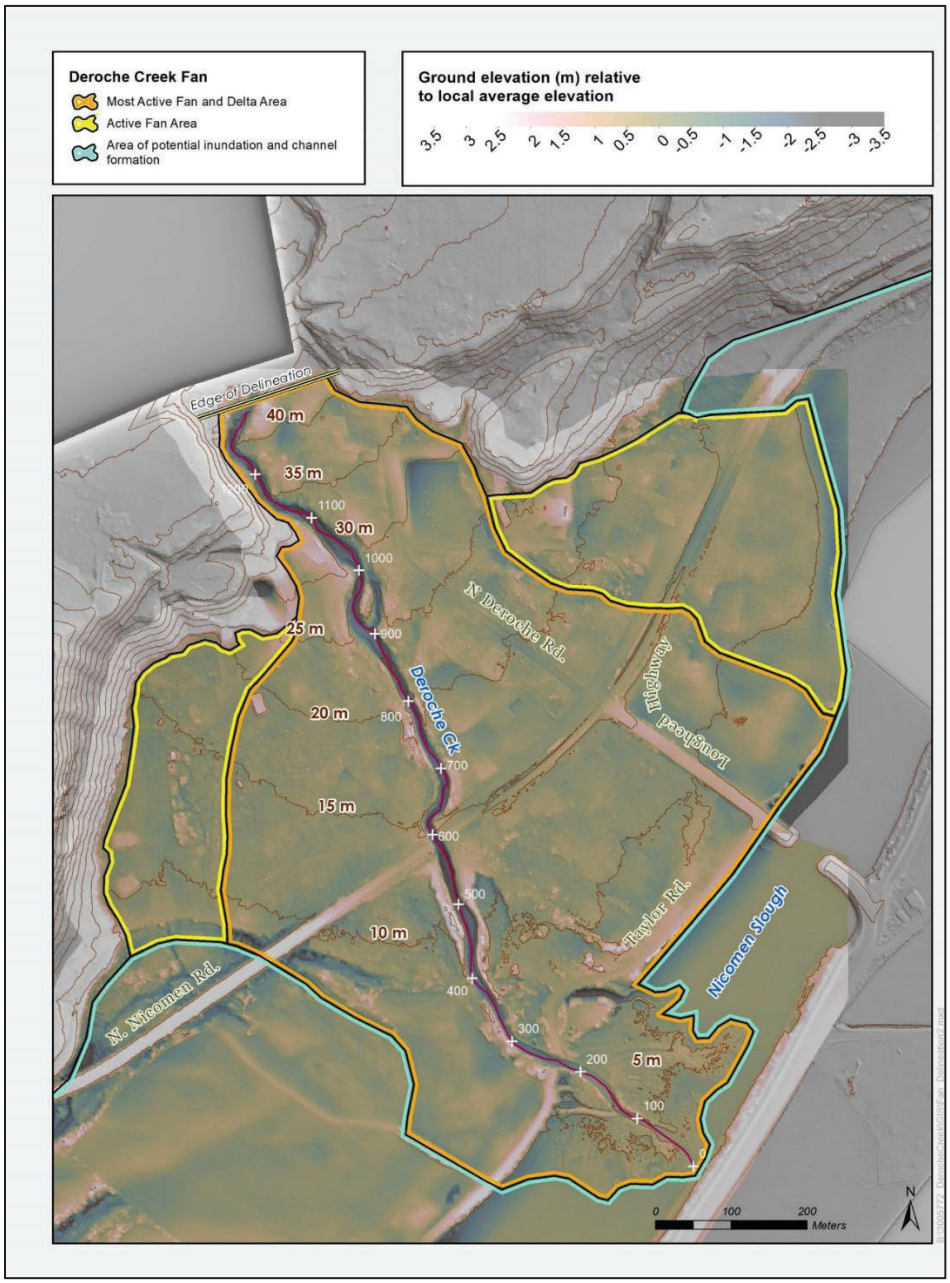

Figure 2. Extent of Deroche Creek Alluvial Fan delineated from 2018 LiDAR data.

5.4 Channel Morphology in the Lower Reaches of the Alluvial Fan

As part of a previous geomorphological assessment of Deroche Creek undertaken in September 2020, NHC divided the creek on the alluvial fan into five distinct reaches, each of which has relatively consistent character. The Project spans Reaches 1 and 2 (Figure 3).

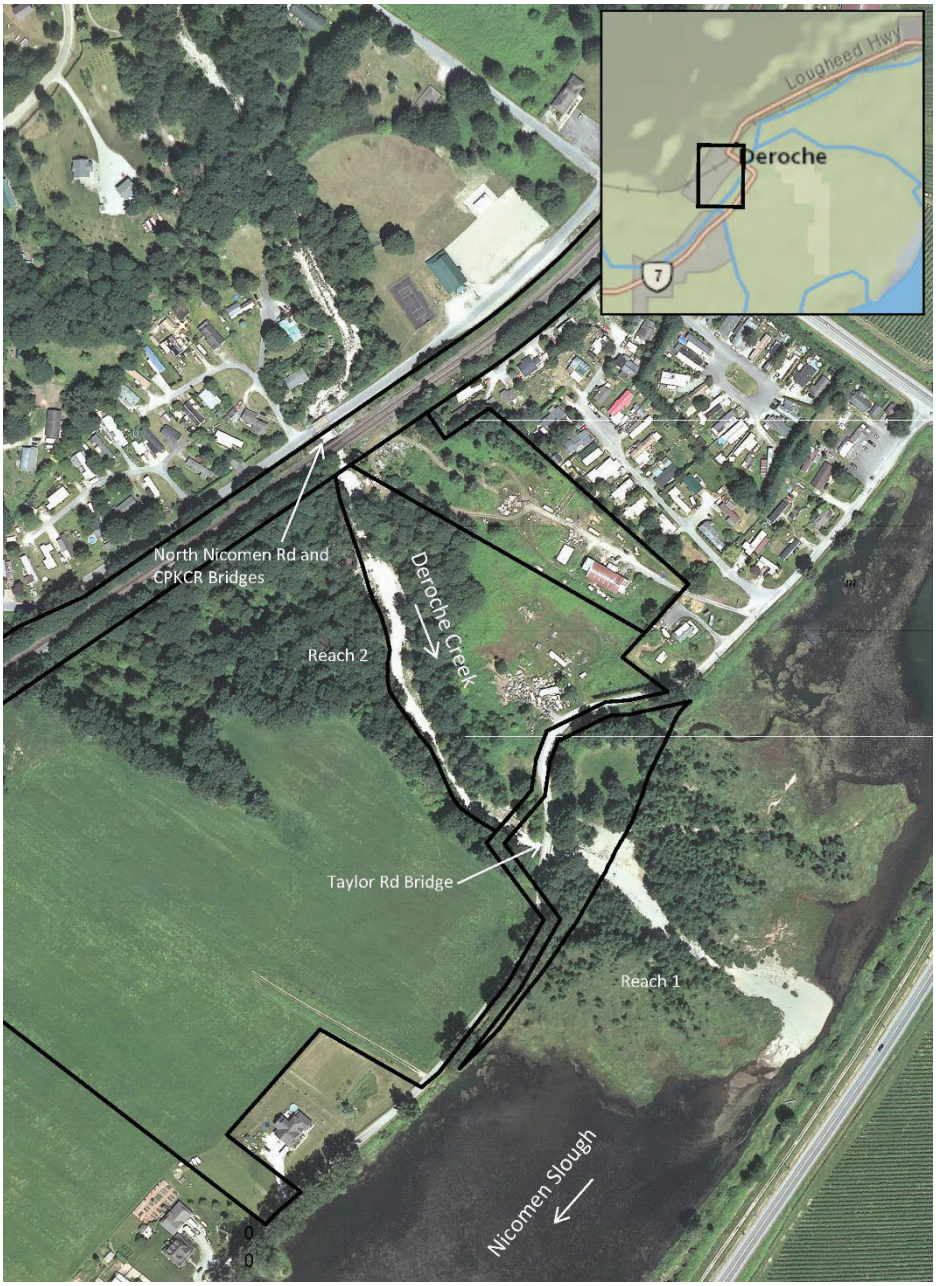

Figure 3. NHC's Reach divisions on the Deroche Creek alluvial fan. The black lines delineate Lakahahmen IR 11 Properties within the Project footprint.

5.4.1 Reach 1

The lowest (most downstream) reach of Deroche Creek crosses a sediment delta that spans Nicomen Slough's width. This sediment is interpreted to have accumulated since diking cut off the Slough in the 1920s from the main Fraser River flow, which had previously provided the energy to transport sediment away from the toe of the fan. This interpretation is based on the consistent geometry of the Slough upstream and downstream of the delta and the form of the delta itself. The delta is 220m long and 300 m wide and consists of relatively fine bed material comprised of sandy gravel. Photo-based grain size analysis of surficial material shows a mean grain size (D50) of around 19 mm, and 55 mm for the larger size fractions (called D84, meaning that 84% of the size distribution is finer than 55 mm). The average channel slope in this reach is 0.015 m/m.

The channel tends to be dry and featureless most years from about mid-summer until fall rains begin (Photo 1). During these times, water from Deroche Creek drains from the upper alluvial fan reaches towards Nicomen Slough as groundwater. Under flowing water the channel would likely demonstrate a plane bed morphology due the excessive sediment supply. The mean flow depth would be around 0.5m under bankfull flow conditions.

Upstream, closer to the Taylor Road Bridge, the channel is relatively flat and varies in width between 12 and 18 m. The bridge often has little clearance and heavy equipment is regularly used to remove material from the area under the bridge (Photo 2). The 2022 Deroche Creek Emergency Sediment Removal Project was undertaken shortly after Photo 2 was taken.



Photo 1. Looking downstream along Reach 1 in October 2022 with Highway 7 in the background.



Photo 2. Looking upstream to Taylor Road Bridge in September 2022, prior to Emergency Sediment Removal.

The upper quarter of Reach 1 is on-reserve and crosses privately held (Alloted, also known as Certificate of Possession or CP held lands; see Figure 3). Development on these lands is subject to the LFN Land Code and must obtain the consent of all property owners.

5.4.2 Reach 2

In Reach 2 extends 275 m from Taylor Road Bridge to roughly 50 m downstream of the Canadian Pacific Kansas City Railway (CPKCR) Bridge and North Nicomen Road Bridge. The channel is homogeneous in form and bed material, and again, mostly featureless due to heavy sediment loads. The morphology would be plane-bed under flowing conditions, and bed material is dominantly cobble intermixed with gravel and large cobble, with the largest stones reaching 500 mm. Photo-based grain sieving indicated a D50 of 34 mm and a D84 of 120 mm. The channel width varies between 7 and 17 meters, and the channel banks are raised 1 to 2 m above the bed. Vegetation encroaches on the dry channel bed at many locations (Photo 3). The channel slope in this reach decreases from 0.03 m/m upstream to 0.015 m/m downstream.

All of Reach 2 is on-reserve and crosses CP held lands (Figure 3). Development on these lands is subject to the LFN Land Code and must obtain the consent of all property owners.



Photo 3. Looking upstream along Reach 2 in September 2022.

5.5 Flood Hydrology and Climate Change Effects

Single station frequency analysis has been carried out on the record of annual maximum daily flow at Water Survey of Canada Station: Norrish Creek above Rose Creek (WSC 08MH150). Frequency analysis results using a 2-parameter Gumbel distribution are shown in Table 1.

Table 1. Annual Maximum Daily Flow estimates for WSC 08MH150

Return Period (years)	Annual Maximum Daily Flow, m^3/s WSC 08MH150
2	63
5	86
10	101
20	116
100	149
200	164

The annual maximum daily flow estimates from 08MH150 have been transferred to Deroche Creek using the following equation:

$$Q_A = Q_B \cdot \left(\frac{A_A}{A_B}\right)^{0.85}$$

The scaling exponent of 0.85 has been selected for consistency with recent studies in nearby watersheds (NHC, 2020).

To estimate annual instantaneous peak flow for Deroche Creek a peaking factor of 1.9 is applied to the transferred annual maximum daily flow estimates. The value is based on evaluation of the ratio of QPI to QPD for basins in the Lower Mainland of similar size and topography, namely Mackay Creek near Montroyal Boulevard (WSC-Mackey; 08GA061) and Noons Creek above Meridian Substation Road (WSC-Noons; 08GA065).

The estimated peak flows for Deroche Creek are given in Table 2. The estimates for Deroche Creek have been checked against estimates using the Rational Method (Water Management Method; MoTI, 2019) and previous estimates (Hayco, 2000). The 2 and 5-year return period estimates have also been compared against flow data from the Deroche Creek, from the now-discontinued WSC gauge: 08MH070), which operated from 1960 to 1964.

Table 2. Flood flow estimates for Deroche Creek

Flood quantile	Flow estimate (m^3/s)
2-yr daily (NHW[1])	9.1
2-year peak	17.3
5-yr peak	23.8
10-yr peak	27.9
20-yr peak	32.1
100-yr peak	41.2
200-yr peak	45.4
200-yr daily	23.9

Notes:
1. NHW is an acronym for Normal High Water. For the purposes of the Project, the 2-year annual daily maximum flow is considered to produce normal high water in Deroche Creek.

5.5.1 Climate Change Considerations

Climate projections for the Fraser Valley suggest overall year-round increase in temperature and reduction of the percent of precipitation falling as snow. Precipitation is expected to decrease in the summer, but increase in the winter (PCIC, 2020).

Peak flows on Deroche Creek tend to occur during the fall and winter because of prolonged or intense periods of rain or rain-on-snow. The projected increase in frequency and intensity of heavy precipitation is expected to lead to increases in peak flows. The potential for more intense 'pineapple express' atmospheric river events following snowfall may also contribute to increased peak flows in the future (Radic et al., 2015).

NHC reviewed the following to determine potential impacts of climate change on peak flows:

- Tests for non-stationarity in observed peak flows;
- Pacific Climate Impacts Consortium (PCIC) Climate Explorer tool (PCIC, 2020);
- University of Western Ontario's Intensity Duration Frequency Climate Change (IDF-CC) tool (UWO, 2020).

5.5.1.1 Mann-Kendall Trend Test

The Mann-Kendall trend test has been applied to the Norrish Creek record at WSC 08MH150. The test checks whether observed peak flow data is increasing or decreasing with time, which can be an indication of climate change or other changes in the basin that may modify the flood risk profile. No statistically significant trend is detectable in the station record (significance level 0.05).

5.5.1.2 PCIC Climate Explorer

The PCIC Climate Explorer Tool is a data visualizer of climate model output. The projected increase in annual maximum, one-day precipitation amounts for the 5-year, 20-year, and 50-year return periods is 19, 22, and 25 percent over historical, respectively (PCIC12 model ensemble; RCP 8.5). Extrapolating to the 200-year return period suggests increases near 30 percent over historical.

5.5.1.3 IDF-CC Projections

The IDF-CC tool provides estimates of the increase in rainfall duration and intensity under future climate scenarios. Projections for Mission West Abbey and Agassiz CS have been reviewed and suggest increases in rainfall intensity of up to 21 percent over historical baseline (model ensemble; RCP 8.5).

5.5.1.4 Climate Allowance Recommendations

NHC recommends applying a 30 percent increase to the 200-year flood estimate to allow for the potential impacts of climate change. The value is in line with projections from the PCIC Climate Explorer for the study area, assuming the projected increase in rainfall corresponds to an increase in flow. The recommended 200-year annual peak instantaneous flow estimate is therefore 59 m^3/s.

5.6 Flood Hydraulics

Hydraulic modeling has been carried out on roughly 1 km long reach of Deroche Creek, from the mouth at Nicomen Slough to a few hundred metres upstream of the Reach 3/ Reach 4 boundary (well upstream of the Project area). Nicomen Slough is included in the model and the modelled boundary extends roughly 150m upstream of the Deroche Bridge on Highway 7, and 1.7 km downstream of Deroche Creek Fan. The model has been developed to allow assessment of flood hydraulics for a variety of return periods and provide hydraulic information for a sediment transport analysis.

The HEC-RAS (River Analysis System), a computer program developed by the U.S. Army Corps of Engineers Hydrologic Engineering Center (HEC), has been used to develop the hydraulic model. Version 6.3 is used for this study. The program is designed to perform one-dimensional (1D), two-dimensional (2D), or combined 1D and 2D hydraulic calculations for a full network of channels. For this project, a 2D steady flow model (RAS2D) is used.

For the 2D computations, the RAS2D uses the full 2D Saint-Venant equations. The 2D computational cells have been pre-processed to develop detailed hydraulic property tables based on the underlying terrain. (This allowed for larger cells to be partially wet with the correct water volume based on the modelled water surface and DEM resolution). Although RAS2D is a sophisticated modelling tool, it assumes a fixed geometry for the channel and floodplain despite the possibility of bank erosion, scour, deposition, and potential avulsions taking place during high flows. Therefore, the model may underpredict the water surface elevation where there is episodic deposition or blockages, may overpredict the water surface elevation where there is scour and will under-predict the hydraulics associated with avulsions.

5.6.1 Model Terrain

The model geometry is represented by a digital terrain model (DEM), built by combining September 2020 and January 2023 topographic and bathymetric surveys, with 2018 LiDAR[1]. Break lines are used liberally to shape the channel topography as needed. In areas of sparse data (such as between downstream of Deroche Creek Fan on Nicomen Slough), riverbed elevations have been interpolated using available data and professional judgement.

[1] The LiDAR data supplied by the BC Ministry of Transportation and infrastructure was collected in early September 2018 by Terra Remote Sensing Inc. Horizontal Datum: UTM Zone 10 NAD 83; Vertical Datum: CGVD28 HT2.0

5.6.2 Hydraulic Roughness

Hydraulic roughness coefficients, represented by Manning's n-values, strongly influence the computed profile. Appropriate values are based on bed grain size observations, channel slope and geometry, technical literature, and professional judgement.

In a 2D model much of the friction losses (variations in channel shape and alignment) are accounted for in the momentum equation and consequently Manning's n-values are generally lower than they would be in a 1D model.

Each reach of Deroche Creek has been assigned a roughness value for the in-channel portion of the reach based on field observations of channel bed composition and verified with values referenced in the literature (Chow, 1959; Cowan, W.L., 1956; Engelund and Hansen, 1967; Jarrett, 1984; Limerinous, 1970; MaynoRoad, 1991).

Table 3. Channel roughness values used in hydraulic modelling.

River	Reach (Figure 2)	Reach Location / Stationing	Manning's Coefficient (n)
Deroche Creek	Reach 1	Slough Fan	0.04
	Reach 2	Taylor Road to River Station 400	0.04
	Reach 2	River Station 400 to North Nicomen Road	0.059
Nicomen Slough	All	All	0.024

There is limited flow beyond the banks of the creek except in one location where the flow floods the agricultural fields on the west bank upstream of Taylor Road. The adopted overbank roughness value is 0.06.

5.6.3 Boundary Conditions

Estimated design flows described in Section 5.5 are used as upstream boundary conditions for Deroche Creek and Nicomen Slough.

The outlet for Deroche Creek is within the model and is controlled by the conditions modelled in Nicomen Slough. Two different downstream boundary conditions are modelled for Nicomen Slough. The first condition uses a normal depth with a very shallow slope (0.001%).

The second downstream boundary condition is a high-water level boundary controlled / contributed to by backwater from the Norrish Creek confluence with Nicomen Slough, located more than 5 km west of

the mouth of Deroche Creek. An approximate rating curve at the Norrish-Nicomen confluence has been developed to determine the water level on Nicomen Slough during floods on Norrish Creek. A 10-year return period annual peak instantaneous flood on Norrish Creek produces an estimated water surface elevation of El. 6.25 m. A 10-year return period is considered suitable as a high-water boundary condition because Norrish Creek and Deroche are quite different in size and not likely to experience the same size of flood coincidently. The estimated 10-year peak flow on Norrish creek has been increased by 10% to account for climate change[2]. The estimated 10-year peak flow (with and without climate change) is used as the downstream boundary for the hydraulic model.

Backwater effects from the Fraser river have also been considered in establishing a water level boundary condition. If Deroche Creek were to experience a spring or summer flood due to intense, localized rainfall, the potential for backwater from the Fraser River exists. Backwater elevations caused by the Fraser River at Nicomen Slough are shown in Table 6.2. The range in water surface elevation reflects the influence of tides. A reasonable assumption for a Fraser River flood event that is coincident with a Deroche Creek flood might be the mean annual flood or a flow slightly higher. The mean annual flood level for the Fraser River at the mouth of Nicomen Slough cis about El. 5.9 m. Since this is reasonably close to the Norrish 10-year peak water level (El. 6.25 m), the latter is used for all simulations involving a high-water level boundary condition.

5.6.4 Model Results

A summary of modelled flow depth and local velocity ranges for select floods is provided in Table 4. The high end of ranges for the recommended 200-year design flood is used as the basis for scour analysis, and riprap and channel armour sizing for the Project.

The 2-year maximum daily flow is considered normal high-water (NWH) flow for Deroche Creek. The normal high-water inundation area is an important parameter used in environmental assessment. The NWH inundation area is plotted on blue on Sheet 002 of the attached drawing set.

[2] The lower climate change adjustment for Norrish Creek, compared to that used for Deroche and Nicomen Slough, reflects the assumption that Norrish Creek is not likely to be as sensitive to future increases in rainfall intensity due to the size of its watershed, and especially not in the context of coincident flooding with Deroche Creek.

Table 4. Summary of channel flow depth and velocity ranges for the Project area

Flow Scenario	Flow (m^3/s)	Flow Depth (m)	Velocity (m/s)
Reach 1			
2-year max. daily (NWH)	9.1	0.5 to 0.8	1.0 to 1.3[1]
10-year peak	27.9	0.9 to 1.2	1.2 to 1.8[1]
200-year peak +30%	59.0	1.2 to 1.8	2.0 to 2.5[1]
Reach 2			
2-year max. daily (NWH)	9.1	0.6 to 1.0	1.3 to 1.6
10-year peak	27.9	1.4 to 1.7	1.7 to 2.9
200-year peak +30%	59.0	2.2 to 2.5	2.5 to 3.2

Notes.

1. The ranges listed are typical of the reach. Velocities through, and in the tail-out of Taylor Road Bridge tend to be 33% to 50% higher than the upper end of this range (a local effect due to the constriction caused by the bridge).

5.6.5 Hydraulic model sensitivity

Model sensitivity analyses have been carried out to determine the effects of changing model parameters on water levels, flow depths, and inundation extents. The sensitivity analyses included analysis of the impacts of varying the following parameters within a credible range:

- Roughness values
- Downstream boundary conditions

The analysis shows there is a small amount of sensitivity to roughness in the channel within Reach 2 (< 10 cm variation in water surface elevation).

Reach 1 hydraulics are sensitive to the assumed downstream boundary condition in Nicomen Slough. Under high water level boundary conditions (i.e. coincident flooding with Norrish Creek), the backwater can impact hydraulics as far upstream as Taylor Road Bridge. Under normal depth boundary conditions there is little sensitivity since current hydrologic conditions in the Slough produce very little flow and the slope is already very flat.

5.7 Annual sediment load in the lower reaches

This section is a brief summary of previous bedload transport study for Deroche Creek that NHC conducted for Mott MacDonald Canada Ltd. and the BC Ministry of Transportation and Infrastructure (NHC, 2021). For more detail on the subject, please refer to that report.

To estimate annual sediment loads, NHC used the hydraulic modelling results discussed in Section 5.6 to calculate sediment transport rates along the channel, which give an indication of both where sediment

deposition is most likely to occur and what sediment volume can be transported by floods of different magnitudes. NHC validated these estimates by calculating the sediment volume deposited within the delta in Nicomen Slough over the last 100 years (NHC, 2021).

Assuming a constant channel bed width of 10 m and an event duration of 6 hours, NHC calculated event-based sediment transport rates shown in Figure 4. Peak flow estimates are used for the flood classes, as sediment transport depends more on peak shear stress during a flood than on the daily average shear stresses.

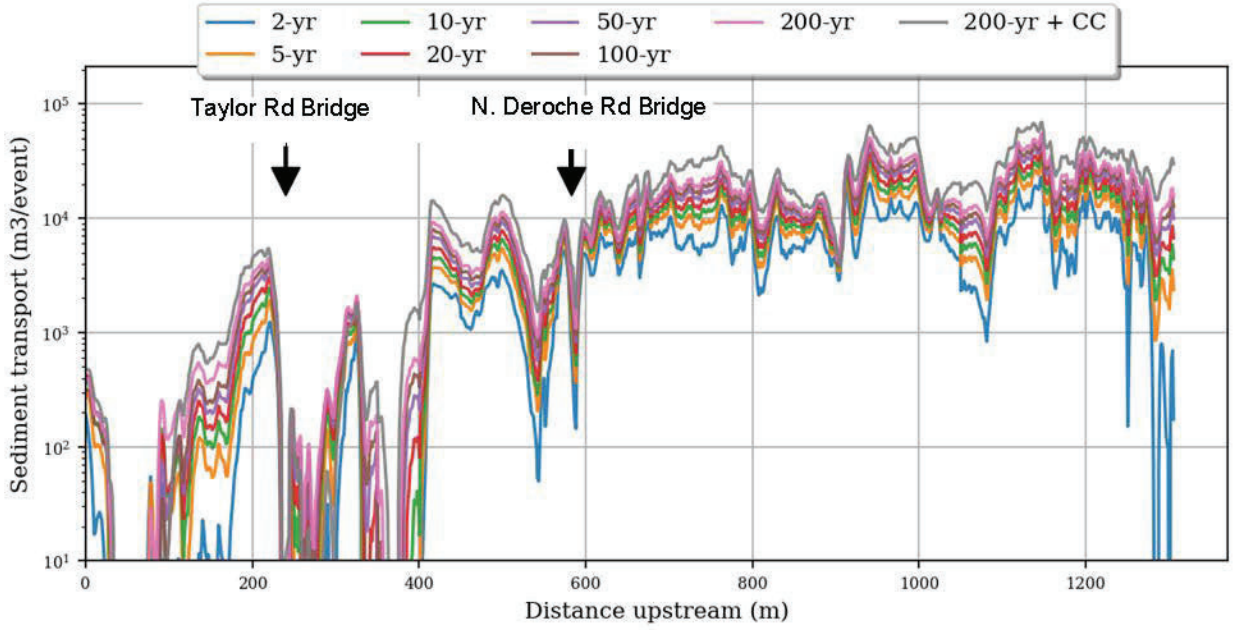

Figure 4. Calculated sediment transport (m^3) in Deroche Creek per event.

From Figure 4, a 2-year flood transports as much as 2,500 to 4,000 m^3 of sediment within Reach 2, whereas the design flood event (200-year + 30% for climate change) can transport on the order of 13,000 to 14,000 m^3.

Figure 5 shows the annualized volumetric sediment load per flood class. The cumulative statistical effect of the flood events is shown as a sum with the black dashed line, which represents a statistical average load per year. The general pattern of sediment transport shows the highest activity occurring in the channel upstream of station 400 m, about the halfway point of Reach 2.

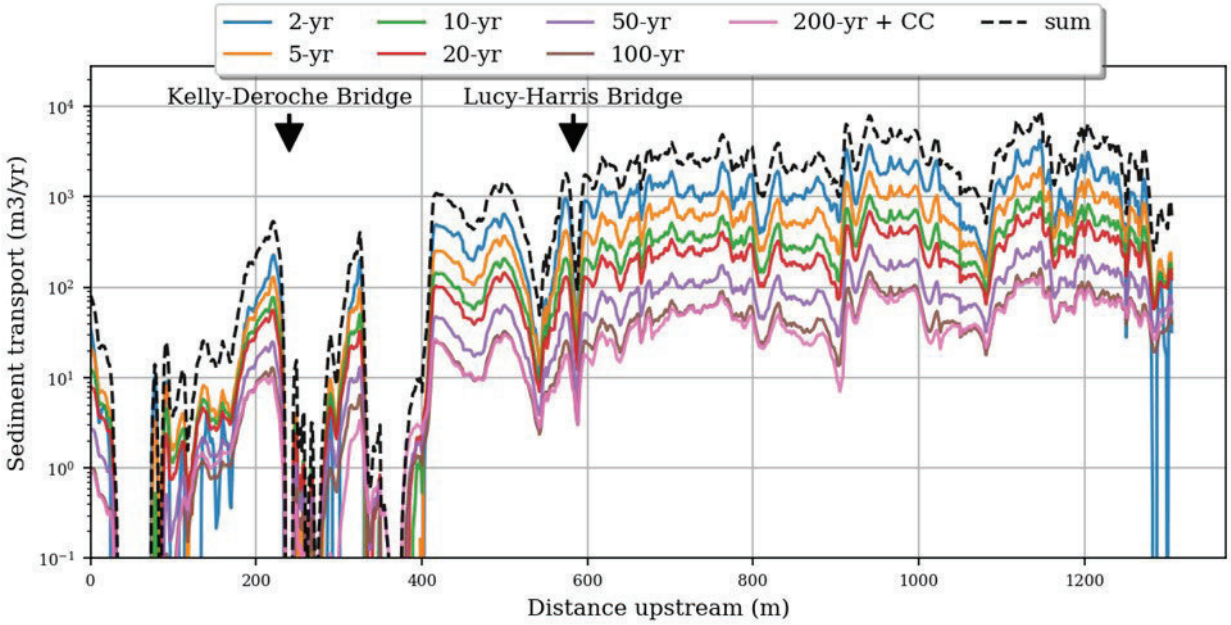

Figure 5. Calculated sediment transport (m^3) in Deroche Creek per year.

In Figure 5, the average annual load for smaller return periods is higher since these floods occur more often and thus moves a higher total sediment amount. The total annual sediment transport near the top of Reach 2, at the North Deroche Road Bridge, is estimated to average 1,800 m^3 per year.

5.8 Environmental Values

KWL has carried out an environmental assessment and produced a report, which identifies fish and other aquatic resources, wildlife, and vegetation within the Project area, assesses impacts, and identifies mitigation measures to be undertaken (KWL, 2023). The report, issued under separate cover, is currently under review by the Leq'á:mel Lands Office, in compliance with Leq'á:mel Environmental Assessment Law.

5.9 Archaeological and Cultural Values

The Leq'á:mel people have lived on, used, occupied, benefited from, governed, and defended the project area since time immemorial. The Cultural Heritage value of Deroche Creek to the Leq'á:mel people is difficult to qualify and quantify. Deroche Creek flows adjacent to the modern-day resting place of Leq'á:mel ancestors, located on the Northeastern corner of Lakahahmen IR 11. Reach 2 flows adjacent to a well-known and significant longhouse and village site.

The presence of cultural heritage features indicates a strong link to Leq'á:mel Governance. The project lies within the core of Leq'á:mel Territory and great care must be taken to document and preserve both

Leq'á:mel cultural heritage resources as well as recognize and promote Leq'a:mel's ongoing governing authority, which was nearly eradicated by European colonization.

Summit has carried out a preliminary archaeological investigation with the sediment basin footprint in October 2023. The intent of the investigation was to determine whether culturally significant items exist within the proposed Project footprint (e.g. burial mounds, culturally modified trees, tools, etc.) and to establish a means of preserving such items. Following 5.5 days of investigations, nothing of an archaeological nature was found within the boundaries of the proposed Sediment Basin. Further monitoring is recommended during future (Phase 2) excavation works associated with the Sediment Basin. Summit's full report can be found in Appendix B[3].

6 Major Works: Rationale and Design Basis

6.1 Reach 1 Timber-Pile, LWD Deflectors

The Reach 1 Timber Pile LWD Deflectors are a set of structures that project out from Taylor Road into Nicomen Slough just to the south of Deroche Creek, Reach 1. Deflector #1 is the shorter of the two at 23 m in length; Deflector #2 is 65 m in length. The rationale for constructing the Deflectors is that they will deflect Deroche Creek flow that overtops either Taylor Road Bridge or south approach, or the south bank of Deroche Creek downstream Taylor Road Bridge, and prevent that flow from posing an erosion risk to Taylor Road itself and the Nicomen Road Dike farther downstream. The northern end of the Nicomen Road Dike is located about 100 m south of Deflector #2.

The trunk sections of both Deflectors will comprise locally milled timber piling sourced from trees removed for construction of the Sediment Basin. The piles will be driven to form an "A" shape, with the wide base against the Taylor Road embankment and the pointed end projecting into the Slough. Additional LWD, including tree stems with or without rootballs, and smaller branches and brush, will be interlaced between the piles. A few of the larger LWD pieces will be ballasted to the piles, using steel cable, to prevent floatation of the interlaced LWD during high-water events. Following construction, disturbed areas around the Deflectors will be revegetated with native plant species.

The Deflectors are not intended to be routinely maintained. In a relatively short time-frame – say 5 to 10 years, it is anticipated that vegetative re-growth will enable them to blend with the landscape. In future, it should be straightforward to add additional piling and/ or inter-laced LWD if desired.

[3] Summit's Archaeological Report makes some mention of Project work in Reach 3 of Deroche Creek (Cemetery Berm and Bank Stabilization), however that work has since been removed from the Project scope.

A little more than half of the Reach 1 Deflectors footprint is located off of LFN Reserve Land; the remainder is on-reserve.

6.1.1 Scour estimate for the Deflectors

Natural scour will occur at the heads of the Deflectors. The scour is difficult to estimate since hydraulic conditions associated with an overtopping event in Deroche Creek are unpredictable. The Deflector piles will be driven a minimum of 5 m below ground level NHC considers this a suitably conservative approach in terms of scour protection for the piles.

6.2 Reach 2 Sediment Basin

The Reach 2 Sediment Basin is the largest, single piece of work in the Project. The in-line basin is a 250 m long excavation within Reach 2 of Deroche Creek. The excavation width is up to 50 m and its widest point and the excavation depth below existing ground varies between 2 m and 6 m.

The purpose of a sediment basin is to improve the capture of sediment in a stream within or upstream of areas that are particularly vulnerable to negative impacts of sediment aggradation. Too much sediment supply results in channel instability, increased flooding, infrastructure damage and degradation of aquatic habitat. All of these are issues in Reaches 1 and 2 of Deroche Creek.

The rationale for siting the basin within Reach 2 of Deroche Creek are as follows:

- Basins should be located where the rate of sediment transport is relatively high. The sediment transport analysis described in Section 5.7 shows the upper portion of Reach 2 is one such location.

- The proposed location is adjacent to or upstream of vulnerable infrastructure (e.g. on-reserve housing, Taylor Road and Bridge) and vulnerable aquatic habitat (e.g. Reach 1 of Deroche Creek and Nicomen Slough).

- The proposed location is in an area with easy equipment access for maintenance, and in a reach that routinely runs dry in the mid- to late summer, which will simplify maintenance.

The intent is not to capture all of the sediment transported within Reach 2 – maintaining some level of sediment supply to Reach 1 is critical for controlling scour and degradation, and for maintaining spawning habitat downstream. Sometimes facilities are constructed to act more like a dam that traps almost all incoming sediment and debris; for instance, in areas that may be affected by debris floods or debris flows. This is not the intent of the Deroche Creek sediment basin.

Sediment basins are usually designed to be “in-line” with the stream channel, as is the case here at Deroche Creek, and they are made significantly wider than the existing channel up- and downstream in

order to reduce sediment transport within the basin (wide channels do not transport sediment as effectively as narrow ones). Having the basin "in-line" improves performance for obvious reasons – if the basin were off-line, a large and sustained effort would have to be expended to redirect the sediment to the basin without dewatering the rest of the creek.

The amount of sediment captured, and over what time frame, depends mostly on the width, depth and slope of the basin. There are limits though – for instance, the width of the basin should not be larger than the upper limit of what is known as the regime width of the stream in question.

The Deroche Creek Sediment Basin has a minimum storage capacity of approximately 10,000 m^3, measured from the design invert up to the level of sediment build-up that occurred during the November 2021 ARE. In reality, the basin will be able to store an additional 0.3 m to 0.5 m of additional sediment before sediment levels begin to pose a threat to surrounding infrastructure – that amount of accumulation results in a capacity of roughly 15,000 m^3.

The banks of the basin will be stabilized using substrate-filled, medium class graded rock akin to MoTI Class 250-kg, but lacking the smaller end of the gradation that is standard to 250-kg. The substrate infill will be comprised of stream gravel at the toe, and native soil above the toe. All substrate fill will be locally sourced from the excavation of the basin. The native soil portion will be revegetated using native plant species. Cabled large woody debris rootballs will be placed at intervals of 10 m along the left (east) bank of the basin. The streambed at the entrance and exit of the basin will be armoured with void-filled boulders – this will provide a natural appearance while being scour resistant to discourage head-cutting upstream and scour/ degradation downstream.

6.2.1.1 Environmental and Property Considerations

The Sediment Basin is located entirely on LFN Reserve Land. Soil relocation and deposition on-reserve subject to the LFN Soil Law. Planting plans are also subject to the review and approval of LFN.

The basin requires the clearing of approximately 229 trees of mixed species; the dominant species are Western redcedar(55), Bigleaf maple (70) and Black cottonwood (53), with less numbers of Western hemlock, Red alder and Bitter cherry. The intent is to utilize suitable tree species and sizes on the Project, for construction of other works and habitat complexing. The largest Western redcedar are too large for construction and are likely to be retained for traditional use by LFN.

The Sediment Basin footprint overlaps a few CP held land lots as summarized in Table 3, and the consent of the property owners and LFN is required. Consultation with the property owners is ongoing.

Table 3. Certificate-of-Possession (CP) Lots overlapped by the Sediment Basin footprint

CP Lot	Area of Overlap (m^2)
1158927, 75462 CLSR BC, Lot 5	18
1186469, 3538R RSBS BC, Lot 8-13	10,668
1236657, 96858 CLSR BC, Lot 8-3-3	1,200

Notes:

1. Areas of overlap relate to construction footprint and do not include an easement that will be established for future maintenance of the Sediment Basin.

6.2.2 Scour estimate

Natural scour will occur within the sediment basin as flow accelerates along the rigid banks of the basin. It will also occur as a result of the thalweg shifting within the relative wide basin. There is potential for the flow to be directed against the rigid banks at sharp angles.

Natural scour at the 200-year design flow has been estimated using a modified version of Blench procedure (TAC 2004) with the following inputs:

- Channel top width at approach and bridge waterway opening = 15 m
- Design flow = 59 m^3/s
- Energy slope = 0.012 m/m (expected maximum slope along deposited sediment)
- D50 of bed material = 34 mm (Section 5.4.2)
- Z factor = 2.75 (upper range of values recommended in TAC 2004)

The channel top width is set to 15 m, which applies near the basin inlet and outlet. The natural scour level is estimated to be 2.75 m below the 200-year flood level. The 200-year flood level will vary over time as the basin fills with sediment. For the purposes of this calculation, NHC has assumed a full-basin condition in which the basin channel invert matches the inverts of the inlet and outlet grade controls and a constant slope of 0.12 is established in between. To be conservative, the toe elevation of riprap has been set 3.4 m below the 200-year flood level for this condition, 0.65 m deeper than the scour estimate suggests it needs to be.

6.2.3 Substrate-Filled Riprap Sizing

The sizing for riprap within the sediment basin has been determined using the U.S. Army Corps of Engineers method (TAC, 2004; USACE, 1991), and the following inputs:

- Design velocity along bank: 3.2 m/s (maximum from the 2D model)
- Depth of water along protected slopes: 1.2 m (minimum from the 2D model)
- Factor of Safety (S_f): 1.5 (Standard is 1.2)

- Coefficient of Stability (C_s): 0.3
- Velocity Distribution Coefficient (C_v): 1.2
- Thickness Coefficient (C_t): 1.0
- Side Slope Factor (K): 0.9 (2H:1V slope)

The resulting estimates of D_{30} and D_{50} for graded riprap are 380 mm and 560 mm, respectively, which is comparable to MoTI Class 250-kg riprap. The minimized depth used in the calculation leads to more conservative results. The high factor of safety is used since the rock with be void-filled with natural substrates (stream gravel at the toe, and in-situ organic soils within the planting zone), so there will be far less rock-to-rock contact within the matrix. The substrates will add some stability in the short-term, and the establishment of vegetation root systems will add stability over the long-term.

6.2.4 Grade Control Boulder Sizing

The Densimetric Froude Number approach (Aguirre-Pe at al, 2003) is used to size boulder bed armour at the entrance and exit to the sediment basin. The hydraulics for sizing is taken from the basin entrance and assumes a design flow could occur when the basin in newly maintained, and so could act of the entrance grade control slope of 0.15 m/m. A Manning's "n" of 0.06 is used for the bed of the steep grade control, which results in a design velocity of 6 m/s at the 200-year design flow, or about twice the maximum velocity modelled in the existing channel (pre-construction). The hydraulics at the exit grade control will not be as severe, however, for sake of simplicity and conservativeness during construction, all bed armour will be sized according to the calculation described here, with the following inputs:

- Channel slope 0.15 m/m
- Design velocity: 6.0 m/s
- Specific gravity of rock: : 2.6
- Angle of repose of rock: 40 degrees
- Depth of flow: 1.1 m

The resulting stable rock size has a median diameter of 850 mm.

6.3 Reach 2 Bed Armouring at Taylor Road Bridge

The Reach 2 Bed Armouing at Taylor Road Bridge will be comprised of void-filled boulder protection similar to the entrance and exit sections of the sediment basin upstream. The rationale for this work is that it will prevent degradation of the streambed through the bridge, which would otherwise lead to undermining of the abutment ballast walls. Degradation is a risk downstream of sediment basins.

The sizing of boulders is consistent with the entrance and exit channels of the sediment basin – rock with a median diameter of 850 mm.

The Reach 2 Bed Armouring at Taylor Road Bridge is located entirely on LFN Reserve Land.

6.4 Off-setting Works

6.4.1 LWD Reef (Reach 1)

A large woody debris "Reef" will be constructed adjacent to the Nicomen Dike at the southeasterly extent of Deroche Creek within Nicomen Slough. The Reef will create fish habitat and improve bank stability adjacent to the dike. Construction of the reef will be similar to that of the Timber Pile LWD Deflectors, except that the Reef will not have an "A" shape to it, and will instead be of roughly uniform shape along its length.

6.4.2 Habitat Channels (Reach 1)

Three habitat channels will be excavated along north edge of the Deroche Creek fan and one will be excavated between the Timber Pile LWD Deflectors. The channels will have 2 to 3 m bottom widths, and 2H: 1V side slopes. Excavated material will be side-cast to create low mounds that will be vegetated with native tree and shrubs providing overhead cover. The channel between the Deflector Berms will be complexed using large woody debris sourced from the Sediment Basin.

6.4.3 Sediment Basin Low-flow Channel and other modifications

As small, 2 m wide, low-flow channel will run the length of the Sediment Basin east bank. The low-flow channel will allow for fish passage during initial, seasonal inflow to the basin. LWD stems with rootballs, and boulders will be added to the low flow channel to promote complexity. Sloping the Sediment Basin invert at 2% toward the low flow channel and installing void-filled grade control weirs flush with the sloping invert will help encourage low flows to concentrate along the east bank.

7 Construction Cost Estimate

A construction cost estimate is being developed; the total cost of the project is expected to be in the range of $3 Million to $4 Million.

8 Maintenance Clean-out of the Sediment Basin

Sediment will accumulate in the sediment basin both laterally and vertically over time, and its efficacy must be maintained by removing accumulated sediment on a regular basis. If the sediment is allowed to accumulate without such maintenance, there will be adverse impacts on the upstream reach (Reach 3), increased risk of flood damage to road and rail infrastructure and adjacent lands, and of course increase

environmental damage to Reach 1 and Nicomen Slough. As the Owner of the Sediment Basin, LFN would be responsible for its maintenance, with the necessary funding provided by ISC.

There is a balance that must be struck between basin design and maintenance requirements. Ideally the basin should be effective enough to capture harmful amounts of sediment for a period of 5 to 10 years without needing to be cleaned out. The high end of that range assumes that flood events over the period carry an average volume of sediment (1,800 m3 as noted in Section 5.7 of this report), and assuming 50-70% of the incoming sediment is retained in the basin. The low end of the range assumes one or two lower probably floods occur over the period. The sediment capture efficiency of the basin will be reduced as it fills. A very large flood, like a 200-year event, would likely fill the basin in a single event and require maintenance clean-out, even if the basin was just maintained a year or two prior.

In today's dollars, each bout of maintenance is likely to cost about $800,000, broken down as follows:

- Mob/ Demob: $20,000
- Quality and Construction Management: $100,000
- Access: $5,000
- Traffic Mgmt.: $40,000
- Environmental Protection: $60,000 (incl. QP fees)
- Excavation to Off-Site: $500,000
- Revegetation: $5,000
- Owner's agent fees: $25,000
- Contingency: $37,750
- **Total $792,750 (round to $800,000)**

Averaged over a 5-to-10-year period, this breaks down to between $80,000 and $160,000 average cost per year. In addition there should be a $5,000 to $10,000 allowance for annual inspection.

As a rule, the basin should be cleaned out to its baseline design condition when sediment accumulation reaches the inverts of both the entrance and exit grade controls, and is continuous across the full length and width of the basin. This equates to about 10,000 m^3 of stored sediment. Additional vertical accumulation of 0.5 m (~15,000 m^3) should not carry much short-term risk, but there should be no delay in cleanout if sediment reaches those level since there will be heightened risk during subsequent fall and winter flood events

Maintenance must be carried out in the least risk window for salmonids, which is in August. The least risk window typically coincides with dry conditions in the creek, with subsurface flow throughout Reaches 1 and 2. Cleanout operations may require 4 to 6 weeks construction time, but regulatory agencies may be willing to extend instream work windows as long as there is no surface water in the

creek and harm to fish can be avoided. There should be standing environmental permits for basin maintenance to avoid administrative delays when maintenance is required.

DISCLAIMER

This report has been prepared by **Northwest Hydraulic Consultants Ltd.** for the benefit of **BC Ministry of Environment and Climate Change Strategy** for specific application to the **Deroche Creek Recovery Solution Project.** The information and data contained herein represent **Northwest Hydraulic Consultants Ltd.** best professional judgment in light of the knowledge and information available to **Northwest Hydraulic Consultants Ltd.** at the time of preparation and was prepared in accordance with generally accepted engineering and geoscience practices.

Except as required by law, this report and the information and data contained herein are to be treated as confidential and may be used and relied upon only by **BC Ministry of Environment and Climate Change Strategy**, its officers and employees. **Northwest Hydraulic Consultants Ltd.** denies any liability whatsoever to other parties who may obtain access to this report for any injury, loss or damage suffered by such parties arising from their use of, or reliance upon, this report or any of its contents.

Report prepared under the direction of:



Des Goold, P.Eng.
Principal

Permit to Practice No: 1003221

9 References

BC Forests, Lands and Natural Resources (2008). Freshwater Atlas Stream Network. GeoBC. [online] Available from: https://apps.gov.bc.ca/pub/geometadata/metadataDetail.do?recoRoadUID=50648&recoRoadSet=ISO19115 (Accessed August 2020)

Campbell, D., & Church, M. (2003). Reconnaissance sediment budgets for Lynn Valley, British Columbia: Holocene and contemporary time scales. *Canadian Journal of Earth Sciences* , 701-713.

Chilliwack Forest District. (2006). *An Overview Assessment of Forest Development-Related Issues in the Deroche Creek Area, Forest License A74688.*

EGBC (2020). *Developing Climate Change-Resilient Designs for Highway Infrastructure in British Columbia V2.0*. [online] Available from: https://www.egbc.ca/getmedia/b60921fc-a820-41be-868f-02f0d3d92892/EGBC-BCMOTI-Climate-Resilient-Design-Highway-V2-0.pdf.aspx.

FPS, F. P. (2011). *Logging in the Deroche Creek Community Watershed.*

Hayco. (2000). *Deroche Creek Flood HazaRoad Management Study.* Vancouver, BC.

Meyer-Peter, E., & Müller, R. (1948). Formulas for Bed-Load transport. *IAHSR 2nd meeting.* Stockholm: IAHR.

Blench, T. (1957). *Regime behaviour of canals and rivers*. Butterworth Scientific Publications, London, UK.

Kerr Wood Leidal Associates Ltd. (2023). Deroche Creek Long-Term Solutions Project, Environmental Assessment Report.

Campbell, D., & Church, M. (2003). Reconnaissance sediment budgets for Lynn Valley, British Columbia: Holocene and contemporary time scales. *Canadian Journal of Earth Sciences* , 701-713.

Chilliwack Forest District. (2006). *An Overview Assessment of Forest Development-Related Issues in the Deroche Creek Area, Forest License A74688.*

EGBC (2020). *Developing Climate Change-Resilient Designs for Highway Infrastructure in British Columbia V2.0*. [online] Available from: https://www.egbc.ca/getmedia/b60921fc-a820-41be-868f-02f0d3d92892/EGBC-BCMOTI-Climate-Resilient-Design-Highway-V2-0.pdf.aspx.

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Hayco. (2000). *Deroche Creek Flood HazaRoad Management Study.* Vancouver, BC.

Meyer-Peter, E., & Müller, R. (1948). Formulas for Bed-Load transport. *IAHSR 2nd meeting.* Stockholm: IAHR.

NHC (2021). Deroche Creek Geomorphological Assessment and Hydrotechnical Scoping, Final Report, preapred for Mott MacDonald Canada Ltd.

NHC. (2000). *Flood and Erosion Damage Mitigation Plan. Water level 1.*

Rapp, C., & Abbe, T. B. (2003). *A Framework for Delineating Channel Migration Zones (#03-06-027).* Ecology Publication. Washington State Department of Transportation and Washington State Department of Ecology.

Rosenau, M., & Angelo, M. (2005). *Conflicts Between Agriculture and Salmon in the Eastern Fraser Valley.* Vancouver, BC:: Pacific Fisheries Resource Conservation Council.

TAC (2004). *Guide to Bridge Hydraulics*. Second Edition. C.R. Neill (Ed.). Thomas TelfoRoad.

USACE (1991). *Hydraulic Design of Flood Control Channels* (EM 1110-2-1601). Engineer Manual. U.S. Army Corps of Engineers, Washington , D.C. 183 pp.

ATTACHMENTS

Tender Drawing Package for the Deroche Recovery Solution Project

ATTACHMENT 1

TENDER DRAWING PACKAGE FOR THE DEROCHE RECOVERY SOLUTION PROJECT

ATTACHMENT 2 – ARCHAEOLOGICAL ASSESSMENT REPORT (SUMMIT, 2023)

Innovation. Integrity.
Employee-Owned.

Appendix B

Design Drawings

KERR WOOD LEIDAL ASSOCIATES LTD.
consulting engineers

DEROCHE CREEK RECOVERY SOLUTION
PROJECT No. 2900712

ISSUED FOR CONSTRUCTION,REVISION 1, JUNE, 2025

DRAWING INDEX		
SHEET No.	SHEET DESCRIPTION	REVISION
001	TITLE SHEET AND PROJECT LOCATION	1
002	EXISTING SITE PLAN	1
003	REACH 1 WORKS - PLAN AND PROFILE VIEWS	1
004	REACH 2 WORKS - PLAN AND PROFILE VIEWS	1
005	REACH 1 - TYPICAL SECTIONS AND PROFILES	1
006	REACH 2 - TYPICAL SECTIONS AND PROFILES	1
007	SEDIMENT BASIN - STANDARD SECTIONS	1
008	LOT 8-3-3 GRADING PLAN	1
009	OFF-SETTING WORKS	1
010	OFF-SETTING WORKS - TYPICAL SECTIONS AND PROFILES	1
011	PLANTING PLAN	1



LOCATION MAP
NOT TO SCALE



SITE MAP
NOT TO SCALE

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0	18 FEB 2025	ISSUED FOR CONSTRUCTION
1	05 JUN 2025	ISSUED FOR CONSTRUCTION

nhc northwest hydraulic consultants

SEAL:

PROFESSIONAL ENGINEER D. J. GOOLD # 28281 WITHIN COLUMBIA

2025-06-0

Permit to Practice 1000221

DEROCHE CREEK RECOVERY SOLUTION

TITLE SHEET AND PROJECT LOCATION

DESIGNED:	DJG	SHEET ID:	2900712-DER RS-001	SHEET No:
DRAFTED:	CZZ	STATUS:	ISSUED FOR CONSTRUCTION	001
CHECKED:	DJG	SCALE:	AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE:	5 JUN 2025	REV No: 1

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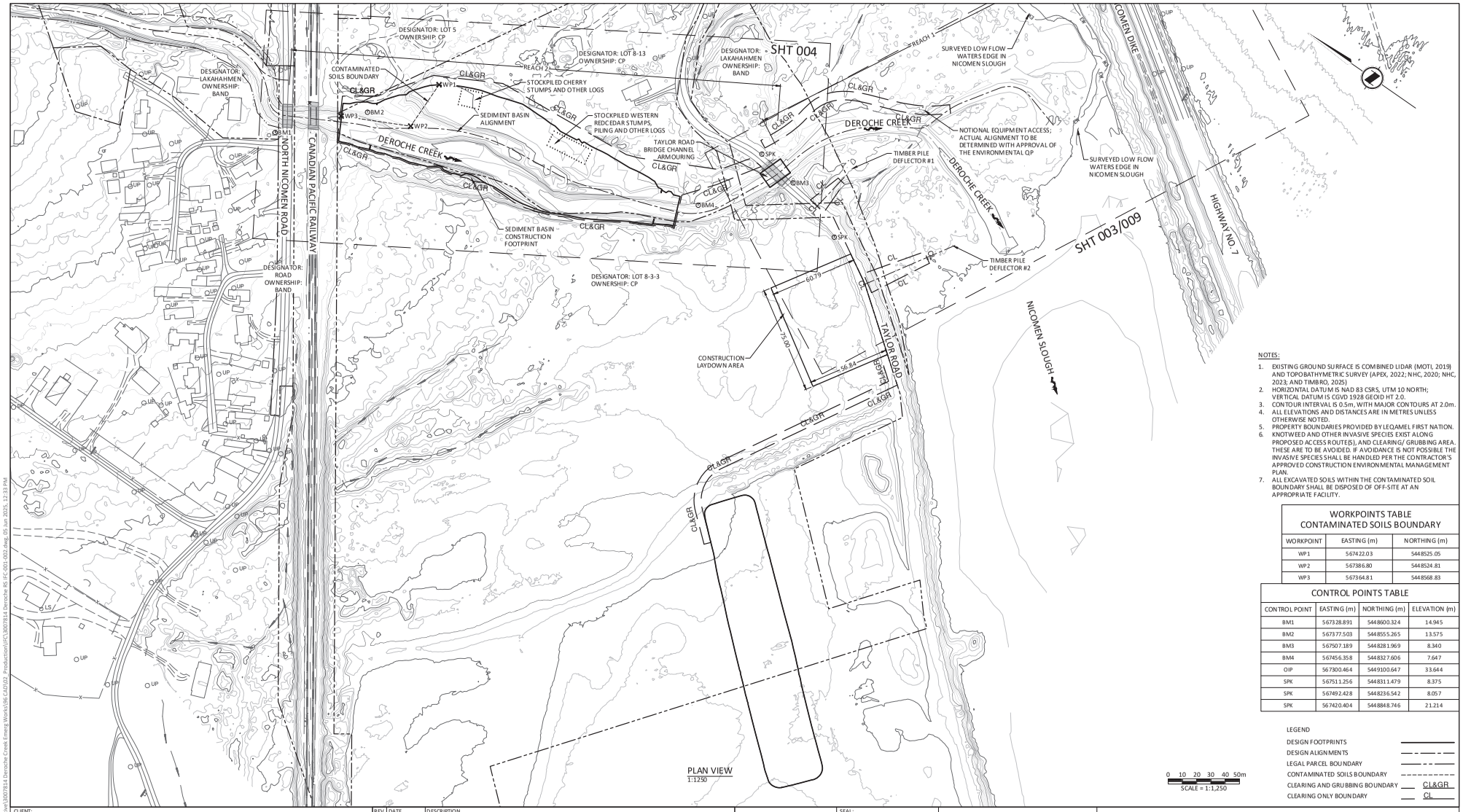

NOTES:

1. EXISTING GROUND SURFACE IS COMBINED LIDAR (MOTI, 2019) AND TOPOBATHYMETRIC SURVEY (APEX, 2022; NHC, 2020; NHC, 2023; AND TIMBRO, 2025)
2. HORIZONTAL DATUM IS NAD 83 CSRS, UTM 10 NORTH; VERTICAL DATUM IS CGVD 1928 GEOID HT 2.0.
3. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
4. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
5. PROPERTY BOUNDARIES PROVIDED BY LEQAMEL FIRST NATION.
6. KNOTWEED AND OTHER INVASIVE SPECIES EXIST ALONG PROPOSED ACCESS ROUTE(S), AND CLEARING/ GRUBBING AREA. THESE ARE TO BE AVOIDED. IF AVOIDANCE IS NOT POSSIBLE THE INVASIVE SPECIES SHALL BE HANDLED PER THE CONTRACTOR'S APPROVED CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN.
7. ALL EXCAVATED SOILS WITHIN THE CONTAMINATED SOIL BOUNDARY SHALL BE DISPOSED OF OFF-SITE AT AN APPROPRIATE FACILITY.

WORKPOINTS TABLE
CONTAMINATED SOILS BOUNDARY

WORKPOINT	EASTING (m)	NORTHING (m)
WP1	567422.03	5448525.05
WP2	567386.80	5448524.81
WP3	567364.81	5448568.83

CONTROL POINTS TABLE

CONTROL POINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
BM1	567328.891	5448600.324	14.945
BM2	567377.503	5448555.265	13.575
BM3	567507.189	5448281.969	8.340
BM4	567456.358	5448327.606	7.647
OIP	567300.464	5449100.647	33.644
SPK	567511.256	5448311.479	8.375
SPK	567492.428	5448236.542	8.057
SPK	567420.404	5448848.746	21.214

LEGEND

DESIGN FOOTPRINTS
DESIGN ALIGNMENTS
LEGAL PARCEL BOUNDARY
CONTAMINATED SOILS BOUNDARY
CLEARING AND GRUBBING BOUNDARY — CL&GR
CLEARING ONLY BOUNDARY — CL

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2025-06-09

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DEROCHE CREEK RECOVERY SOLUTION

SITE PLAN

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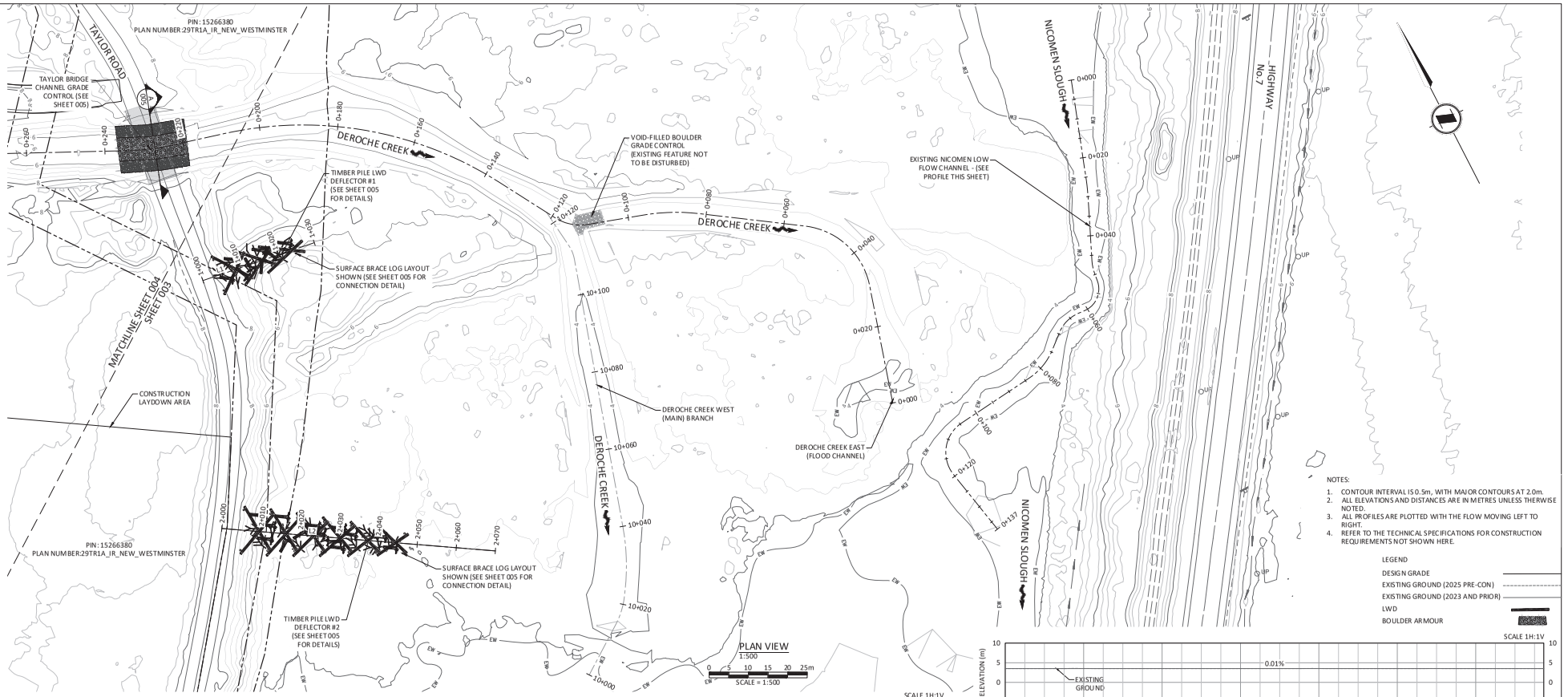
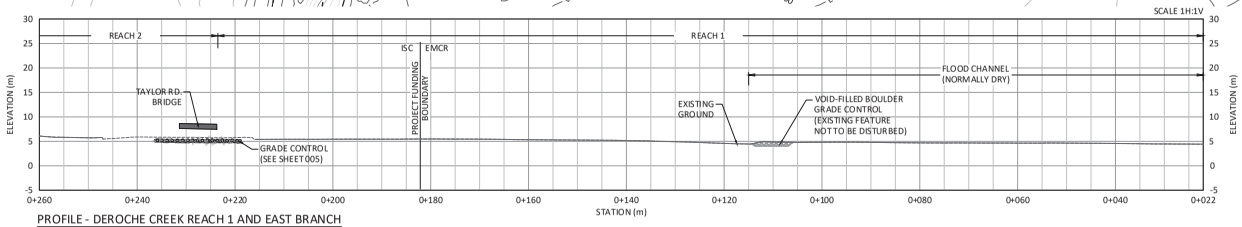


NOTES:

1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS THERWISE NOTED.
3. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.
4. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.

LEGEND

- DESIGN GRADE
- EXISTING GROUND (2025 PRE-CON)
- EXISTING GROUND (2023 AND PRIOR)
- LWD
- BOULDER ARMOUR



PROFILE - DEROCHE CREEK REACH 1 AND EAST BRANCH
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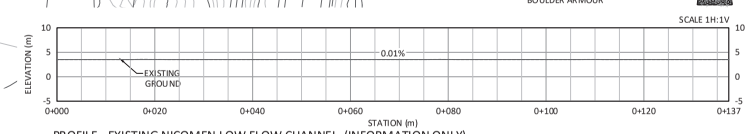

PROFILE - EXISTING NICOMEN LOW FLOW CHANNEL (INFORMATION ONLY)
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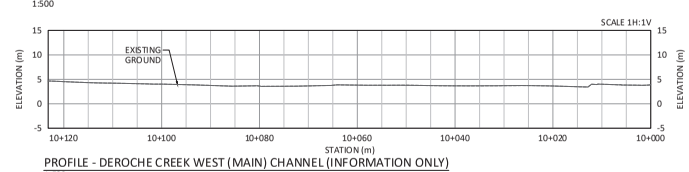

PROFILE - DEROCHE CREEK WEST (MAIN) CHANNEL (INFORMATION ONLY)
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DEROCHE CREEK RECOVERY SOLUTION

REACH 1 WORKS

PLAN AND PROFILE

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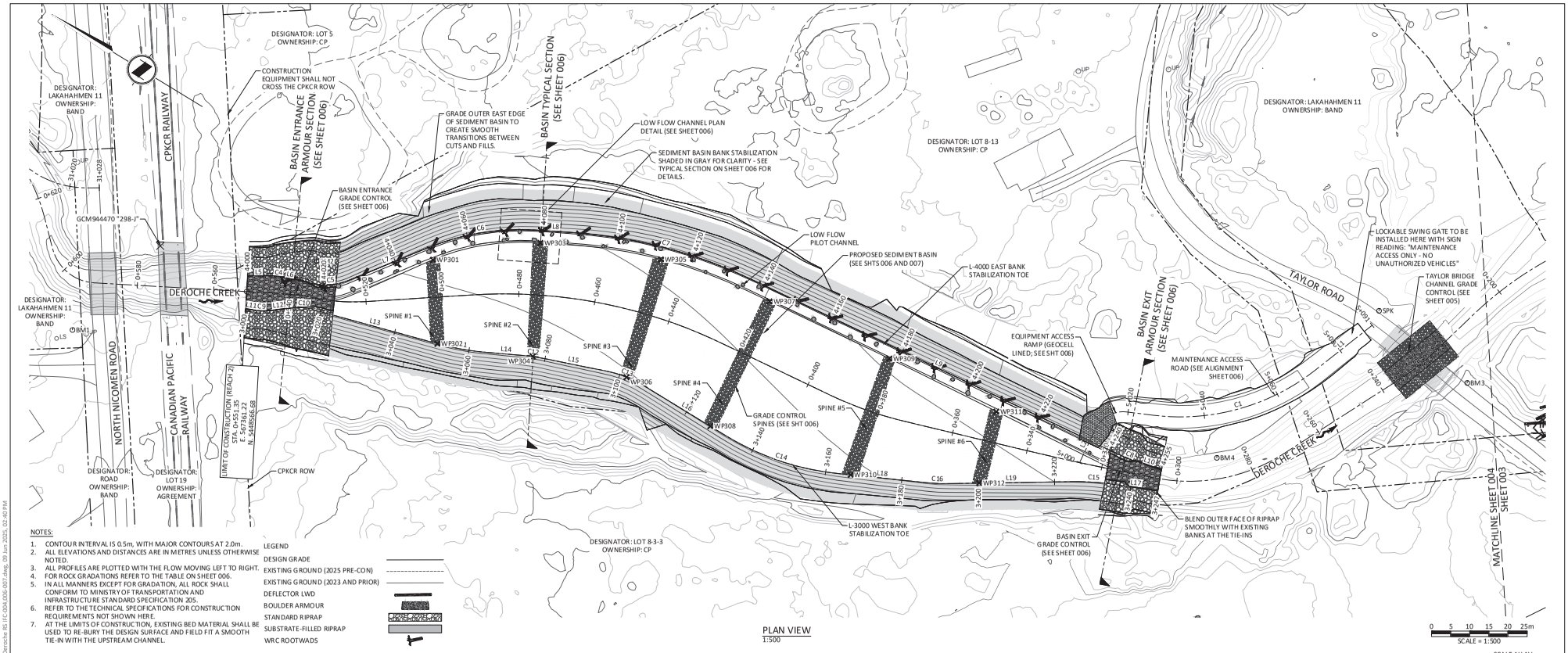


PLAN VIEW
1:500

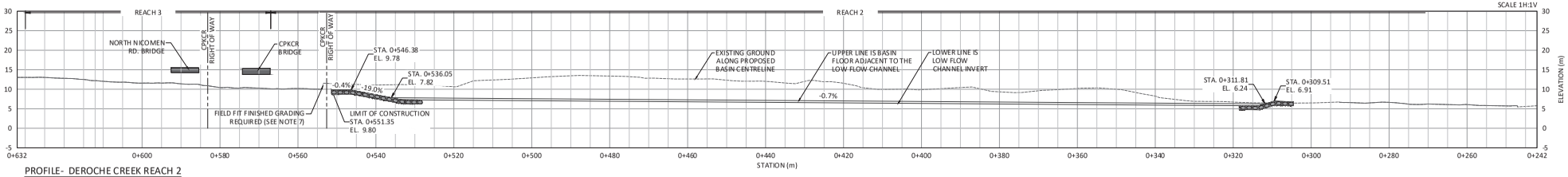
0 5 10 15 20 25m
SCALE = 1:500

NOTES:

1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
3. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.
4. FOR ROCK GRADATIONS REFER TO THE TABLE ON SHEET 006.
5. IN ALL MANNERS EXCEPT FOR GRADATION, ALL ROCK SHALL CONFORM TO MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE STANDARD SPECIFICATION 205.
6. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.
7. AT THE LIMITS OF CONSTRUCTION, EXISTING BED MATERIAL SHALL BE USED TO RE-BURY THE DESIGN SURFACE AND FIELD FIT A SMOOTH TIE-IN WITH THE UPSTREAM CHANNEL.

LEGEND

- DESIGN GRADE
- EXISTING GROUND (2025 PRE-CON)
- EXISTING GROUND (2023 AND PRIOR)
- DEFLECTOR LWD
- BOULDER ARMOUR
- STANDARD RIPRAP
- SUBSTRATE-FILLED RIPRAP
- WRC ROOTWADS



PROFILE- DEROCHE CREEK REACH 2
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BRITISH COLUMBIA

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DEROCHE CREEK RECOVERY SOLUTION
REACH 2 WORKS

PLAN AND PROFILE VIEWS

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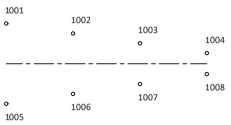
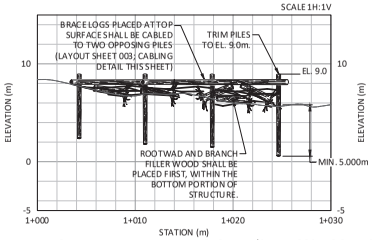


PILING PLAN - DEFLECTOR #1
1:250

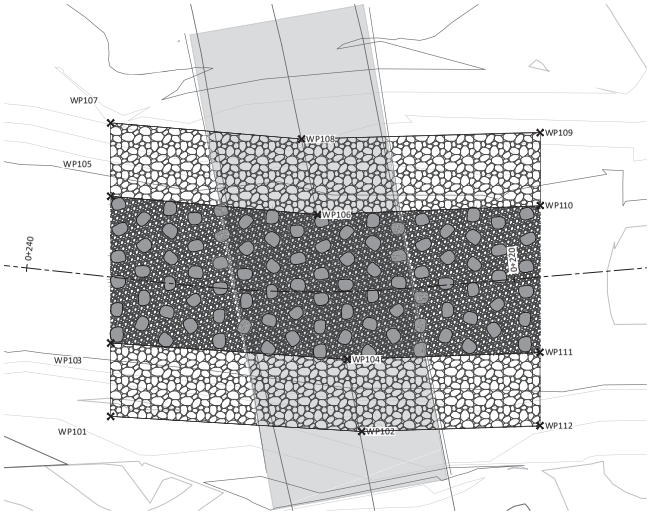
PILE LAYOUT TABLE - DEFLECTOR #1		
PILE #	EASTING (m)	NORTHING (m)
1001	567505.93	5448262.56
1002	567512.54	5448260.55
1003	567519.16	5448258.55
1004	567525.77	5448256.55
1005	567504.73	5448254.45
1006	567511.63	5448254.44
1007	567518.54	5448254.43
1008	567525.45	5448254.42

TIMBER PILE DEFLECTOR #1 ALIGNMENT LAYOUT						
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L1	1+000.000	567501.20	5448259.12	098° 28' 01.01"	30.000	

WORKPOINT TABLE - TAYLOR BRIDGE ARMOURING		
PILE #	EASTING (m)	NORTHING (m)
101	567495.22	5448292.99
102	567504.69	5448288.95
103	567496.24	5448295.82
104	567505.12	5448291.93
105	567498.26	5448301.47
106	567505.97	5448297.91
107	567499.27	5448304.29
108	567506.40	5448301.04
109	567515.67	5448298.00
110	567514.67	5448295.19
111	567512.64	5448289.54
112	567511.63	5448286.72



PROFILE - TIMBER PILE DEFLECTOR #1 (SHEET 003; LOOKING NORTH)
1:250



TAYLOR BRIDGE CHANNEL ARMOURING
1:150

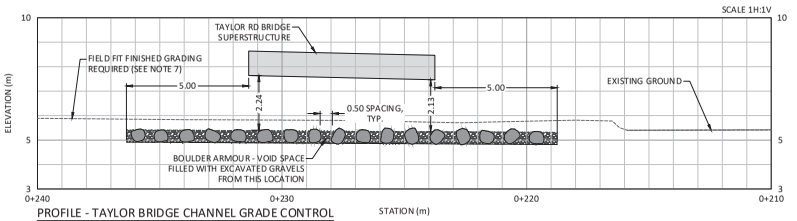


PILING PLAN - DEFLECTOR #2
1:250

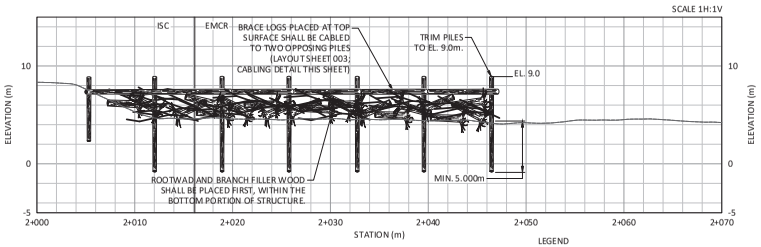
PILE LAYOUT TABLE - DEFLECTOR #2		
PILE #	EASTING (m)	NORTHING (m)
2001	567483.71	5448202.35
2002	567489.33	5448198.33
2003	567494.95	5448194.32
2004	567500.57	5448190.30
2005	567506.19	5448186.28
2006	567511.81	5448182.26
2007	567517.43	5448178.24

PILE LAYOUT TABLE - DEFLECTOR #2		
PILE #	EASTING (m)	NORTHING (m)
2008	567478.26	5448193.60
2009	567484.35	5448190.33
2010	567490.43	5448187.06
2011	567496.52	5448183.79
2012	567502.61	5448180.52
2013	567508.69	5448177.25
2014	567514.78	5448173.98

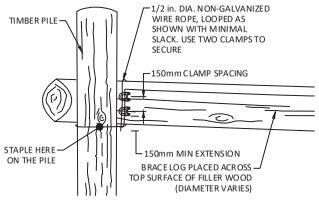
TIMBER PILE DEFLECTOR #2 ALIGNMENT LAYOUT						
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L2	2+000.000	567476.59	5448200.71	121° 53' 59.96"	70.000	



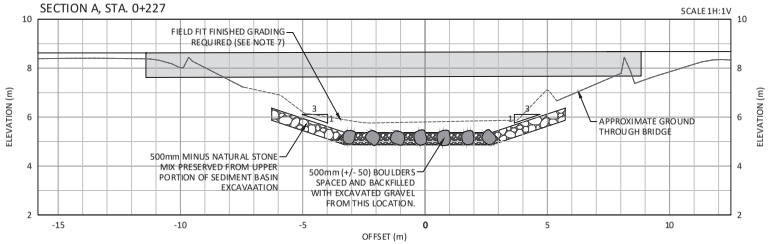
PROFILE - TAYLOR BRIDGE CHANNEL GRADE CONTROL (SHEET 003; LOOKING EAST)
1:100



PROFILE - TIMBER PILE DEFLECTOR #2 (SHEET 003; LOOKING NORTH)
1:250



BRACE LOG CABLING DETAIL
1:25



A 003 TAYLOR BRIDGE CHANNEL GRADE CONTROL (LOOKING SOUTH)
1:100

LEGEND
- DESIGN GRADE
- EXISTING GROUND (2025 PRE-CON)
- EXISTING GROUND (2023 AND PRIOR)
- LARGE WOODY DEBRIS
- TIMBER PILE
- VOID-FILLED BOULDER ARMOURING

NOTES:
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
3. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.
4. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
5. IN ALL MANNERS EXCEPT FOR GRADATION, ROCK QUALITY SHALL CONFORM TO MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE STANDARD SPECIFICATION 205.
6. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.
7. AT TAYLOR BRIDGE EXISTING BED MATERIAL SHALL BE USED TO RE-BURY THE DESIGN SURFACE AND FIELD FIT A SMOOTH TIE-IN WITH THE CHANNEL UP- AND DOWNSTREAM.

CLIENT:
BRITISH COLUMBIA — Ministry of Environment and Climate Change Strategy

REV	DATE	DESCRIPTION
0	18 FEB 2025	ISSUED FOR CONSTRUCTION
1	05 JUN 2025	ISSUED FOR CONSTRUCTION

nhc northwest hydraulic consultants

SEAL:
PROFESSIONAL ENGINEER — D. J. GOULD — # 28281 — PROVINCE OF BRITISH COLUMBIA — ENGINEERS
2025-06-09
Permit to Practice 1000021

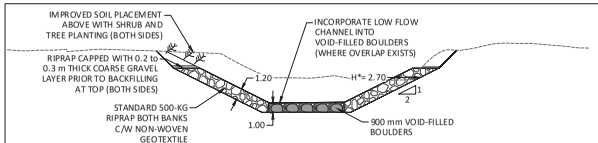
DEROCHE CREEK RECOVERY SOLUTION
REACH 1

TYPICAL SECTIONS AND PROFILE DETAILS

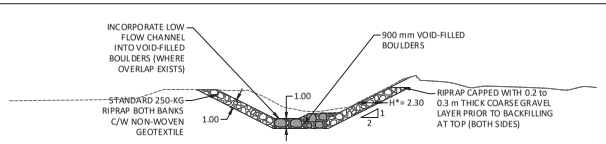
DESIGNED: DJG	SHEET ID: 2900712-DER RS-005		SHEET No: 005
DRAFTED: CZZ	STATUS: ISSUED FOR CONSTRUCTION		
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 9 JUN 2025	REV No: 1	

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

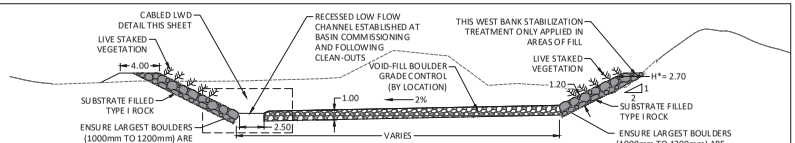
FILENAME: \\nanaimo-van\Projects\Active\2900712 Deroche Creek Emerg Works\06 CAD\02_Production\PC\2900712 Deroche RS IFC-003,005.dwg, 09 Jun 2025, 02:37 PM



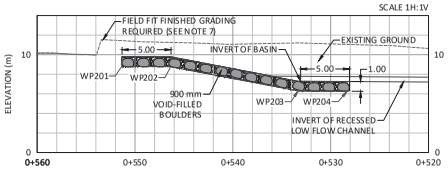
TYPICAL SECTION - BASIN ENTRANCE ARMOUR (SEE SHEET 004)
1:250



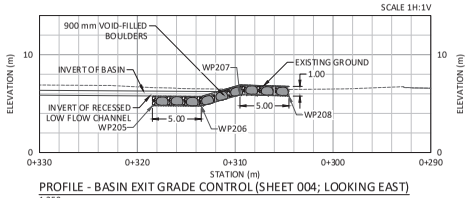
TYPICAL SECTION - BASIN EXIT ARMOUR (SEE SHEET 004)
1:250



TYPICAL SECTION - BASIN (SEE SHEET 004)
1:250



PROFILE - BASIN ENTRANCE GRADE CONTROL (SHEET 004; LOOKING EAST)
1:250



PROFILE - BASIN EXIT GRADE CONTROL (SHEET 004; LOOKING EAST)
1:250

WEST BANK STABILIZATION ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L11	3+000.000	567357.14	5448564.62	157° 30' 27.32"	2.803	
C9	3+002.803	567358.21	5448562.03	149° 56' 14.47"	2.907	11.000
L12	3+005.709	567359.66	5448559.52	142° 22' 01.61"	7.605	
C10	3+013.314	567364.30	5448553.50	153° 08' 19.07"	3.948	10.500
L13	3+017.262	567366.08	5448550.00	163° 54' 36.53"	34.242	
C11	3+051.504	567375.57	5448517.10	158° 44' 00.11"	12.649	70.000
L14	3+064.153	567380.15	5448505.32	153° 33' 23.68"	10.947	
C12	3+075.100	567385.02	5448495.52	156° 43' 38.64"	3.320	30.000
L15	3+078.420	567386.34	5448492.47	159° 53' 53.60"	17.959	
C13	3+096.379	567392.51	5448475.61	169° 55' 09.83"	10.494	30.000
L16	3+106.873	567394.33	5448465.33	179° 56' 26.06"	25.234	
C14	3+132.107	567394.36	5448440.09	167° 11' 53.43"	31.136	70.000
L18	3+163.243	567401.20	5448409.98	154° 27' 20.79"	23.184	
C16	3+186.427	567411.20	5448389.07	151° 03' 18.30"	5.935	50.000
L19	3+192.362	567414.07	5448383.87	147° 39' 15.81"	32.521	
C15	3+224.884	567431.47	5448356.40	152° 15' 55.54"	10.462	65.000
L17	3+235.346	567436.33	5448347.15	156° 52' 35.26"	11.832	

EAST BANK STABILIZATION ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L5	4+000.000	567364.60	5448568.54	148° 11' 05.50"	5.815	
C4	4+005.815	567367.66	5448563.59	154° 10' 14.71"	4.387	20.995
C5	4+017.349	567372.00	5448552.93	143° 10' 38.73"	9.399	15.858
L7	4+026.748	567377.55	5448545.52	126° 11' 53.53"	22.305	
C6	4+049.053	567395.55	5448532.34	139° 21' 17.98"	29.393	64.000
L8	4+078.446	567414.53	5448510.24	152° 30' 42.42"	9.419	
C7	4+087.864	567418.87	5448501.88	163° 16' 57.04"	48.500	129.000
L9	4+136.364	567432.74	5448455.70	174° 03' 11.66"	107.249	
C8	4+243.613	567443.85	5448349.03	170° 38' 17.75"	3.576	30.000
L10	4+247.189	567444.43	5448345.51	167° 13' 23.84"	7.393	

ENTRANCE GRADE CONTROL WORKPOINTS TABLE

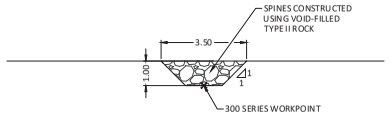
WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP201	567361.22	5448566.68	8.80
WP202	567363.57	5448562.29	8.74
WP203	567369.12	5448550.51	6.30
WP204	567371.06	5448545.87	6.26

EXIT GRADE CONTROL WORKPOINTS TABLE

WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP201	567361.22	5448566.68	8.80
WP202	567363.57	5448562.29	8.74
WP203	567369.12	5448550.51	6.30
WP204	567371.06	5448545.87	6.26

BASIN MAINTENANCE ACCESS ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L2	5+000.000	567436.58	5448357.58	083° 59' 09.03"	9.673	
C2	5+009.673	567446.20	5448358.59	119° 46' 07.66"	9.992	8.000
C1	5+026.784	567457.27	5448347.47	132° 57' 25.88"	44.956	57.000
L1	5+071.740	567489.32	5448317.62	110° 21' 45.47"	18.959	



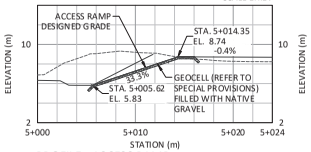
TYPICAL SECTION - GRADE CONTROL SPINE
1:100

GRADE CONTROL SPINE WORKPOINTS TABLE

WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP301	567393.69	5448529.45	6.39
WP302	567375.58	5448517.03	6.83
WP303	567412.07	5448507.78	6.12
WP304	567385.73	5448494.04	6.72
WP305	567424.84	5448478.65	5.90
WP306	567393.90	5448470.28	6.55

GRADE CONTROL SPINE WORKPOINTS TABLE

WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP307	567430.27	5448448.70	5.69
WP308	567394.39	5448444.92	6.41
WP309	567433.83	5448414.20	5.45
WP310	567402.65	5448406.96	6.09
WP311	567436.62	5448383.10	5.36
WP312	567418.34	5448377.21	5.74



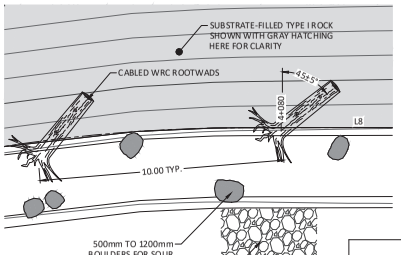
PROFILE - ACCESS RAMP (SHEET 004; LOOKING NORTH)
1:250

WEST BANK STABILIZATION OFFSET/ELEVATION TABLE

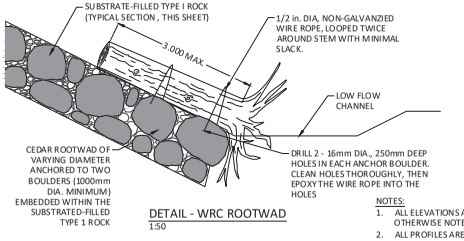
STATION	O/S TO TOE OF CUT	ELEV TOE OF CUT	O/S TO TOP OF CUT	ELEV TOP OF CUT
3+000.000	0.16	8.60	7.53	12.31
3+002.803	0.11	8.60	7.36	12.24
3+005.709	0.13	8.48	7.86	12.16
3+010.000	0.14	7.65	9.60	12.08
3+013.314	0.15	6.99	10.86	11.95
3+017.262	-0.64	6.20	10.85	11.96
3+020.000	-0.84	6.09	10.73	11.90
3+030.000	0.27	6.63	10.39	11.84
3+040.000	0.27	6.63	9.79	11.66
3+050.000	0.27	6.62	9.33	11.41
3+060.000	0.26	6.61	9.19	11.19
3+070.000	0.28	6.56	9.56	11.22
3+080.000	0.28	6.49	9.37	11.08
3+090.000	0.28	6.43	9.00	10.79
3+096.379	0.28	6.37	8.44	10.44
3+100.000	0.31	6.34	8.31	10.35
3+110.000	0.28	6.29	8.07	10.28
3+120.000	0.28	6.24	8.05	10.16
3+130.000	0.28	6.19	7.39	9.77
3+140.000	0.26	6.13	7.32	9.66
3+150.000	0.27	6.05	7.49	9.69
3+160.000	0.21	5.95	7.51	9.66
3+170.000	0.28	5.84	7.41	9.46
3+180.000	0.28	5.75	7.34	9.30
3+190.000	0.28	5.65	7.09	9.13
3+200.000	0.27	5.53	6.94	8.96
3+210.000	0.27	5.42	6.97	8.85
3+220.000	0.28	5.30	7.07	8.77
3+230.000	0.28	5.19	7.34	8.74
3+235.346	-0.91	4.77	6.98	8.72
3+240.000	0.10	5.31	6.72	8.73
3+247.178	0.11	5.77	5.96	8.70

EAST BANK STABILIZATION OFFSET/ELEVATION TABLE

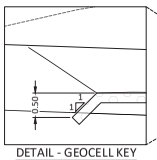
STATION	O/S TO TOE OF CUT	ELEV TOE OF CUT	O/S TO TOP OF CUT	ELEV TOP OF CUT
4+000.000	0.37	8.60	7.77	12.30
4+003.275	0.37	8.60	7.62	12.26
4+007.661	0.37	8.24	8.24	12.15
4+010.000	0.39	7.90	8.78	12.11
4+017.298	-0.41	6.40	10.54	11.97
4+020.000	-0.50	6.09	10.78	11.92
4+026.696	0.46	6.43	10.49	11.86
4+030.000	0.32	6.39	10.09	11.82
4+040.000	0.27	6.25	10.24	11.59
4+050.000	0.21	6.12	10.06	11.37
4+060.000	0.12	6.01	10.43	11.29
4+070.000	0.06	5.92	10.44	11.14
4+080.000	0.21	5.85	10.60	11.05
4+090.000	0.18	5.79	10.50	10.96
4+100.000	0.18	5.71	10.07	10.67
4+110.000	0.21	5.65	9.60	10.34
4+120.000	0.25	5.58	9.63	10.27
4+130.000	0.26	5.52	9.66	10.22
4+136.313	0.22	5.47	9.45	10.08
4+140.000	0.27	5.45	9.37	10.00
4+150.000	0.28	5.38	9.01	9.74
4+160.000	0.28	5.31	8.98	9.66
4+170.000	0.28	5.24	9.17	9.68
4+180.000	0.28	5.17	8.77	9.46
4+190.000	0.28	5.13	8.36	9.26
4+200.000	0.28	5.10	8.10	9.10
4+210.000	0.28	5.08	7.83	8.93
4+220.000	0.28	5.05	7.68	8.83
4+230.000	0.28	5.03	7.58	8.77
4+240.000	0.27	5.00	7.07	8.73
4+243.562	-0.61	4.76	7.16	8.73
4+247.138	0.19	5.16	6.93	8.73
4+250.000	0.35	5.90	5.87	8.67
4+254.531	0.34	5.77	6.17	8.69



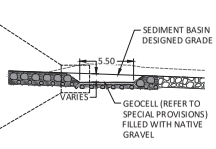
DETAIL - LOW FLOW CHANNEL PLAN
1:100



DETAIL - WRC ROOTWAD
1:50



DETAIL - GEOCELL KEY
1:50



TYPICAL SECTION - ACCESS RAMP (LOOKING WEST)
1:250

GRADATION TABLE - IMPORTED ROCK MATERIALS

	ROCK DIAMETER (mm)					
	250-KG RIPRAP	500-KG RIPRAP	TYPE I ROCK	TYPE II ROCK	900mm BOULDERS	500mm BOULDERS
D_{100}	1000	1250	1250	750	-	-
D_{85}	830	1050	1050	610	-	-
D_{50}	575	725	725	425	900 (± 100)	500 (± 50)
D_{35}	270	340	550	350	-	-
D_0	200	250	450	300	-	-

NOTES:
1. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
2. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.
3. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
4. FOR ROCK GRADATIONS REFER TO THE TABLE ON THIS SHEET.
5. IN ALL MANNERS EXCEPT FOR GRADATION, ROCK QUALITY SHALL CONFORM TO MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE STANDARD SPECIFICATION 205.
6. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.
7. AT THE LIMITS OF CONSTRUCTION, EXISTING BED MATERIAL SHALL BE USED TO RE-BURY THE DESIGN SURFACE AND FIELD FIT A SMOOTH TIE-IN WITH THE UPSTREAM CHANNEL.

LEGEND
DESIGN GRADE
EXISTING GROUND (2025 PRE-CON)
EXISTING GROUND (2023 AND PRIOR)
SUBSTRATE FILLED RIPRAP
BOULDER ARMOUR
STANDARD RIPRAP
6-INCH MINUS STREAM GRAVEL

CLIENT:
BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

REV	DATE	DESCRIPTION
0	18 FEB 2025	ISSUED FOR CONSTRUCTION
1	05 JUN 2025	ISSUED FOR CONSTRUCTION

nhc northwest hydraulic consultants

SEAL:
PROFESSIONAL ENGINEER
D. J. GOOD
29281
PROVINCE OF BRITISH COLUMBIA
2025-06-09
Permit to Practice 1000021

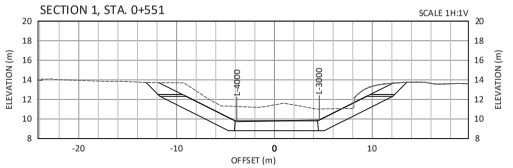
DEROCHE CREEK RECOVERY SOLUTION
REACH 2
TYPICAL SECTIONS AND PROFILE DETAILS

DESIGNED:	DJG	SHEET ID: 2900712-DER RS-006	SHEET No: 006
DRAFTED:	CZZ	STATUS: ISSUED FOR CONSTRUCTION	
CHECKED:	DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE: 9 JUN 2025	REV No: 1

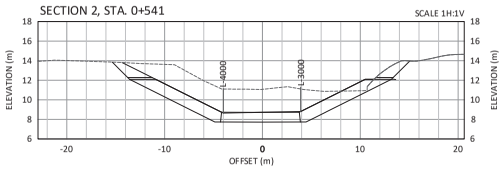
SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nanaimo-van\Projects\Active\2900712\14 Deroche Creek Emerg Works\06 CAD\02_Production\IFC\2900712-DER RS-006_005_007.dwg, 09 Jun 2025, 02:40 PM

SECTION 1, STA. 0+551



SECTION 2, STA. 0+541



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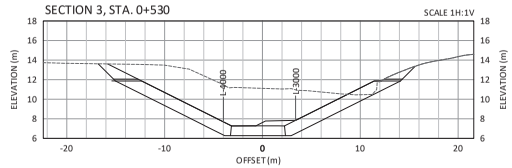
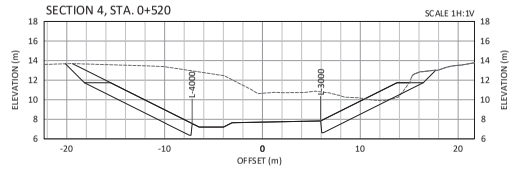


SECTION 4, STA. 0+520



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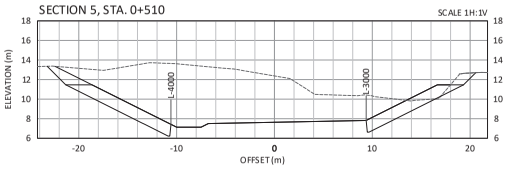

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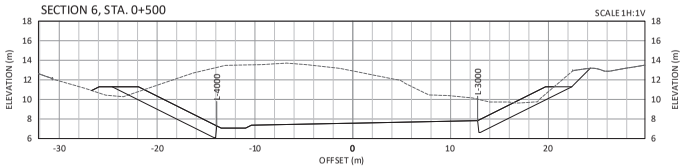
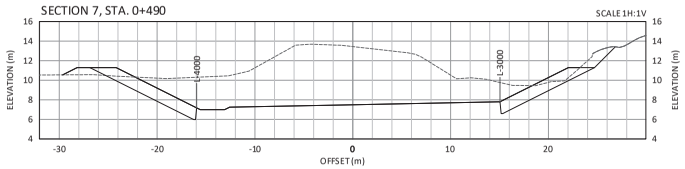


SECTION 7, STA. 0+490



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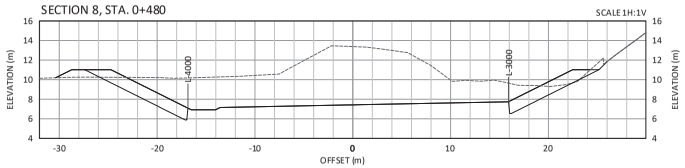

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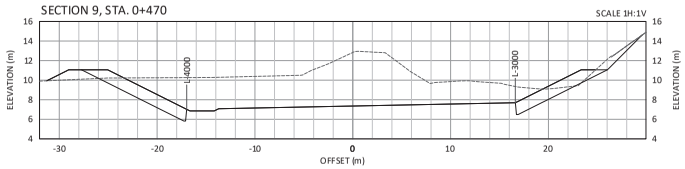

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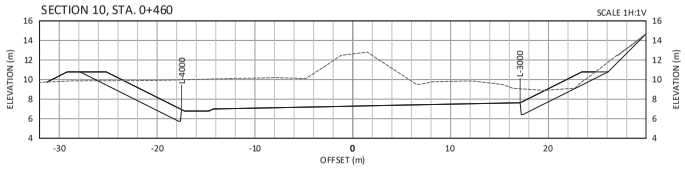
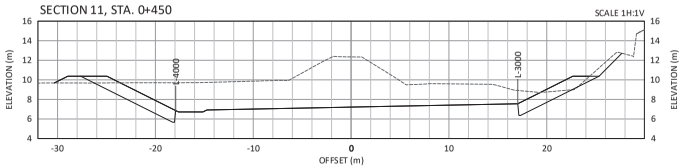
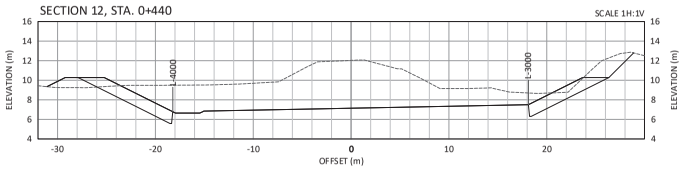


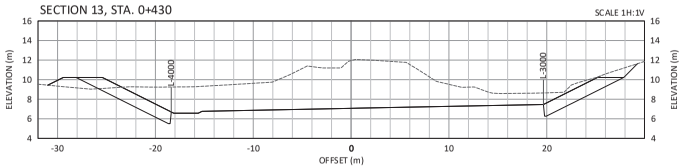
SECTION 11, STA. 0+450



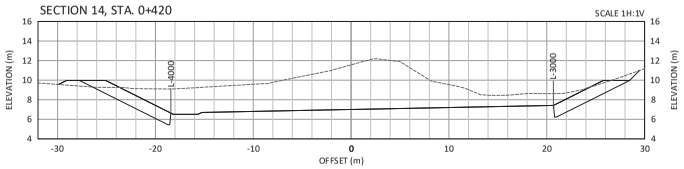
SECTION 12, STA. 0+440



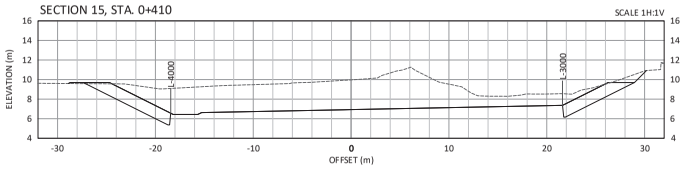
SECTION 13, STA. 0+430



SECTION 14, STA. 0+420



SECTION 15, STA. 0+410



LEGEND

DESIGN GRADE

EXISTING GROUND (2025 PRE-CON)

EXISTING GROUND (2023 AND PRIOR)

NOTES:

1. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
2. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
3. REFER TO SHEET 006 FOR L-3000 AND L-4000 ALIGNMENT TABLES, AND OFFSET/ ELEVATION TABLES

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
0	18 FEB 2025	ISSUED FOR CONSTRUCTION
1	05 JUN 2025	ISSUED FOR CONSTRUCTION

nhc northwest hydraulic consultants

SEAL:

PROFESSIONAL ENGINEER D. J. GOOLD # 28281 WATER COLUMBIA

2025-06-09

Permit to Practice 1000221

DEROCHE CREEK RECOVERY SOLUTION

SEDIMENT BASIN

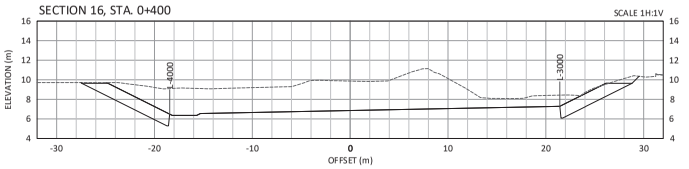
STANDARD SECTIONS

DESIGNED:	DJG	SHEET ID:	2900712-DER RS-007A	SHEET No:
DRAFTED:	CZZ	STATUS:	ISSUED FOR CONSTRUCTION	007A
CHECKED:	DJG	SCALE:	AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE:	9 JUN 2025	REV No: 1

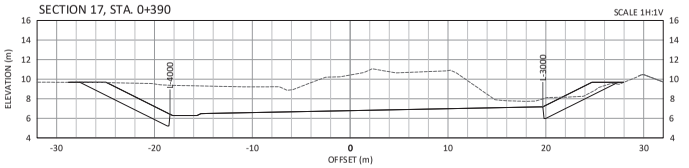
SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\mainfile-van\Projects\Active\3007814 Deroche Creek Emerg Works\96 CAD\02_Production\IFC\3007814 Deroche RS IFC-004,006-007.dwg, 09 Jun 2025, 02:40 PM

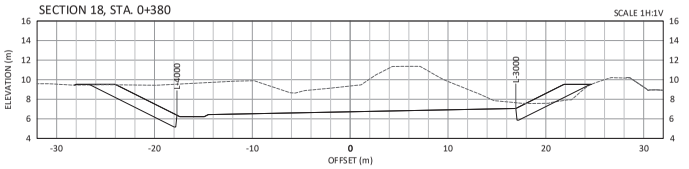
SECTION 16, STA. 0+400



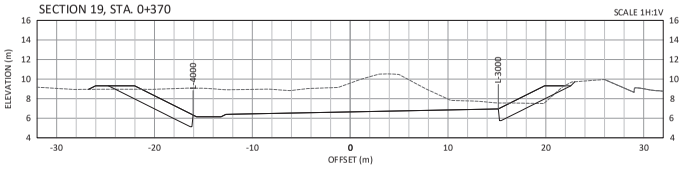
SECTION 17, STA. 0+390



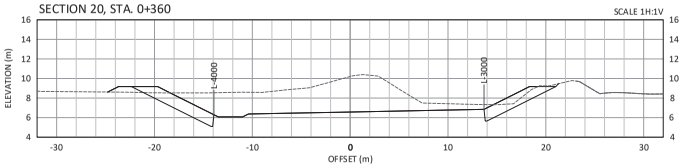
SECTION 18, STA. 0+380



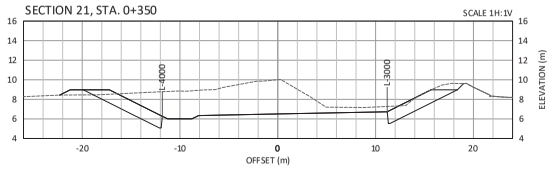
SECTION 19, STA. 0+370



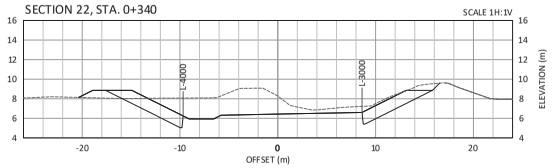
SECTION 20, STA. 0+360



SECTION 21, STA. 0+350



SECTION 22, STA. 0+340



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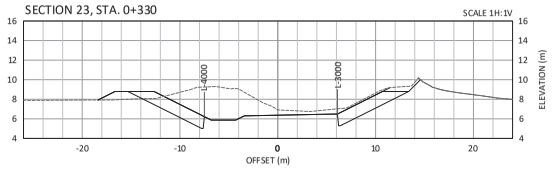
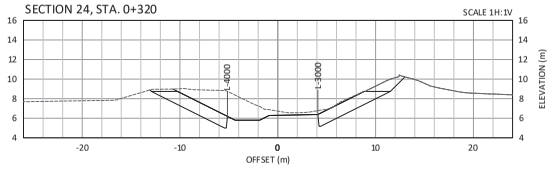
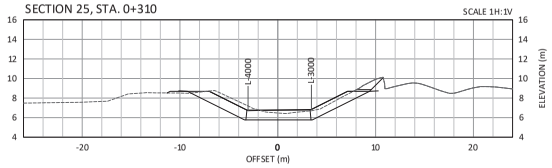


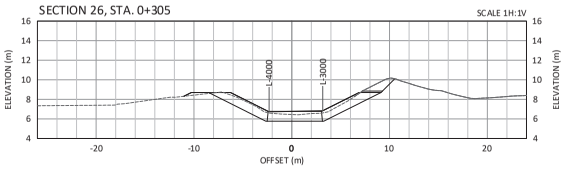
SECTION 24, STA. 0+320



SECTION 25, STA. 0+310



SECTION 26, STA. 0+305



LEGEND

DESIGN GRADE

EXISTING GROUND (2025 PRE-CON)

EXISTING GROUND (2023 AND PRIOR)

NOTES:

1. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
2. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
3. REFER TO SHEET 006 FOR L-3000 AND L-4000 ALIGNMENT TABLES, AND OFFSET/ ELEVATION TABLES

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
0	18 FEB 2025	ISSUED FOR CONSTRUCTION
1	05 JUN 2025	ISSUED FOR CONSTRUCTION

nhc northwest hydraulic consultants

SEAL:

PROFESSIONAL ENGINEER D. J. GOOLD # 28281 BRITISH COLUMBIA

2025-06-09

Permit to Practice 1000221

DEROCHE CREEK RECOVERY SOLUTION

SEDIMENT BASIN

STANDARD SECTIONS

DESIGNED:	DJG	SHEET ID:	2900712-DER RS-007B	SHEET No:
DRAFTED:	CZZ	STATUS:	ISSUED FOR CONSTRUCTION	007B
CHECKED:	DJG	SCALE:	AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE:	9 JUN 2025	REV No: 1

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\mainfile-van\Projects\Active\3007814 Deroche Creek Emerg Works\96 CAD\02_Production\IFC\3007814 Deroche RS IFC-004,006-007.dwg, 09 Jun 2025, 02:40 PM

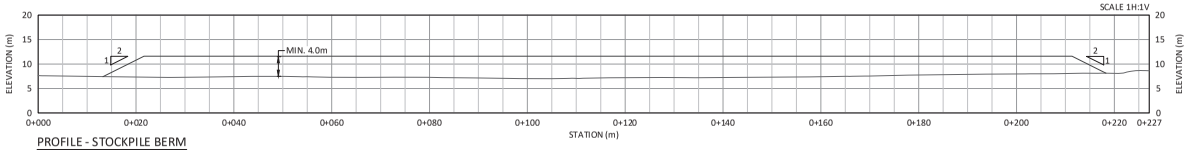


PLAN VIEW - LOT 8-3-3
1:1000

SCALE = 1:1,000



TYPICAL SECTION - STOCKPILE BERM
1:500



PROFILE - STOCKPILE BERM
1:500

NOTES:
1. EXISTING GROUND SURFACE IS LIDAR (MOTI, 2019).
2. HORIZONTAL DATUM IS NAD 83 CSRS, UTM 10 NORTH; VERTICAL DATUM IS CGVD 1928 GEOID HT 2.0.
3. REFER TO DRAWING SHEET 002 FOR CONTROL TABLE.
4. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
5. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
6. PROPERTY BOUNDARIES PROVIDED BY LEQAMEL FIRST NATION.
7. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.

LEGEND
PROPERTY BOUNDARIES
DESIGN GRADE
EXISTING GROUND (2023 AND PRIOR)

CLIENT:
BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

REV	DATE	DESCRIPTION
0	18 FEB 2025	ISSUED FOR CONSTRUCTION
1	05 JUN 2025	ISSUED FOR CONSTRUCTION

nhc northwest hydraulic consultants

SEAL:
PROFESSIONAL ENGINEER
D. J. GOULD
28281
BRITISH COLUMBIA
ENGINEERS
2025-06-05
Permit to Practice 1000021

DEROCHE CREEK RECOVERY SOLUTION
REACH 2
LOT 8-3-3 GRADING

DESIGNED: DJG	SHEET ID: 2900712-DER RS-008		SHEET No: 008
DRAFTED: CZZ	STATUS: ISSUED FOR CONSTRUCTION		
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 5 JUN 2025	REV No: 1	

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nanlfile-van\Projects\Active\2900712 Deroche Creek Emerg Works\06 CAD\02_Production\PC\2900712 Deroche RS PC-008.dwg, 05 Jun 2025, 12:53 PM



NOTES:
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
3. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.

LEGEND
DESIGN FOOTPRINTS
DESIGN ALIGNMENTS
DEFLECTOR LWD
WRC ROOTWADS

0 5 10 15 20 25m
SCALE = 1:500

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
0	18 FEB 2025	ISSUED FOR CONSTRUCTION
1	05 JUN 2025	ISSUED FOR CONSTRUCTION

nhc northwest hydraulic consultants

SEAL:

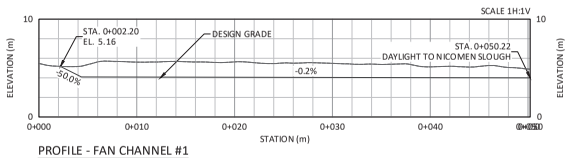
PROFESSIONAL ENGINEER D. J. GOOLD # 28281 BRITISH COLUMBIA
2025-06-09
Permit to Practice 1003021

DEROCHE CREEK RECOVERY SOLUTION
OFF-SETTING WORKS
PLAN

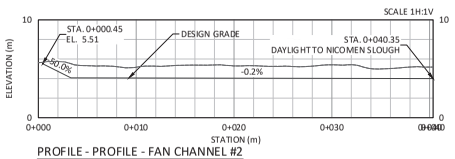
DESIGNED: DJG	SHEET ID: 2900712-DER RS-009	SHEET No: 009
DRAFTED: CZZ	STATUS: ISSUED FOR CONSTRUCTION	
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED: DJG	DATE: 5 JUN 2025	REV No: 1

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\mainfile-van\Projects\Active\3007814 Deroche Creek Emerg Works\96 CAD\02_Production\IFC\3007814 Deroche RS IFC-009-010.dwg, 05 Jun 2025, 12:33 PM



PROFILE - FAN CHANNEL #1
1:250



PROFILE - PROFILE - FAN CHANNEL #2
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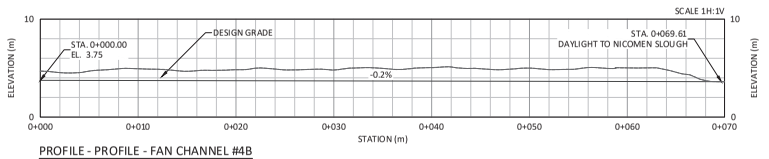
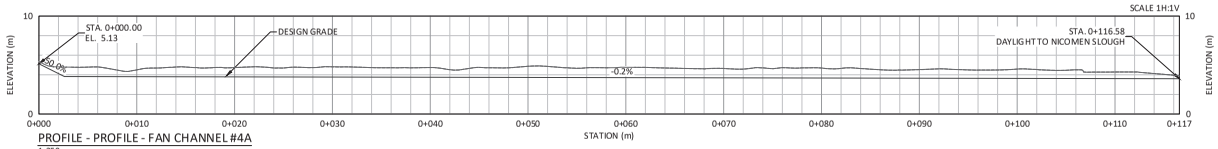


PROFILE - PROFILE - FAN CHANNEL #4B
1:250



PROFILE - PROFILE - FAN CHANNEL #4A
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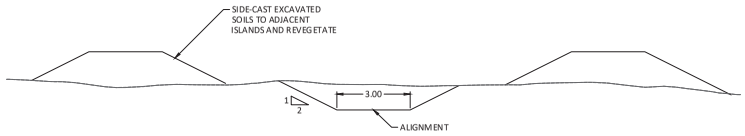


TYPICAL SECTION, FAN CHANNEL 1-4 (SEE SHEET 006)
1:100

FAN CHANNEL 1 ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L1	0+000.000	567581.74	5448355.64	120° 08' 23.70"	5.708	
C1	0+005.708	567586.68	5448352.77	079° 47' 38.43"	7.042	5.000
L2	0+012.750	567593.05	5448353.92	039° 26' 53.15"	2.514	
C2	0+015.264	567594.65	5448355.86	088° 01' 06.32"	15.259	9.000
L3	0+030.522	567608.14	5448356.33	136° 35' 19.49"	4.601	
C3	0+035.123	567611.30	5448352.98	090° 20' 15.26"	11.301	7.000
L4	0+046.425	567621.41	5448352.92	044° 05' 11.03"	3.796	

FAN CHANNEL 2 ALIGNMENT LAYOUT

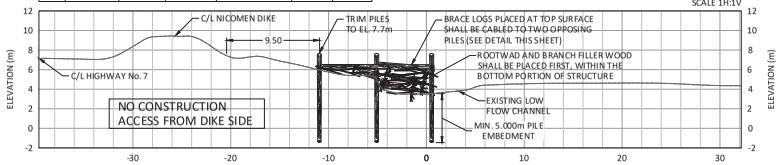
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L5	0+000.000	567597.76	5448323.44	049° 11' 11.75"	1.308	
C4	0+001.308	567598.75	5448324.29	073° 26' 20.84"	4.233	5.000
L6	0+005.541	567602.69	5448325.47	097° 41' 29.92"	4.208	
C5	0+009.749	567606.86	5448324.90	073° 06' 58.60"	6.005	7.000
L7	0+015.754	567612.43	5448326.59	048° 32' 27.27"	12.583	
C6	0+028.337	567621.86	5448334.92	065° 58' 50.42"	3.044	5.000
L8	0+031.381	567624.60	5448336.14	083° 25' 13.57"	3.757	
C7	0+035.137	567628.33	5448336.57	077° 14' 38.75"	1.725	8.000
L9	0+036.862	567630.01	5448336.95	071° 04' 03.94"	3.490	

FAN CHANNEL 4B ALIGNMENT LAYOUT

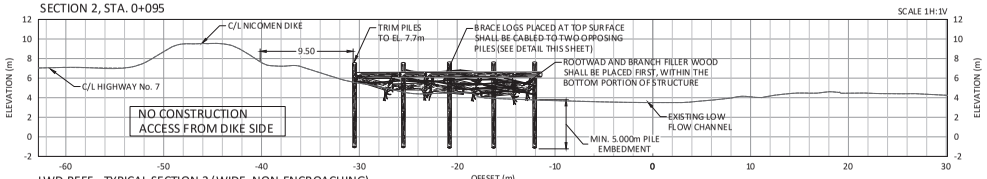
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L10	0+000.000	567529.59	5448201.74	029° 11' 52.45"	13.098	
C8	0+013.098	567535.98	5448213.17	089° 51' 38.87"	14.823	7.000
L11	0+027.920	567548.19	5448213.20	150° 31' 25.29"	13.018	
C9	0+040.939	567554.59	5448201.87	118° 18' 26.91"	8.996	8.000
L12	0+049.935	567562.10	5448197.83	086° 05' 28.53"	5.027	
C10	0+054.962	567567.12	5448198.17	116° 30' 34.99"	7.433	7.000
L13	0+062.395	567573.46	5448195.01	146° 55' 41.45"	7.545	

FAN CHANNEL 4A ALIGNMENT LAYOUT

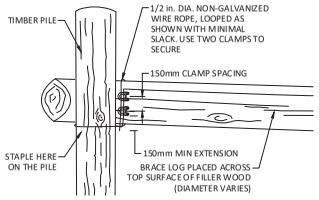
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L15	0+000.000	567497.09	5448215.67	101° 10' 45.55"	8.777	
C12	0+008.777	567505.70	5448213.96	136° 30' 31.15"	7.399	6.000
L16	0+016.176	567510.47	5448208.93	171° 50' 16.75"	3.456	
C13	0+019.632	567510.96	5448205.51	127° 43' 43.89"	9.238	6.000
L17	0+028.870	567517.57	5448200.40	083° 37' 11.03"	19.059	
C14	0+047.930	567536.51	5448202.52	148° 17' 09.33"	13.544	6.000
L18	0+061.473	567542.21	5448193.29	212° 57' 07.62"	4.159	
C15	0+065.632	567539.95	5448189.80	178° 12' 11.59"	21.833	18.000
L19	0+087.466	567540.59	5448169.29	143° 27' 15.55"	3.321	
C16	0+090.786	567542.57	5448166.62	155° 33' 49.34"	6.763	16.000
L20	0+097.550	567545.35	5448160.51	167° 40' 23.13"	2.743	
C17	0+100.292	567545.93	5448157.83	154° 18' 28.02"	4.665	10.000
L21	0+104.957	567547.94	5448153.66	140° 56' 32.91"	2.870	
C18	0+107.827	567549.75	5448151.44	146° 19' 52.20"	3.762	20.000
L22	0+111.589	567551.83	5448148.31	151° 43' 11.49"	4.995	



LWD REEF - TYPICAL SECTION 1 (NARROW, ENCROACHING ON CHANNEL)
1:250



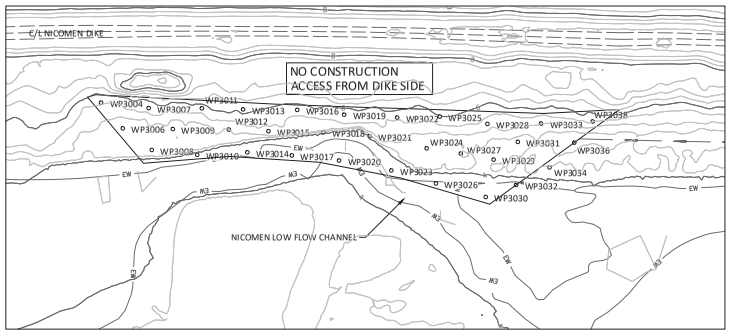
LWD REEF - TYPICAL SECTION 2 (WIDE, NON-ENCROACHING)
1:250



BRACE LOG CABLING DETAIL
1:25

LEGEND
DESIGN GRADE
EXISTING GROUND (2023 AND PRIOR)
DEFLECTOR LWD
WRC ROOTWADS

NOTES:
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
3. CROSS-SECTIONS ARE VIEWED DOWNSTREAM.
4. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.



PILING PLAN - LWD REEF
1:500

PILE LAYOUT TABLE - LWD REEF

PILE #	EASTING (m)	NORTHING (m)
3004	567736.93	5448188.08
3006	567730.10	5448187.21
3007	567730.67	5448180.54
3008	567723.15	5448184.66
3009	567724.39	5448178.72
3010	567717.27	5448177.41
3011	567724.70	5448171.44
3012	567718.06	5448169.20
3013	567719.92	5448164.50
3014	567712.09	5448168.56
3015	567713.36	5448162.59

PILE LAYOUT TABLE - LWD REEF

PILE #	EASTING (m)	NORTHING (m)
3016	567713.80	5448155.27
3017	567706.59	5448161.28
3018	567707.04	5448153.25
3019	567707.75	5448147.78
3020	567700.46	5448153.76
3021	567701.20	5448145.80
3022	567701.35	5448139.00
3023	567692.93	5448145.89
3024	567692.78	5448137.38
3025	567696.75	5448131.58
3026	567685.74	5448139.73

PILE LAYOUT TABLE - LWD REEF

PILE #	EASTING (m)	NORTHING (m)
3027	567688.07	5448132.11
3028	567690.20	5448124.25
3029	567683.37	5448127.17
3030	567677.85	5448132.68
3031	567683.71	5448121.04
3032	567676.53	5448126.14
3033	567684.27	5448115.03
3034	567675.81	5448118.45
3036	567677.29	5448111.45
3038	567678.84	5448105.92

CLIENT:
BRITISH COLUMBIA — Ministry of Environment and Climate Change Strategy

REV	DATE	DESCRIPTION
0	18 FEB 2025	ISSUED FOR CONSTRUCTION
1	05 JUN 2025	ISSUED FOR CONSTRUCTION

nhc northwest hydraulic consultants

SEAL:
PROFESSIONAL ENGINEER — D. J. GOULD — # 20281 — PROVINCE OF BRITISH COLUMBIA
2025-06-05
Permit to Practice 1000021

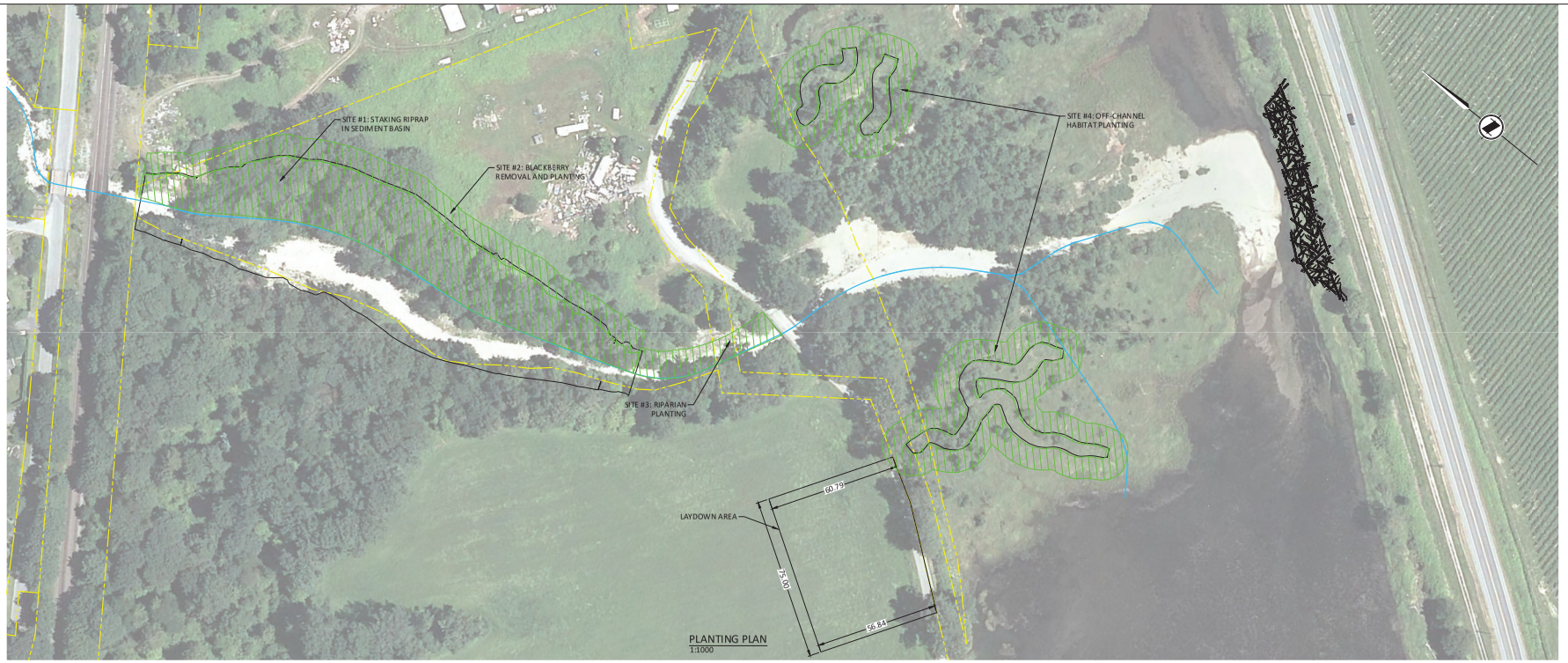
DEROCHE CREEK RECOVERY SOLUTION
OFF-SETTING WORKS

TYPICAL SECTIONS AND PROFILE

DESIGNED: DJG	SHEET ID: 2900712-DER RS-010		SHEET No: 010
DRAFTED: CZZ	STATUS: ISSUED FOR CONSTRUCTION		
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 5 JUN 2025		REV No: 1

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nanaimo-van\Projects\Active\2900712 Deroche Creek Emerg Works\06 CAD\02_Production\FC\2900712-010.dwg, 05 Jun 2025, 12:33 PM



PLANTING PLAN
1:1000

SITE PREPARATION:

1. THE PLANTING AREA SHALL BE CLEARED OF ANY INVASIVE PLANT AND PLANT PARTS, GARBAGE, OR DEBRIS PRIOR TO PLANTING.
2. INVASIVE PLANT MATERIAL SHALL BE REMOVED FROM THE SITE AND DISPOSED OF APPROPRIATELY AT A FACILITY EQUIPPED TO BURY OR BURN INVASIVE PLANT MATERIAL TO PREVENT ITS PROPAGATION.
3. MINIMAL SOIL AMENDMENTS, EARTHWORKS, AND DISTURBANCE ARE RECOMMENDED TO MINIMIZE THE LIKELIHOOD OF COLONIZATION BY INVASIVE PLANTS (i.e., HIMALAYAN BLACKBERRY).

GENERAL RIPARIAN PLANTING NOTES

1. LIVE STAKES, SHRUBS, AND TREES ARE TO BE ARRANGED IN A TRIANGULAR GRID AND SPACED ACCORDING TO THE PLANTING TABLES ON THIS DRAWING.
2. CONFORM TO PLANTING LAYOUT AS SHOWN ON THE PLANTING PLAN. PLANS MAY BE SUBJECT TO CHANGE BASED ON FIELD CONSTRAINTS AND LIMITATIONS. ALL CHANGES MUST BE APPROVED BY THE QEP.
3. CONTAINER STOCK INSTALLATION SHOULD OCCUR DURING THE FALL (SEP-OCT) TO REDUCE WATERING REQUIREMENTS AND IMPROVE SURVIVAL.
4. PLANTS MAY BE FERTILIZED WITH PELLETS OR TEA-BAG TYPE FERTILIZERS HIGH IN NITROGEN AND PHOSPHATE TO ENCOURAGE GROWTH. THIS CAN BE DONE BY PLACING FERTILIZER IN THE BASE OF THE HOLE BEFORE PLANT INSTALLATION.
5. CAREFULLY REMOVE PLANTS FROM CONTAINERS WITHOUT INJURING THE ROOT BALLS, ROOT BOUND STOCK SHOULD BE GENTLY AGITATED TO ENSURE THE ROOTS ARE PLACED IN THEIR NATURAL GROWING POSITION. GENTLY FIRM THE GROWING MEDIUM AROUND THE ROOT SYSTEM AND SETTLE THE SOIL WITH WATER AFTER PLANTING.
6. PLANTING AREAS SHALL BE SEEDED WITH FALL RYE AT A DENSITY OF 50 kg/ha.

LIVE STAKE INSTALLATION

1. LIVE STAKES SHOULD BE INSERTED SO THAT THE NATURAL ORIENTATION OF THE CUTTING IS PRESERVED. THAT IS, THE OLDER PORTION OF THE PLANT SHOULD BE INSERTED INTO THE GROUND AND THE YOUNGER PORTION SHOULD BE EXPOSED. THE BOTTOM OF THE CUTTING SHOULD BE IDENTIFIABLE BY A 45° TAPER AND THE TOP SHALL BE FLAT. LIVE STAKES SHOULD BE INSTALLED PERPENDICULAR TO THE SURFACE.
2. RATHER THAN DIGGING A HOLE FOR THE CUTTINGS, PUSH CUTTINGS INTO THE SOIL TO A DEPTH EQUAL TO APPROXIMATELY 70% OF THEIR LENGTH.
3. IF THE SOIL IS TOO FIRM TO PUSH THE CUTTING INTO THE SOIL, A PILOT HOLE CAN BE FORMED FIRST USING A MALLET AND METAL ROD OR AN AUGER. THEN THE CUTTING CAN BE PLACED INTO THE HOLE. THE HOLE DIAMETER SHALL BE SMALLER THAN THE CUTTING DIAMETER TO PREVENT AIR POCKET FORMATION.
4. AT LEAST 50 mm AND NOT MORE THAN 100 mm OF THE LIVE STAKE SHOULD BE EXPOSED.
5. AVOID DAMAGING BUDS WHEN INSERTING OR DRIVING THE CUTTING INTO THE GROUND.
6. IF THE CUTTING IS SPLIT WHILE DRIVING, TRIM THE CUTTING BELOW THE SPLIT TO PREVENT DESICCATION AND PLANT MORTALITY.
7. THERE MUST BE FIRM CONTACT BETWEEN THE CUTTING AND THE SOIL. AVOID CREATING AIR POCKETS AROUND THE CUTTING THAT CAN PREVENT ROOTS FROM DEVELOPING. TAMP THE SOIL AROUND THE CUTTING TO FILL IN ANY AIR POCKETS.
8. WATER THE CUTTING IMMEDIATELY AFTER PLANTING, AND DAILY DURING THE INSTALLATION PHASE.

WATERING

1. TO PROMOTE INITIAL ESTABLISHMENT, PLANTED MATERIAL SHALL BE WATERED IMMEDIATELY AFTER PLANTING IF NEEDED (TO BE DETERMINED BY THE QEP).

INVASIVE PLANT MANAGEMENT DURING CONSTRUCTION

1. A QEP TRAINED IN THE IDENTIFICATION OF INVASIVE PLANTS FOUND WITHIN THE LOWER MAINLAND OF BRITISH COLUMBIA WILL MONITOR PLANTING ACTIVITIES TO HELP THE CONTRACTOR PREVENT THE INTRODUCTION OF AND THE SPREAD OF INVASIVE PLANTS AT THE SITE.
2. ALL MACHINERY AND HAND TOOLS WILL BE CLEAN, RECENTLY WASHED, AND FREE OF WEED SEEDS OR PLANT MATERIAL UPON ARRIVAL TO SITE.
3. THE CONTRACTOR WILL ENSURE THAT PLANTING ACTIVITIES DO NOT INADVERTENTLY INTRODUCE INVASIVE SPECIES TO THE SITE.
4. THE CONTRACTOR WILL WORK CLOSELY WITH THE BCMOECCS TO ENSURE EARLY DETECTION AND TREATMENT OF INVASIVE SPECIES ON SITE.

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV	DATE	DESCRIPTION
0	18 FEB 2025	ISSUED FOR CONSTRUCTION
1	05 JUN 2025	ISSUED FOR CONSTRUCTION

SEAL:

COLLEGE OF APPLIED BIOLOGISTS
Janice Kwo
June 9, 2025
RPBio 3279 CAB

DEROCHE CREEK RECOVERY SOLUTION

PLANTING PLAN

DESIGNED:	JK	SHEET ID: 2900712-DER RS-011	SHEET No: 011
DRAFTED:	TR	STATUS: ISSUED FOR CONSTRUCTION	
CHECKED:	JK	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	PL	DATE: 5 JUN 2025	REV No: 1

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nanlfile-van\Projects\Active\2900712 Deroche Creek Emerg Works\06 CAD\02_Production\PC\2900712-DER-011.dwg, 05 Jun 2025, 11:04 AM

KERR WOOD LEIDAL
consulting engineers

Okanagan
202 – 3334 30th Avenue
Vernon, BC V1T 2C8
T 250 503 0841

Supplemental Instruction #04

DATE:	August 6, 2025
OWNER:	Leq'a:mel First Nation
PROJECT NAME:	Deroche Creek Recovery Solution – Construction Works
CONTRACT NO.:	2900712
SUPPLEMENTAL INSTRUCTION NO.:	#01
CONTRACTORS RFI NO.:	NA
TO:	Tyson West, Project Coordinator - Timbro Contracting Ltd.

A few discrepances were noted on IFC Drawing 005 and 006.

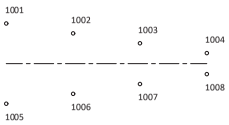
Find attached copies of replacement drawings R2. A sealed set was previously sent. Please only use the sealed set.

Yours truly,

KERR WOOD LEIDAL ASSOCIATES LTD.

Brett Barker, Owners Representative

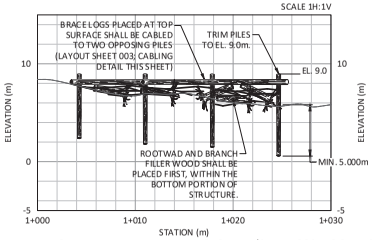
Encl.



PILING PLAN - DEFLECTOR #1
1:250

PILE LAYOUT TABLE - DEFLECTOR #1		
PILE #	EASTING (m)	NORTHING (m)
1001	567505.93	5448262.56
1002	567512.54	5448260.55
1003	567519.16	5448258.55
1004	567525.77	5448256.55
1005	567504.73	5448254.45
1006	567511.63	5448254.44
1007	567518.54	5448254.43
1008	567525.45	5448254.42

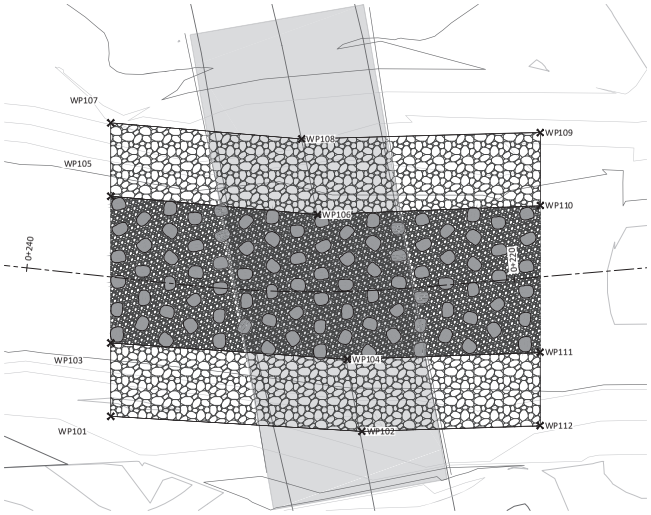
TIMBER PILE DEFLECTOR #1 ALIGNMENT LAYOUT						
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L1	1+000.000	567501.20	5448259.12	098° 28' 01.01"	30.000	



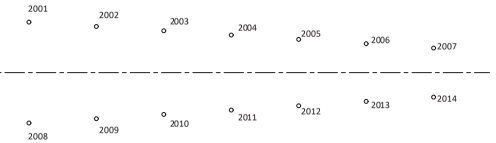
PROFILE - TIMBER PILE DEFLECTOR #1 (SHEET 003; LOOKING NORTH)
1:250

2

WORKPOINT TABLE - TAYLOR BRIDGE ARMOURING			
WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP101	567495.22	5448292.99	5.92
WP102	567504.69	5448288.95	5.86
WP103	567496.24	5448295.82	4.92
WP104	567505.12	5448291.93	4.87
WP105	567498.26	5448301.47	4.92
WP106	567505.97	5448297.91	4.87
WP107	567499.27	5448304.29	5.92
WP108	567506.40	5448301.04	5.88
WP109	567515.67	5448298.00	5.82
WP110	567514.67	5448295.19	4.82
WP111	567512.64	5448289.54	4.82
WP112	567511.63	5448286.72	5.81



TAYLOR BRIDGE CHANNEL ARMOURING
1:150

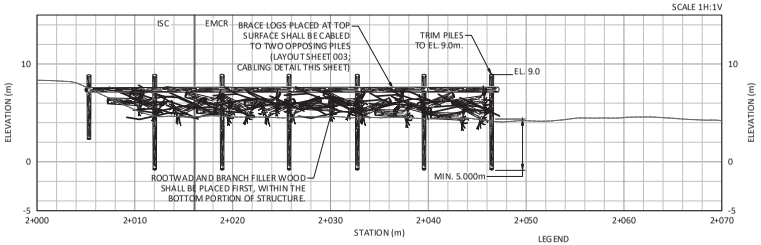


PILING PLAN - DEFLECTOR #2
1:250

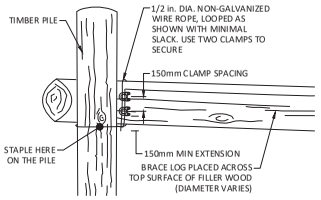
PILE LAYOUT TABLE - DEFLECTOR #2		
PILE #	EASTING (m)	NORTHING (m)
2001	567483.71	5448202.35
2002	567489.33	5448198.33
2003	567494.95	5448194.32
2004	567500.57	5448190.30
2005	567506.19	5448186.28
2006	567511.81	5448182.26
2007	567517.43	5448178.24

PILE LAYOUT TABLE - DEFLECTOR #2		
PILE #	EASTING (m)	NORTHING (m)
2008	567478.26	5448193.60
2009	567484.35	5448190.33
2010	567490.43	5448187.06
2011	567496.52	5448183.79
2012	567502.61	5448180.52
2013	567508.69	5448177.25
2014	567514.78	5448173.98

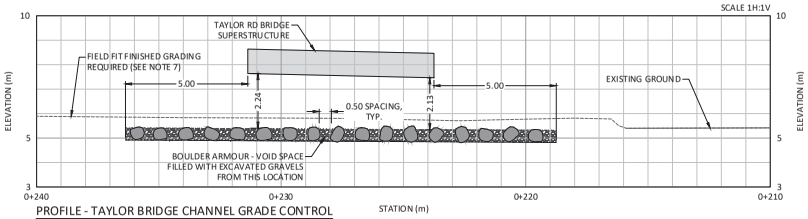
TIMBER PILE DEFLECTOR #2 ALIGNMENT LAYOUT						
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L2	2+000.000	567476.59	5448200.71	121° 53' 59.96"	70.000	



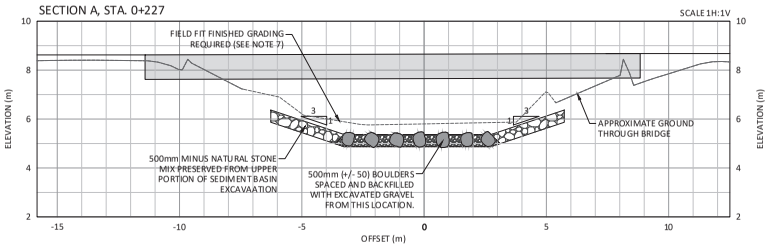
PROFILE - TIMBER PILE DEFLECTOR #2 (SHEET 003; LOOKING NORTH)
1:250



BRACE LOG CABLING DETAIL
1:25



PROFILE - TAYLOR BRIDGE CHANNEL GRADE CONTROL (SHEET 003; LOOKING EAST)
1:100



A / 003 TAYLOR BRIDGE CHANNEL GRADE CONTROL (LOOKING SOUTH)
1:100

LEGEND
- DESIGN GRADE
- EXISTING GROUND (2025 PRE-CON)
- EXISTING GROUND (2023 AND PRIOR)
- LARGE WOODY DEBRIS
- TIMBER PILE
- VOID-FILLED BOULDER ARMOURING

NOTES:
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
3. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.
4. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
5. IN ALL MANNERS EXCEPT FOR GRADATION, ROCK QUALITY SHALL CONFORM TO MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE STANDARD SPECIFICATION 205.
6. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.
7. AT TAYLOR BRIDGE EXISTING BED MATERIAL SHALL BE USED TO RE-BURY THE DESIGN SURFACE AND FIELD FIT A SMOOTH TIE-IN WITH THE CHANNEL UP- AND DOWNSTREAM.

CLIENT:
BRITISH COLUMBIA — Ministry of Environment and Climate Change Strategy

REV	DATE	DESCRIPTION
0	18 FEB 2025	ISSUED FOR CONSTRUCTION
1	05 JUN 2025	ISSUED FOR CONSTRUCTION
2	31 JUL 2025	ISSUED FOR CONSTRUCTION - WORKPOINT TABLE REVISED

nhc northwest hydraulic consultants

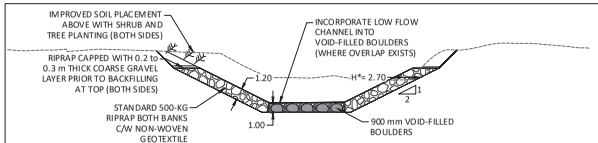
SEAL:
D. J. GOULD # 28091 PROFESSIONAL ENGINEER — 2025-08-01
Permit to Practice 1003931

DEROCHE CREEK RECOVERY SOLUTION
REACH 1
TYPICAL SECTIONS AND PROFILE DETAILS

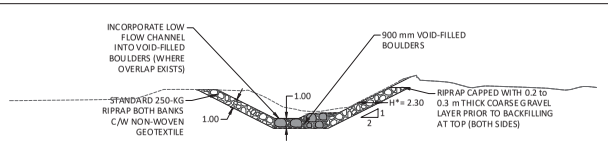
DESIGNED: DJG	SHEET ID: 2900712-DER RS-005	SHEET No: 005
DRAFTED: CZZ	STATUS: ISSUED FOR CONSTRUCTION	
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED: DJG	DATE: 31 JUL 2025	REV No: 2

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

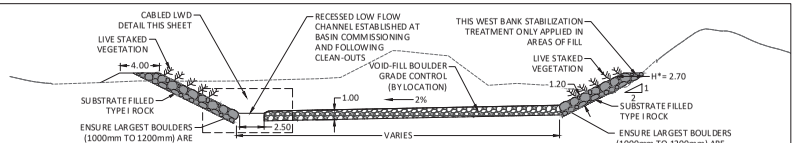
FILENAME: \\nanaimo-van\Projects\Active\2900712 Deroche Creek Energy Works\06 CAD\02_Production\PC\2900712 Deroche RS PC-003_005.dwg, 31 Jul 2025, 02:09 PM



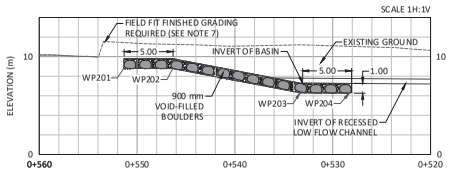
TYPICAL SECTION - BASIN ENTRANCE ARMOUR (SEE SHEET 004)
1:250



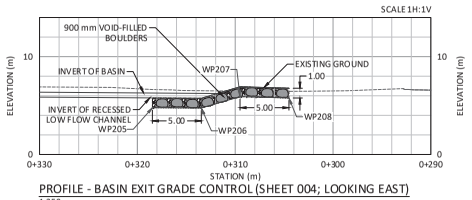
TYPICAL SECTION - BASIN EXIT ARMOUR (SEE SHEET 004)
1:250



TYPICAL SECTION - BASIN (SEE SHEET 004)
1:250



PROFILE - BASIN ENTRANCE GRADE CONTROL (SHEET 004; LOOKING EAST)
1:250



PROFILE - BASIN EXIT GRADE CONTROL (SHEET 004; LOOKING EAST)
1:250

WEST BANK STABILIZATION ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L11	3+000.000	567357.14	5448564.62	157° 30' 27.32"	2.803	
C9	3+002.803	567358.21	5448562.03	149° 56' 14.47"	2.907	11.000
L12	3+005.709	567359.66	5448559.52	142° 22' 01.61"	7.605	
C10	3+013.314	567364.30	5448553.50	153° 08' 19.07"	3.948	10.500
L13	3+017.262	567366.08	5448550.00	163° 54' 36.53"	34.242	
C11	3+051.504	567375.57	5448517.10	158° 44' 00.11"	12.649	70.000
L14	3+064.153	567380.15	5448505.32	153° 33' 23.68"	10.947	
C12	3+075.100	567385.02	5448495.52	156° 43' 38.64"	3.320	30.000
L15	3+078.420	567386.34	5448492.47	159° 53' 53.60"	17.959	
C13	3+096.379	567392.51	5448475.61	169° 55' 09.83"	10.494	30.000
L16	3+106.873	567394.33	5448465.33	179° 56' 26.06"	25.234	
C14	3+132.107	567394.36	5448440.09	167° 11' 53.43"	31.136	70.000
L18	3+163.243	567401.20	5448409.98	154° 27' 20.79"	23.184	
C16	3+186.427	567411.20	5448389.07	151° 03' 18.30"	5.935	50.000
L19	3+192.362	567414.07	5448383.87	147° 39' 15.81"	32.521	
C15	3+224.884	567431.47	5448356.40	152° 15' 55.54"	10.462	65.000
L17	3+235.346	567436.33	5448347.15	156° 52' 35.26"	11.832	

EAST BANK STABILIZATION ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L5	4+000.000	567364.60	5448568.54	148° 11' 05.50"	5.815	
C4	4+005.815	567367.66	5448563.59	154° 10' 14.71"	4.387	20.995
C5	4+017.349	567372.00	5448552.93	143° 10' 38.73"	9.399	15.858
L7	4+026.748	567377.55	5448545.52	126° 11' 53.53"	22.305	
C6	4+049.053	567395.55	5448532.34	139° 21' 17.98"	29.393	64.000
L8	4+078.446	567414.53	5448510.24	152° 30' 42.42"	9.419	
C7	4+087.864	567418.87	5448501.88	163° 16' 57.04"	48.500	129.000
L9	4+136.364	567432.74	5448455.70	174° 03' 11.66"	107.249	
C8	4+243.613	567443.85	5448349.03	170° 38' 17.75"	3.576	30.000
L10	4+247.189	567444.43	5448345.51	167° 13' 23.84"	7.393	

ENTRANCE GRADE CONTROL WORKPOINTS TABLE

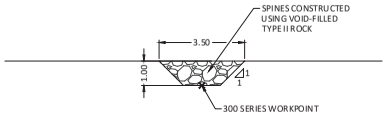
WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP201	567361.22	5448566.68	8.80
WP202	567363.57	5448562.29	8.74
WP203	567369.12	5448550.51	6.30
WP204	567371.06	5448545.87	6.26

EXIT GRADE CONTROL WORKPOINTS TABLE

WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP205	567439.09	5448350.55	4.78
WP206	567440.80	5448345.86	4.75
WP207	567442.17	5448342.15	5.91
WP208	567443.91	5448337.47	5.77

BASIN MAINTENANCE ACCESS ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L2	5+000.000	567436.58	5448357.58	083° 59' 09.03"	9.673	
C2	5+009.673	567446.20	5448358.59	119° 46' 07.66"	9.992	8.000
C1	5+026.784	567457.27	5448347.47	132° 57' 25.88"	44.956	57.000
L1	5+071.740	567489.32	5448317.62	110° 21' 45.47"	18.959	



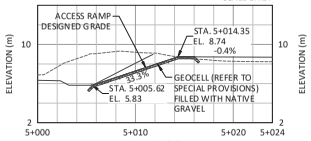
TYPICAL SECTION - GRADE CONTROL SPINE
1:100

GRADE CONTROL SPINE WORKPOINTS TABLE

WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP301	567393.69	5448529.45	6.39
WP302	567375.58	5448517.03	6.83
WP303	567412.07	5448507.78	6.12
WP304	567385.73	5448494.04	6.72
WP305	567424.84	5448478.65	5.90
WP306	567393.90	5448470.28	6.55

GRADE CONTROL SPINE WORKPOINTS TABLE

WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP307	567430.27	5448448.70	5.69
WP308	567394.39	5448444.92	6.41
WP309	567433.83	5448414.20	5.45
WP310	567402.65	5448406.96	6.09
WP311	567436.62	5448383.10	5.36
WP312	567418.34	5448377.21	5.74



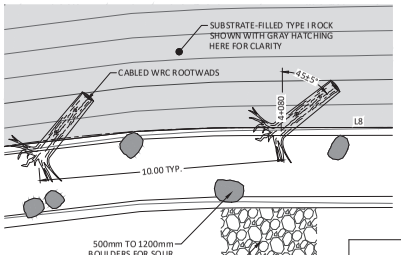
PROFILE - ACCESS RAMP (SHEET 004; LOOKING NORTH)
1:250

WEST BANK STABILIZATION OFFSET/ELEVATION TABLE

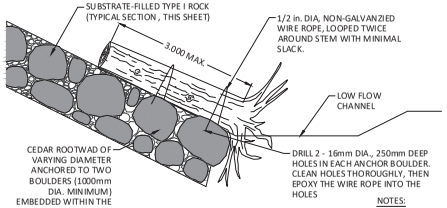
STATION	O/S TO TOE OF CUT	ELEV TOE OF CUT	O/S TO TOP OF CUT	ELEV TOP OF CUT
3+000.000	0.16	8.60	7.53	12.31
3+002.803	0.11	8.60	7.36	12.24
3+005.709	0.13	8.48	7.86	12.16
3+010.000	0.14	7.65	9.60	12.08
3+013.314	0.15	6.99	10.86	11.95
3+017.262	-0.64	6.20	10.85	11.96
3+020.000	-0.84	6.09	10.73	11.90
3+030.000	0.27	6.63	10.39	11.84
3+040.000	0.27	6.63	9.79	11.66
3+050.000	0.27	6.62	9.33	11.41
3+060.000	0.26	6.61	9.19	11.19
3+070.000	0.28	6.56	9.56	11.22
3+080.000	0.28	6.49	9.37	11.08
3+090.000	0.28	6.43	9.00	10.79
3+096.379	0.28	6.37	8.44	10.44
3+100.000	0.31	6.34	8.31	10.35
3+110.000	0.28	6.29	8.07	10.28
3+120.000	0.28	6.24	8.05	10.16
3+130.000	0.28	6.19	7.39	9.77
3+140.000	0.26	6.13	7.32	9.66
3+150.000	0.27	6.05	7.49	9.69
3+160.000	0.21	5.95	7.51	9.66
3+170.000	0.28	5.84	7.41	9.46
3+180.000	0.28	5.75	7.34	9.30
3+190.000	0.28	5.65	7.09	9.13
3+200.000	0.27	5.53	6.94	8.96
3+210.000	0.27	5.42	6.97	8.85
3+220.000	0.28	5.30	7.07	8.77
3+230.000	0.28	5.19	7.34	8.74
3+235.346	-0.91	4.77	6.98	8.72
3+240.000	0.10	5.31	6.72	8.73
3+247.178	0.11	5.77	5.96	8.70

EAST BANK STABILIZATION OFFSET/ELEVATION TABLE

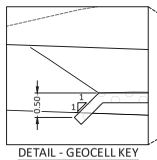
STATION	O/S TO TOE OF CUT	ELEV TOE OF CUT	O/S TO TOP OF CUT	ELEV TOP OF CUT
4+000.000	0.37	8.60	7.77	12.30
4+003.275	0.37	8.60	7.62	12.26
4+007.661	0.37	8.24	8.24	12.15
4+010.000	0.39	7.90	8.78	12.11
4+017.298	-0.41	6.40	10.54	11.97
4+020.000	-0.50	6.09	10.78	11.92
4+026.696	0.46	6.43	10.49	11.86
4+030.000	0.32	6.39	10.09	11.82
4+040.000	0.27	6.25	10.24	11.59
4+050.000	0.21	6.12	10.06	11.37
4+060.000	0.12	6.01	10.43	11.29
4+070.000	0.06	5.92	10.44	11.14
4+080.000	0.21	5.85	10.60	11.05
4+090.000	0.18	5.79	10.50	10.96
4+100.000	0.18	5.71	10.07	10.67
4+110.000	0.21	5.65	9.60	10.34
4+120.000	0.25	5.58	9.63	10.27
4+130.000	0.26	5.52	9.66	10.22
4+136.313	0.22	5.47	9.45	10.08
4+140.000	0.27	5.45	9.37	10.00
4+150.000	0.28	5.38	9.01	9.74
4+160.000	0.28	5.31	8.98	9.66
4+170.000	0.28	5.24	9.17	9.68
4+180.000	0.28	5.17	8.77	9.46
4+190.000	0.28	5.13	8.36	9.26
4+200.000	0.28	5.10	8.10	9.10
4+210.000	0.28	5.08	7.83	8.93
4+220.000	0.28	5.05	7.68	8.83
4+230.000	0.28	5.03	7.58	8.77
4+240.000	0.27	5.00	7.07	8.73
4+243.562	-0.61	4.76	7.16	8.73
4+247.138	0.19	5.16	6.93	8.73
4+250.000	0.35	5.90	5.87	8.67
4+254.531	0.34	5.77	6.17	8.69



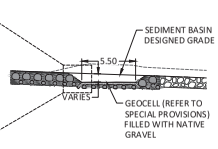
DETAIL - LOW FLOW CHANNEL PLAN
1:100



DETAIL - WRC ROOTWAD
1:50



DETAIL - GEOCELL KEY
1:50



TYPICAL SECTION - ACCESS RAMP (LOOKING WEST)
1:250

GRADATION TABLE - IMPORTED ROCK MATERIALS

	ROCK DIAMETER (mm)					
	250-KG RIPRAP	500-KG RIPRAP	TYPE I ROCK	TYPE II ROCK	900mm BOULDERS	500mm BOULDERS
D_{100}	1000	1250	1250	750	-	-
D_{85}	830	1050	1050	610	-	-
D_{50}	575	725	725	425	900 (± 100)	500 (± 50)
D_{15}	270	340	550	350	-	-
D_0	200	250	450	300	-	-

NOTES:
1. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
2. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.
3. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
4. FOR ROCK GRADATIONS REFER TO THE TABLE ON THIS SHEET.
5. IN ALL MANNERS EXCEPT FOR GRADATION, ROCK QUALITY SHALL CONFORM TO MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE STANDARD SPECIFICATION 205.
6. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.
7. AT THE LIMITS OF CONSTRUCTION, EXISTING BED MATERIAL SHALL BE USED TO RE-BURY THE DESIGN SURFACE AND FIELD FIT A SMOOTH TIE-IN WITH THE UPSTREAM CHANNEL.

LEGEND
- DESIGN GRADE
- EXISTING GROUND (2025 PRE-CON)
- EXISTING GROUND (2023 AND PRIOR)
- SUBSTRATE FILLED RIPRAP
- BOULDER ARMOUR
- STANDARD RIPRAP
- 6-INCH MINUS STREAM GRAVEL

CLIENT:
BRITISH COLUMBIA — Ministry of Environment and Climate Change Strategy

REV	DATE	DESCRIPTION
0	18 FEB 2025	ISSUED FOR CONSTRUCTION
1	05 JUN 2025	ISSUED FOR CONSTRUCTION
2	31 JUL 2025	ISSUED FOR CONSTRUCTION - WORKPOINT TABLE REVISED

nhc northwest hydraulic consultants

SEAL: D. J. GOULD # 28261 PROFESSIONAL ENGINEER — 2025-08-01 — Permit to Practice 1000201

DEROCHE CREEK RECOVERY SOLUTION
REACH 2
TYPICAL SECTIONS AND PROFILE DETAILS

DESIGNED:	DJG	SHEET ID: 2900712-DER RS-006	SHEET No: 006
DRAFTED:	CZZ	STATUS: ISSUED FOR CONSTRUCTION	
CHECKED:	DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE: 31 JUL 2025	REV No: 2

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nanaimo-van\Projects\Active\2900712\4 Deroche Creek Energy Works\06 CAD\02_Production\IFC\2900712-Deroche RS IFC-004,006-007 Aing, 31 Jul 2025, 02:15 PM

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Appendix C

Offsetting Plan

KERR WOOD LEIDAL ASSOCIATES LTD.
consulting engineers

KERR WOOD LEIDAL
consulting engineers

Greater Vancouver
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Deroche Creek Sediment Long-Term Solution Project

Environmental Assessment and Offsetting Plan

Final Report
May 29, 2024
KWL Project No. 2838.300

Prepared for:
BC Ministry of Environment and Climate Change Strategy

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Report Submission

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1. Introduction

The Deroche Creek Sediment Long-Term Removal Project (the Project) will address sediment accumulation and erosion concerns in the lower 1 km of Deroche Creek upstream of Nicomen Slough. Accumulated material has the potential to create channel erosion, road flooding, and infrastructure damage in the Leq'a:mel First Nation community located within Lakahahmen IR 11 and the neighbouring properties near Deroche in the Fraser Valley Regional District (FVRD). Emergency sediment removal was conducted in November 2022 to remove sediments introduced by the 2021 Atmospheric River Event (ARE). The following Project aims to provide a long-term solution to the ongoing sedimentation in lower Deroche Creek to mitigate future impacts on infrastructure and salmon habitat.

This Environmental Assessment and Offsetting Plan provides details on the existing conditions present at the site, the proposed construction activities, identifies potential impacts to aquatic and riparian habitat, presents mitigation and offsetting measures, and a monitoring plan. This report is intended to support a *Fisheries Act* Authorization application to Fisheries and Oceans Canada (DFO).

1.1 Project Background

In November 2021, multiple atmospheric rivers passed through British Columbia causing widespread flooding across the Fraser Valley and other parts of the province. As part of the flood recovery initiatives by Environment and Climate Change Strategy (ENV), emergency sediment removal was conducted in Deroche Creek in 2022. Roles within the project are:

- ENV is the project proponent.
- Leq'a:mel First Nation (LFN) is a project partner.
- Northwest Hydraulic Consultants (NHC) is the Engineer-of-Record.
- Kerr Wood Leidal Associates Ltd. (KWL) is a subconsultant to the to provide environmental services during design, permitting support, contract administration, construction management, and construction environmental monitoring.

1.2 Regulatory Context and Requirements

All Project construction related works must be completed in compliance with applicable legislation, guidelines, and commitments outlined in Table 1-1.

Based on the current scope of the proposed works, the following environmental legislation does not apply to the Project:

- Federal *Impact Assessment Act* [S.C. 2019, c. 28, s. 1]: The Project does not meet the criteria for a designated project described in the Schedule describing physical activities in the Regulations Designating Physical Activities (SOR/2012-147).
- Provincial *Environmental Assessment Act* [SBC 2018, c. 51]*:* This Project does not meet the criteria for a reviewable project described in the Reviewable Projects Regulation (BC Reg. 243/2019).
- Provincial *Heritage Conservation Act*: As the project is located on federal reserve land, Heritage Inspection or Alteration Permits are not required.

Table 1-1: Environmental Legislation and Regulations Applicable to the Project

Legislation	Agency	Area of Regulation	Permits/Actions Required
Federal			
Fisheries Act [R.S.C., 1985, c. F-14]	Fisheries and Oceans Canada	Protection of fish and fish habitat.	• Submit a request for review to the Fish and Fish Habitat Protection Program to identify potential risks to the conservation and protection of fish and fish habitat. • If the death of fish, or harmful alteration, disruption or destruction of fish habitat will likely result from the Project, Authorization will be required.
Migratory Birds Convention Act [SC 1994, c. 22]	Environment and Climate Change Canada	Prohibiting injury, molestations, and destruction of migratory birds and their nests.	• As tree clearing will occur outside the nesting window for migratory birds of March 1–August 31, breeding bird surveys will not be required.
Species at Risk Act [SC 2002, c. 29]	Fisheries and Oceans Canada (aquatic species); Environment and Climate Change Canada (terrestrial species)	Protection of species designated on Schedule 1 of the Act and their critical habitat.	• No known SARA listed species or habitats are present at the site. • No permitting under SARA is anticipated.
Provincial			
Water Sustainability Act [SBC 2014, c. 15]	Ministry of Water, Land and Resource Stewardship	Regulates activities being carried out in and about a stream.	• Submit a Section 11 Change Approval for works in and about a stream for sediment removal. • Ensure all works adhere to the conditions of the Change Approval.
Wildlife Act [RSBC 1996, c. 488, S. 34]		Regulates works that impact wildlife species in BC.	• Permitting for salvage of amphibians and small mammals in riparian areas
Weed Control Act [RSBC 1996, c. 487]		Requires all land occupiers to control the spread of provincial and/or regional noxious weeds on their land.	• Ensure proper identification and management of invasive plants throughout Project works.
Integrated Pest Management Act [RSBC 2003, c. 58]	Ministry of Environment & Climate Change Strategy	Regulates pesticide use and treatment of noxious weeds in BC.	• Ensure pesticide permit is obtained, if required, for treatment of noxious weeds.
Leq'a:mel First Nation			
Environmental Assessment Law (2018)	Leq'a:mel First Nation	Identifies environmental effects from projects and promotes collaboration between Leq'a:mel and other levels of government.	• Obtain an environmental assessment approval for the Project or a written letter confirming an environmental assessment is not required.
Environmental Protection Law (2018)	Leq'a:mel First Nation	Projects on Leq'a:mel Lands.	• Ensure Project activities comply with the law
Soil Transport, Deposit, and Removal Law (2020)	Leq'a:mel First Nation	Soil management and transportation and protection of Leq'á:mel Lands from contamination.	• Apply for a permit to transport, remove, or deposit soil.
Leq'a:mel Archaeological Permit	Leq'a:mel First Nation	Protection and management archaeological sites.	• Apply for a permit for site investigation and, if required, alteration.

2. Project Description

2.1 Project Location and Details

Table 2-1: Project Location Description

Site ID	**S-CR-30**
Site Description	Deroche Creek at Lakahahmen IR 11
Location	UTM Zone 10U 567551E 5448285N
Local Government Agency	LFN, Fraser Valley Regional District
Waterbody	Deroche Creek, Nicomen Slough

Deroche Creek flows through Lakahahmen IR 11 where it enters Nicomen Slough, a historical side channel of the Fraser River that has had its inflow from the river regulated by diking and the "Bell Dam" since the 1930s.

Lakahahmen IR 11 is located on and adjacent to the Deroche Creek alluvial fan, approximately 22 km east of the City of Mission, BC. The project location is the mainstem of Deroche Creek, starting to the west of the intersection of North Deroche Road and Cooper Road, running southeast to Taylor Road, and ending at the downstream edge of the alluvial fan within Nicomen Slough (Figure 2-1).

The assessment area was separated into the following assessment reaches:

- Reach 1 – Downstream of Taylor Road, including the alluvial fan.
- Reach 2a – Taylor Road to limit of Fall 2022 sediment removal.
- Reach 2b – Limit of Fall 2022 sediment removal to North Nicomen Road.
- Reach 3 – North Nicomen Road to Leq'á:mel First Nation Cemetery.

Continued sediment deposition on the alluvial fan poses potential threats such as channel avulsion, bank erosion, and negative impacts to fish passage. Initial emergency sediment removal works have been completed, but further long-term solutions are required to mitigate future risks.

2.2 Description of Proposed Works

The immediate proposed Project includes the following works:

1. Construction of a sediment basin with a low-flow channel in Reach 2 to increase area available for sediment deposition and reduce infilling of the lower channel and fan, which has the potential to impede the migration of fish during low flows and smother spawning habitat downstream.
2. Installation of bed armouring at Ministry of Transportation & Infrastructure's Taylor Road Bridge in Reach 2, downstream of the proposed sediment basin, to prevent degradation due the reduction in sediment supply.
3. Construction of two timber deflectors on the Deroche Creek alluvial fan perpendicular to the Taylor Road to prevent high flows from eroding the embankment of Taylor Road.

The construction stage, activity, and description of activity for construction works are described in Table 2-2 to Table 2-5. Engineering drawings of proposed works can be found in Appendix B.

Table 2-2: Proposed Construction Methods for Sediment Basin

Stage	Activity	Description of Activity
Site Preparation	Clearing and Grubbing	Remove vegetation for access path from Taylor Road to the downstream extent of the sediment basin. Remove vegetation on east bank of Deroche Creek within the basin footprint.
	Site Isolation	The work site will be isolated from flow and dewatered so that work can be conducted in the dry. Flow will be pumped around the site or through a bypass channel. Exclusion fencing of construction area to prevent fish access; salvage of all fish, amphibians, and mammals from enclosed site.
Construction	Basin Construction	Excavation and grading of sediment basin. The west bank of Deroche Creek will act as the west wall of the sediment basin, therefore no excavation is proposed west of Deroche Creek. A low flow channel will be established along the left bank to convey base surface flows once they return to the creek. All construction below the normal high-water mark will occur in the dry and/or fully isolated from creek flows.
	Hauling and Disposal	Excavated material will be hauled by truck and either used on-site for construction of other project components or disposed of on reserve at a location approved by LFN. Machine access will occur from Taylor Road.
	Instream Complexing	Large woody debris (sourced from clearing) and habitat boulders will be placed in the low flow channel to add habitat complexity for salmonids.
	Bank Stabilization	Banks of the sediment basin will be stabilized using riprap filled with appropriate growing substrate for vegetation above the normal high-water mark.
	Surface Restoration	Refinish roads and seed exposed soils disturbed from the works.
Site Restoration	Site Restoration and Enhancement	The banks of the sediment basin will be planted with native riparian plant species and live stakes.

Table 2-3: Proposed Construction Methods for Taylor Bridge Grade Control

Stage	Activity	Description of Activity
Site Preparation	Site Isolation	The work site will be isolated from flow and dewatered so that work can be conducted in the dry. Flow will be pumped around the site.
	Clearing and Grubbing	Remove riparian vegetation along the machine access path from Taylor Road.
Construction	Excavation	Excavate sediment to subgrade, place boulders in a checkerboard pattern, and fill voids between boulders using excavated sediment.
	Hauling and Disposal	Excavated material will be hauled by truck and either used on-site for construction of other Project Elements or disposed of at a location approved by LFN.
	Surface Restoration	Refinish roads and seed and exposed soils disturbed from the works.
Site Restoration	Site Restoration and Enhancement	Replant cleared area with native riparian plant species.

Table 2-4: Proposed Construction Methods for Timber Deflectors

Stage	Activity	Description of Activity
Site Preparation	Clearing and Grubbing	Remove vegetation along access path and within the berm footprints from Taylor Road.
Construction	Installation of Wood Piles	Drive timber piles (sourced from sediment basin clearing) into the Deroche Creek fan approximately 4 m below grade.
	Installation of Timbers and Woody Debris	Timber and woody debris from cleared trees will be placed between the timber piles to form the timber deflectors.
	Surface Restoration	Refinish roads, driveways, and other surfaces disturbed due to the works.
Site Restoration	Site Restoration and Enhancement	Disturbed areas will be replanted with native shrubs and trees.

2.3 Construction Schedule

The construction schedule is outlined in Table 2-5 below.

Table 2-5: Proposed Construction Schedule

Stage	Activity	Start	End
Permitting	DFO Request for Review	September 2023	October 2023
	Water Sustainability Act Change Approval	September 2023	February 2024
	Fisheries Act Authorization	December 2023	February 2024
	DFO Scientific Fish Collection Permit	December 2023	December 2023
	Provincial Fish and Wildlife Salvage Permits	December 2023	December 2023
Procurement	Tree clearing tender	January 2024	February 2024
	Main construction tender	January 2024	April 2024
Construction	Tree clearing[1]	February 2024	February 2024
	Out of stream construction	May 2024	September 2024
	Instream construction	August 1, 2024	September 15, 2024

[1]If *Fisheries Act* Authorization has not been received, tree clearing will only occur outside of the riparian area.

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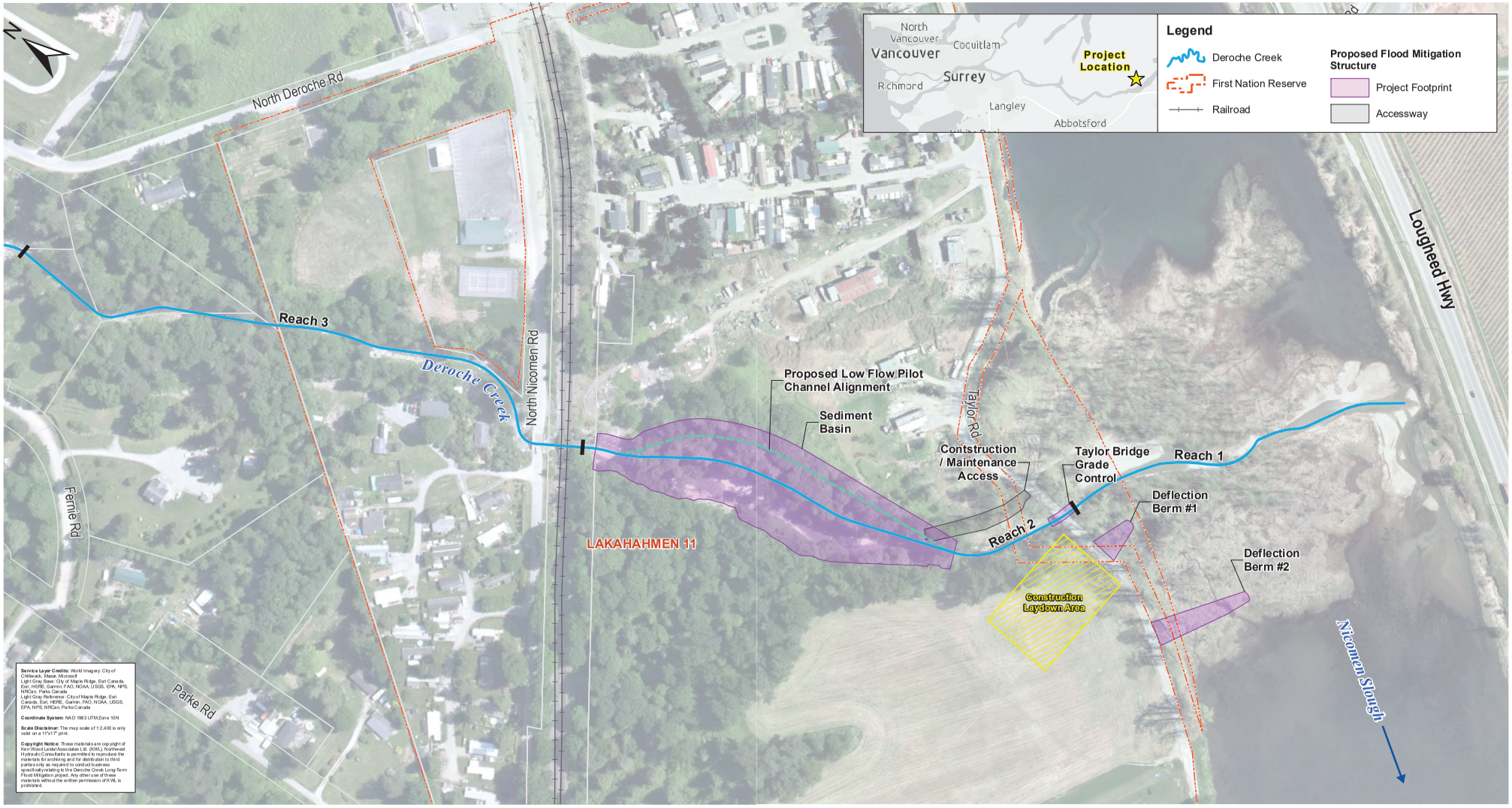

Project No. 2838.003
Date December 2023
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Project Location

Figure 2-1

3. Description of Fish and Aquatic Habitat

3.1 Methods

An assessment of existing conditions in and around Deroche Creek and the Nicomen Slough were conducted using desktop and field reviews. The desktop review included the following sources:

- BC HabitatWizard 50K Freshwater Atlas and Stream Reports.
- BC Fish Information Data Query (FIDQ).
- BC Conservation Data Centre (BC CDC) Species and Ecosystems Explorer Database.
- BC CDC iMap.
- BC Ecological Reports Catalogue (EcoCat).

On March 9, 2023, KWL biologists Andrew Baylis (RPBio) and Janice Kwo (RPBio) conducted an environmental assessment of the site with the following objectives:

- To characterize the existing environmental conditions, features, and values present at the site.
- To provide context for the potential ecological impacts of the proposed works.

KWL assessed the creek using methodology based on the Level 1 Fish Habitat Assessment Procedures[1] to assess the creek and its surrounding riparian area and took note of any additional observations. Section 3 includes a summary of the information collected during this environmental assessment. Photographs of the site are available in Appendix A.

3.2 Environmental Assessment Area

The Environmental Assessment Area is composed of the 850 m section of Deroche Creek from the Leq'á:mel First Nation Cemetery to the toe of the alluvial fan and the entirety of its surrounding riparian area (i.e., the entire footprint of the Project). Machine access for the sediment basin and timber deflectors will occur from Taylor Road. Machine access for bank stabilization works will occur from North Nicomen Road.

3.3 Fish Communities

There were no observations of fish in Deroche Creek or Nicomen Slough during the site visit in March. In the fall of 2022 and 2023, spawning chum and coho were observed in the lower reaches of Deroche Creek (below the CP Rail bridge)[2]. Rearing salmon fry have also been observed in Deroche Creek. A summary of fish species observed in Deroche Creek is summarized in Table 3-1. The assessed area does not contain critical habitat for any aquatic species protected under Schedule 1 of Canada's *Species at Risk Act*.

[1] Johnston, N.T. and Slaney, P.A. 1996. Fish Habitat Assessment Procedures. British Columbia Ministry of Environment, Lands and Parks, and British Columbia Ministry of Forests, Watershed Restoration Program, Technical Circular No. 8. Victoria, BC
[2] Rick McKamey (Leq'á:mel First Nation), personal communication. March 9, 2023.

Table 3-1 Summary of Fish Species Observed in Deroche Creek

Common Name	Scientific Name
Chum Salmon	*Onchorhychus keta*
Coho Salmon	*Oncorhynchus kisutch*
Cutthroat Trout	*Oncorhynchus clarkii*
Sculpin	*Cottoidea sp.*
Threespine Stickleback	*Gasterosteus aculeatus*

3.4 Description of Aquatic Habitat

Physical Aquatic Habitat Characteristics

Reaches 1 and 2a are located within the footprint of the Emergency Sediment Removal project which occurred in Fall 2022. Sediment deposition, minor bank erosion, and intermittent flows were observed in these areas. Flows went subsurface approximately 15 meters above Taylor Road and resurfaced approximately 50 meters downstream of Taylor Road. Sediment deposition was also observed at the southeast edge of the alluvial fan, which is causing the flow path of Nicomen Slough to undercut the embankment of Highway 7.

The main channel of Deroche Creek was more defined in Reaches 2b and 3 with no intermittency. The morphology ranged from shallow riffle-glide sequences in Reach 2b to riffle-cascade sequences in Reach 3. There were many disturbance indicators and flood signs throughout these reaches including cut eroding banks, uprooted vegetation, large sediment deposits, and little to no pool area.

Suitable spawning substrate and flow for chum and coho were observed in all three reaches of the assessment area. However, based on site visit observations, Deroche Creek is an unstable system, and the frequent movement and deposition of sediment poses a high risk of sedimentation of any viable spawning sites. Please refer to Appendix A for site photos.

Physical Water Quality

In-situ water quality observations were recorded during the March 9, 2023 field visit to provide a snapshot of relative water quality conditions in the Project area (Table 3-2). All measurements fell within a suitable range for aquatic life in freshwater systems in British Columbia.

Table 3-2: In-situ Water Quality Analysis Results from August 22, 2022

Reach	pH[3]	Temperature (°C)[4]	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Specific Conductance (µS/cm)[5]
1	8.5	6.8	68.3	8.58	37.2
2a	8.3	7.2	99.5	11.91	38.7
2b	8.2	4.7	98.9	12.70	41.7
3	8.1	5.7	97.6	12.24	42.9

[3] Unrestricted change permitted within a pH range of 6.5–9 (B.C. Ministry of Environment and Climate Change Strategy).
[4] Temperatures as high as 22–24°C are considered life-threatening for salmon species. (B.C. Ministry of Environment and Climate Change Strategy).
[5] No provincial guideline for aquatic life exists for ambient measurements of specific conductivity; however, low measurements (<200 µS/cm) are considered to indicate relatively pristine conditions in freshwater systems (Environment and Climate Change Canada).

3.5 Description of Riparian Vegetation

Existing Conditions

The riparian vegetation within the assessed area of Deroche Creek consists disturbed young deciduous forest and mixed forest. Upstream of Taylor Road, the riparian community transitions into a mixed forest with larger cottonwood and western redcedar (*Thuja plicata*) with an understory that consists of invasive species. Invasive species observed through this reach include Himalayan blackberry (*Rubus armeniacus*), English ivy (*Hedera helix*), Japanese knotweed (*Fallopia japonica*), and Scotch broom (*Cytisus scoparius*).

Riparian vegetation on the alluvial fan consists of small black cottonwoods (*Populus tricocarpa*), red alders (*Alnus rubra*), and willow (*Salix* sp.) with an understory consisting predominantly of invasive reed canary grass (*Phalaris arundinacea*). Vegetation is limited on the alluvial fan due to continual inputs of sediment from Deroche Creek. Canopy cover in this area is low compared to the rest of Deroche Creek.

Please refer to Appendix A for site photos.

4. Description of Effects of Fish and Fish Habitat

The Project works are anticipated to results in temporary and permanent effects on fisheries and aquatic resources. Impacts are expected to affect all fish and life stages present in Deroche Creek. All potential impacts to fisheries and aquatic resources that may result from the Project are outlined in Table 4-1.

Table 4-1: Potential Impacts to Fisheries and Aquatic Habitat

Activity	Type of Potential Impact	Potential Impact	Probability of Impact	Magnitude of Impact	Extent of Impact
Temporary Impacts					
Use of Industrial Equipment	Changes to contaminant concentrations	Introduction of deleterious substances into Deroche Creek and Nicomen Slough could negatively impact fish health.	Low	Medium	Deroche Creek & Nicomen Slough
Use of Industrial Equipment	Changes in sediment concentration	Increased turbidity from instream works could negatively impact fish health.	Medium	Low	Deroche Creek & Nicomen Slough
Permanent Impacts					
Sediment Basin – Placement of Material/ Structure	Changes to habitat structure and cover	The existing alignment of Deroche Creek will be redirected into a new low flow channel along the east bank of the sediment basin.	High	High	2,700 m^2
	Changes in sediment concentration	The sediment basin will reduce the amount of sediment being transported downstream and decrease the likelihood of smothering redds further downstream.	High	High	Deroche Creek & Nicomen Slough
Timber Deflectors Footprint – Placement of Material	Changes to habitat structure and cover	Timber piles, timbers, and woody debris will be placed permanently on the Deroche Creek fan, below the high-water mark of Nicomen Slough to deflect creek flows away from the Taylor Road embankment but will also have the added benefit of increasing habitat complexity and cover during high flows and/or water levels.	Low	Low	~1,000 m^2
Taylor Road Grade Control – Placement of Material	Changes to habitat structure and cover	Boulder armoring will be placed in Deroche Creek under the Taylor Road Bridge, which alters the type of habitat available in that area.	High	Low	110 m^2

Activity	Type of Potential Impact	Potential Impact	Probability of Impact	Magnitude of Impact	Extent of Impact
Use of Industrial Equipment	Potential mortality to fish/eggs/ova from equipment	There is potential for injury or mortality of fish during construction.	Low	High	Project Footprint

Table 4-2: Potential Impacts to Riparian Vegetation

Activity	Type of Potential Impact	Potential Impact	Probability of Impact	Magnitude of Impact	Extent of Impact
Temporary Impacts					
Clearing of Riparian Vegetation	Loss of riparian vegetation	Removal of vegetation (native and invasive) in the following areas: • Construction laydown area • Machine access and footprint for timber deflectors	High	Medium	4,000
Clearing of Riparian Vegetation	Introduction of invasive plants	Introduction of additional invasive plant species	Medium	Low	Project Footprint
Permanent Impacts					
Clearing of Riparian Vegetation	Loss of riparian vegetation	Riparian vegetation will be permanently removed in the following areas: • Access road to the sediment basin • Sediment basin footprint east of Deroche Creek	High	Medium	7,400

5. Description of Measures and Standards to Avoid or Mitigate Death of Fish or Harmful Alteration, Disruption or Destruction of Fish Habitat

5.1 Avoidance Measures

Impacts to fish and fish habitat from the timber deflectors will be avoided by eliminating the use of fill and rip rap in the design. Berms will be constructed with wood pilings and woody debris to provide habitat complexity for salmonids when during high flow in addition to protecting the Taylor Road embankment from erosion. Wood materials used to build the proposed pile and timber deflectors will be sourced on site from the sediment basin footprint.

The sediment basin has been designed to avoid disturbance and vegetation clearing on the right bank. The extent of the sediment basin on the left bank will be field-fit to avoid clearing large trees.

5.2 Mitigation Measures

The following guidance documents were used to develop mitigation measures for this project:

- *Requirements and Best Management Practices for Making Changes In and About a Stream in British Columbia*. Version 2022.01. Government of British Columbia, 2022.
- *Measures to Protect Fish and Fish Habitat*, Fisheries and Oceans Canada, 2019.
- *A Field Guide to Fuel Handling, Transportation and Storage*, Ministry of Water, Land and Air Protection, 3rd Edition, 2002.
- *B.C. Approved Water Quality Guidelines*, Ministry of Environment and Climate Change Strategy Updated 2018.
- *Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia*, Ministry of Water, Land and Air Protection, 2004.
- *Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia*, Ministry of Environment and Climate Change Strategy, 2014.
- *Land Development Guidelines for the Protection of Aquatic Habitat, Fisheries and Oceans, 2nd Edition, 1993.*
- *New Migratory Birds Regulations,* Environment and Climate Change Canada, 2022.

Environmental Monitoring

Environmental monitoring will be conducted to ensure appropriate measures are being taken to protect the environment. The Environmental Monitor (EM) must be an appropriate Qualified Environmental Professional (QEP). The EM will regularly inspect the work site for compliance with the environmental requirements of the Project. Observations will be recorded and reported to the Consultant and the Contractor. The EM must be familiar with the regulatory requirements of the Project and has the responsibility to report all non-compliance events and stop work if necessary. The EM will be on-site at the project start-up and during any sensitive activity.

Use of Reduced Risk Instream Work Window

Instream works will be completed in the reduced risk instream work window for the area (August 1–September 15). At this time, water levels in Deroche Creek and the Nicomen Slough and expected to be low, with the potential for the lower reach of Deroche Creek to be dry or intermittently dry. Conducting works at this time should reduce duration of instream works and the potential for fish to be present in the work area. Proposed works are expected to last through the entire work window (until September 15), with a potential to extend beyond if necessary (e.g., weather delays). Any extension will be done with the direction of the QEP for the project and in consultation with regulatory agencies.

Instream works will occur in the dry. In the event that the creek is not dry during construction, fish isolation fencing will be installed around the construction area and the area will be salvaged using minnow traps, seine netting, and dip netting. Dewatering of the work site will occur under the supervision of the QEP. All pump intakes will be equipped with fish screens (mesh width < 2.54 mm) to prevent entrainment and impingement of fish, in accordance with the DFO Interim Code of Practice for End-of-pipe fish protection screens for small water intakes in freshwater[6]. Generally, harm to fish during dewatering can occur due to stranding. To mitigate this risk, dewatering will be done slowly under the supervision of the QEP.

Fish Salvage

Isolation will be the primary mitigation measure for fish, and salvages should be conducted after the confirmation of fish presence in the isolated work area is confirmed, and where it is safe and practicable. Isolation measures are to remain in place for the duration of the project. A QEP must be on site during in-water works. See CEMP for more information on measures to avoid harming fish and fish habitat.

Amphibian and Reptiles Salvage

Amphibian and reptile salvage surveys are to be conducted according to the BMPs for Amphibian and Reptile Salvages in BC and the *Interim Hygiene Protocols for Amphibian Field Staff and Researchers*. Salvages will consist of both time-constraint (TCS) and systematic searches (i.e., visual encounter surveys) and dip-netting during any potential dewatering activities. Salvages will be completed under the direction of the QEP.

Breeding Bird Nest Surveys

Between March 1 and August 31, a QEP with experience in breeding bird nest surveys should be retained to carry out breeding bird nest surveys within the Project Footprint. These surveys are intended to identify nesting birds and apply mitigative measures to prevent contravention of the federal *Migratory Birds Convention Act* and the associated *Migratory Birds Regulation*.

Breeding bird nest surveys are to be conducted in a manner consistent with the following methodology:

1. Prior to any construction-related activity within undisturbed habitat, the surveyor(s) are to walk the entire area where works are proposed to identify birds exhibiting nesting behaviours and to locate nests within and adjacent to the right-of-way, this includes:
    - observing visual and audible behavioural cues; and
    - inspecting suitable nesting habitats, including ground, shrubs, wetland perimeters, and trees for nests.

[6] DFO, 2020. DFO 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. Accessed December 15, 2023.

2. A minimum of two surveys on separate days are to be conducted to identify any potential nests.
3. Surveys are to be conducted at a minimum intensity of 1 ha per hour.
4. Should an active nest be identified during nest surveys, a “no-work” radial buffer appropriate to the species and as determined by the QEP is to be established around the nest as described below. No work is to be conducted within the buffer until the nest has fledged.
5. Surveyors are to record the following information for identified nests:
    - Species
    - Geographic coordinates
    - Distance to the applicable project components.
    - Date and time of day.
    - Representative photos
    - Site description (i.e., tree or shrub species, height of nest, type of nest, direction cavity faces)
    - Stage of nesting (i.e., construction stage; eggs, including number; hatchlings; almost fledged)

Erosion and Sediment Control

- Stockpiles of excavated soil will be covered with polyethylene sheeting or alternative to prevent erosion, to be determined in consultation between the QEP and contractor.
- Silt fencing will be installed at the limit of disturbed areas to prevent sediment (as applicable).
- All construction materials, garbage, and erosion and sediment control materials will be removed from the site after the Project is complete.
- Water used in any concrete works (mixing, washing, curing, runoff, grout, etc.) will be managed to prevent entry into storm drains and watercourses.

Spill Prevention and Management

- All fueling of vehicles and equipment will be done off-site or onsite in a designated fueling area over a spill containment tray at least 30 m from any storm drain and watercourses.
- All equipment washing (i.e., concrete truck washout) must be done off-site or onsite in a designated area at least 30 m from storm drains and watercourses in a manner that will prevent wash from reaching any waterway.
- Generators, pumps, and other stationary equipment will be placed on spill trays. Where possible, generators will be located at least 30 m from any waterway.
- All machinery will be clean, in good working condition and free of excess oil and grease. Equipment will be inspected daily and documented.
- Containers will be labelled according to the Transportation of Dangerous Good Act and Workplace Hazardous Materials Information Systems (WHMIS) regulations.
- Oil waste, filters, absorbent pads, and cartridges will be collected and disposed of off-site at an appropriate facility in accordance with federal, provincial, and municipal regulatory requirements.
- A spill kit will be on each site, and staff trained in their use. Spill kits will contain appropriate materials for each site including spill booms capable of spanning creek widths where applicable.

- Any spill of a listed substance according to the *Spill Reporting Regulation* will be immediately reported to the Provincial Emergency Program 24-hour phone line at 1-800-663-3456. Leq'a:mel First Nation, the BC Ministry of Environment and Climate Change Strategy, FVRD, and all project team members will be notified of the spill.

Site Restoration and Replanting

- Areas, where aquatic and riparian vegetation is disturbed or removed, will be replanted with native plant species as required, including construction laydown areas and machine access routes. The banks of the sediment basin will be staked with native species.

5.3 Summary of Residual Impacts to Fish and Fish Habitat

The death of fish is not anticipated after avoidance and mitigation measures are put in place. However, there is the potential for temporary impact while the work is ongoing. These impacts to fish habitat will be mitigated by following procedures outlined in the CEMP.

After mitigation measures are implemented, it is expected the following residual impacts will result from the proposed project works and activities are likely to result in serious harm to fish:

- The alteration of approximately 230 m of channel comprising **2,700 m^2** of aquatic habitat in Deroche Creek through the sediment basin footprint.
- The alteration of **110 m^2** of aquatic habitat in Deroche Creek as a result of the Taylor Road bridge grade control structure.
- The destruction of approximately **7,400 m^2** of riparian vegetation within the footprint of the sediment basin including the loss of 229 trees[7] greater than 20 cm diameter at breast height (DBH).

The proposed timber deflectors are not anticipated to have any harmful residual effects and have been designed to function as rearing habitat during high creek flows from Deroche Creek and/or water levels in Nicomen Slough.

[7] Total trees cleared, including area outside of the 30 m riparian buffer of Deroche Creek.

6. Offsetting Plan

The offsetting plan is required to offset the impacts to aquatic and riparian fish habitat associated with the proposed project. Avoidance of impact is not possible as repairs are necessary to address sediment accumulation in Deroche Creek to mitigate future impacts on infrastructure and salmon habitat. The offsetting plan is being implemented in-kind and in addition to mitigation measures that are in place to minimize impacts to fish and fish habitat during and after construction. The objectives of the offsetting plan are aimed to achieve a residual positive net gain in fish habitat value, where the geographic extent, duration, timing, and intensity of residual effects are described in the following sections.

The offsetting objectives and measures have been determined in collaboration with LFN.

6.1 Offsetting Measures

The offsetting plan for the Project consists of the habitat-related measures of the hybrid design approaches as well as the installation of a number of specific habitat complexing features.

The proposed offsetting measures are as follows:

1. Construction of four rearing habitat channels within the northeast and southeast portions of the Deroche Creek alluvial fan (**1,325 m^2**).
2. Installation of a large woody debris reef along the Highway 7 embankment to improve habitat complexity, limit further erosion, and encourage natural channel migration away from the south bank of Nicomen Slough (**1,200 m^2**).
3. Installation of habitat complexing features, including installation of large woody debris (LWD) in the sediment basin low flow channel (**700 m^2**).
4. Enhancement of existing riparian habitat along Deroche Creek through invasive species removal and planting of native trees and shrubs (**9,800 m^2**).

Rearing Channel Creation in Deroche Fan

The Deroche Creek alluvial fan provides relatively simple and uniform juvenile salmonid rearing habitat during low flow conditions (outside of Fraser freshet). Low sloping topography and placid conditions contribute to shallow water with an abundance of fine sediments, invasive reed canary grass, and aquatic macrophytes. Rearing habitat, in the form of relatively narrow incised “finger” channel are proposed to be constructed in the south-east region of the fan. Channels 2–3 m wide and at least 1 m deep, with steep sides will create an abundance of edge habitat and most likely act as point source outlets for groundwater. This will be beneficial for water temperature moderation in summer and winter and may create some chum spawning potential. LWD and brush will be added to the channel for habitat complexing. Excavated gravels will be used to form mounds with an elevation conducive to shrub growth and planted with native species. These will contribute to riparian diversity and, when inundated during freshet, provide excellent wetted habitat. An example of a constructed rearing channel in shown in Figure 6-1.

Engineering design drawings are available in Appendix B.



Figure 6-1: Example of Constructed Rearing Channel

Large Woody Debris Reef

The large woody debris reef will be constructed in a similar manner to the timber deflectors. Timber piles, sourced from trees within the sediment basin footprint, will be driven into the ground at a maximum depth of 3 m. Woody debris of a variety of sizes, including pieces with rootwads and brush material will be interlocked between piles to provide instream cover for salmonids. Figure 6-2 shows a sketch of the proposed design.

Engineering design drawings are available in Appendix B.

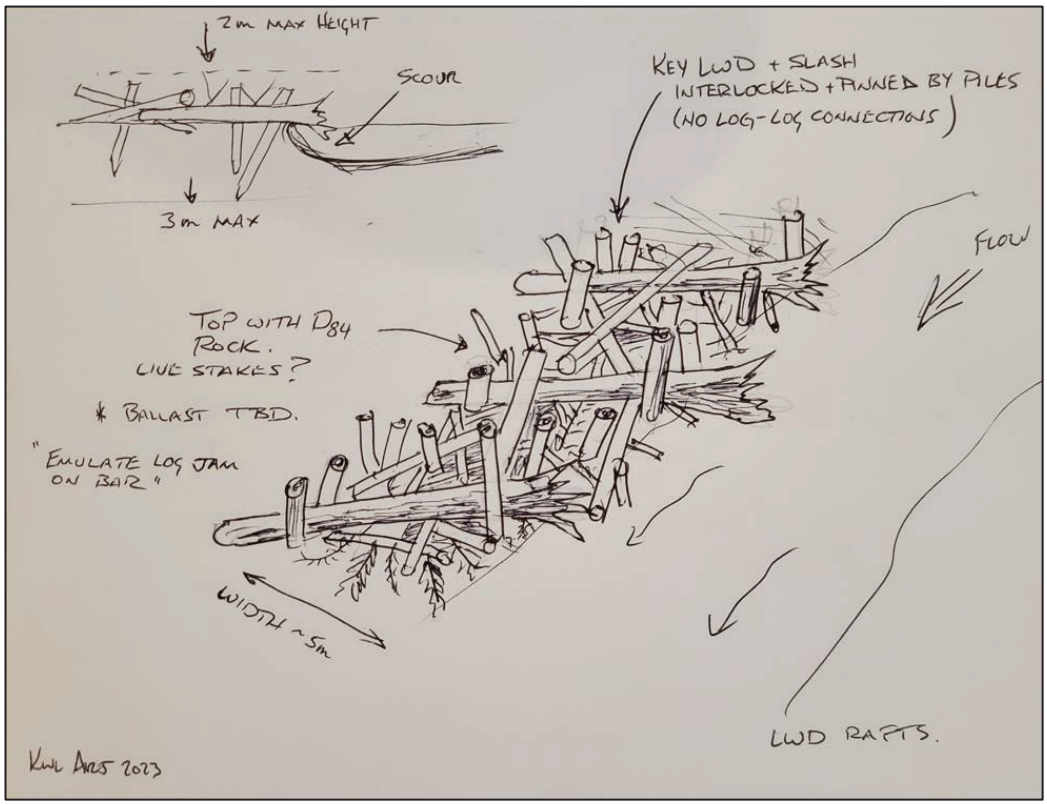

Figure 6-2: Diagram of Proposed Large Woody Debris Reef along the Highway 7 Embankment

Sediment Basin Low Flow Channel

The reach of Deroche Creek that flows through the sediment basin footprint is predominately a fast-moving channel with cobble substrate. This area has limited spawning habitat value due to the lack of appropriate spawning gravel and limited rearing habitat value due to the lack of instream cover and fast flowing water.

The banks of the sediment basin will be lined with substrate filled riprap and the area will be staked with willow. A low flow channel will be created along the base of the left bank of the basin. Embedded boulders with anchored large woody debris will be placed along this reach of the channel to create channel complexity and cover habitat for salmonids. Soil will be placed at the top of banks on either side of the basin and this area will be planted with native shrubs and trees.

This basin is specifically designed to maintain the low flow channel through scour. Traditional sediment basins typically consist of an over-excavated pool that provides short-term habitat value through depth but is deficient in structural cover. As the pool fills with sediment, low flows braid out into extremely shallow channels with no cover, structure, or complexity. The basin is dredged and the whole process starts over. In contrast, the Deroche basin behaves more like a natural channel that accretes a mid-channel bar. Such bars typically skew the low flow channel to either side, often increasing erosion on channel margins and sometimes creating undercut banks. The addition of low weirs is intended to favour this channel skew to the left side of the basin where complexing elements are placed. This may improve the habitat and fish passage as flow decline and, ideally, may create spawning locations not subject to burial over the winter.

Vegetated riprap provides greater riparian and aquatic ecological value than traditional riprap. Riparian vegetation also shades waterways from typical summer temperatures, providing nutrients as leaf litter or bug drop, and preventing the establishment of invasive species. Riparian vegetation, hydric soils and leaf litter may act as a sponge, soaking up stormwater during high flow events and allowing water to be slowly released back into the stream. The increase in organic matter and reduction in soil compaction associated with riparian vegetation also allows for greater water infiltration and drainage. The roots of the riparian vegetation, once established, can then provide enhanced riprap resiliency while also reducing surface runoff through uptake and transpiration (Natural Edge, 2020).

Implementation monitoring and effectiveness monitoring protocols are in place to ensure the native shrubs, plugs, and seeds successfully establish and create functional riparian habitat over the following five (5) years post construction.

Engineering design drawings are available in Appendix B.

Invasive Species Removal and Riparian Planting

Invasive species such as English ivy and Himalayan blackberry are prevalent in the riparian area of Deroche Creek. Several areas along Deroche Creek have been identified as suitable areas for invasive species removal and native planting (Figure 6-3). The planting sites are as follows:

Site 1: Willow staking and planting riprap along the east wall of the low flow channel in the sediment basin to provide shade.

Site 2: English ivy removal and riparian planting of native shrubs along the west bank of the sediment basin.

Site 3: Himalayan blackberry removal and riparian planting of native trees and shrubs east of sediment basin.

Site 4: Himalayan blackberry removal and riparian planting of native trees and shrubs on northeast side of Taylor Road bridge.

Site 5: Riparian planting of native trees and shrubs along the created rearing habitat channels areas on the Deroche Creek alluvial fan.



Photo 6-1: Proposed location of the LWD reef.



Photo 6-2: Proposed English Ivy removal and riparian planting area (Site 2).



Photo 6-3: Proposed blackberry removal and planting area east of sediment basin (Site 3).



Photo 6-4: Proposed blackberry removal and planting area (Site 4).



Photo 6-5: Proposed location of rearing habitat channel between timber deflectors.



Photo 6-6: Proposed location of three rearing habitat channels on the north side of the alluvial fan.

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Northwest Hydraulic Consultants
Deroche Creek Long-Term Flood Mitigation

KERR WOOD LEIDAL consulting engineers



Project No.	2838.003
Date	May 2024
Scale	1:2,000

0 12.5 25 50 Metres

Planting Areas

Figure 6-3

6.2 Habitat Balance

This section outlines the habitat balances for the amount impacted fish habitat and the amount of offsetting habitat created or enhanced. The project will achieve a net ecological gain in fish habitat by creating **665 m^2** of aquatic habitat and restoring **6,009 m^2** of riparian habitat. Table 6-1 summarizes the residual impacts to fish habitat and proposed aquatic offsetting measures. Table 6-2 summarizes residual impacts to riparian habitat and proposed riparian offsetting measures.

Table 6-1: Summary of Residual Aquatic Habitat Impacts and Proposed Offsetting Areas

Proposed Works	Habitat Description	Area (m^2)
Residual Impacts – Aquatic Habitat		
Deroche Creek – Sediment Basin	• Low channel complexity with limited instream cover and a predominately cobble substrate. • Limited habitat for rearing or spawning salmon.	2,700
Deroche Creek – Taylor Road Bridge Grade Control	• Low gradient channel with a cobble and gravel substrate. • Seasonally dry. • Limited instream cover. • Potential spawning area, however, area prone to sediment deposition (potential smothering of redds).	110
	Total Aquatic Area Impacted	**-2,810 m^2**
Proposed Offsetting – Aquatic Habitat		
Creation of Rearing Habitat Channels in Deroche Fan	• Off-channel rearing habitat with large woody debris.	1,325
Nicomen Slough – LWD Reef	• Rearing habitat or staging area for spawning adults.	1,200
Creation of Low Flow Channel in Sediment Basin	• Migratory corridor with habitat complexing.	950
	Total Aquatic Offsetting	**+3,475 m^2**
	Net Aquatic Habitat	**+665 m^2**

Table 6-2: Summary of Residual Riparian Habitat Impacts and Proposed Offsetting Areas

Proposed Works	Habitat Description	Area (m^2)
Residual Impacts – Riparian Habitat		
Loss of Riparian Habitat from Sediment Basin (229 Trees)	• Large cottonwood, cedars, and bigleaf maple with limited understory. Due to a berm along the east bank of Deroche Creek, the riparian area has limited influence on the creek.	7,400
	Total Riparian Area Impacted	**-7,400 m^2**
Proposed Offsetting – Riparian Habitat		
Site 1: Staking and Planting Riprap in Sediment Basin	• Rip rap along the sediment basin will be filled with growing medium and planted and staked.	3,740
Site 2: Himalayan Blackberry Removal and Planting East of Sediment Basin	• Himalayan blackberry will be removed from the area and native shrubs and trees will be planted.	2,588
Site 3: Riparian Planting on NE Side of Taylor Road Bridge	• Himalayan blackberry will be removed from the area and native shrubs and trees will be planted.	414
Site 4: Riparian Planting of Rearing Habitat Channels	• Native shrubs and trees will be planted along the margins of the created rearing habitat channels on the Deroche Creek alluvial fan.	6,667
	Total Riparian Offsetting	**13,409 m^2**
	Net Riparian Habitat	**+6,009 m^2**

6.3 Habitat Credits

No habitat credits will be used for this project. Residual impacts from the project will be offset by the measures outlined in the previous sections.

7. Description of Monitoring Measures to Assess Effectiveness of Measures and Standards Described

This section describes monitoring required during and after construction of the measures to mitigate habitat impacts to fish from the Project. Construction monitoring will occur during construction. Implementation monitoring will occur immediately following construction. Effectiveness monitoring will occur over a five (5)-year period after construction for aquatic habitat components and over a ten (10)-year period after construction for riparian habitat components.

7.1 Monitoring Approach

The monitoring approach proposed is based on the advice and guidance found in the following documents:

- *Policy for Applying Measures to Offset Adverse Effects on Fish and Fish Habitat Under the Fisheries Act, Fisheries and Oceans Canada, 2019*.
- *Requirements and Best Management Practices for Making Changes In and About A Stream in British Columbia, Ministry of Forests, Lands, Natural Resource Operations, and Rural Development, 2022*.
- *Standards and Best Practices for Instream Works, Ministry of Water, Land, and Air Protection, 2004*.
- *Guidelines for In-Stream and Off-Channel Routine Effectiveness Evaluation, Ministry of Water, Land, and Air Protection, 2003*.
- *Monitoring and Assessment of Fish Habitat Compensation and Stewardship Projects: Study Design, methodology, and Example Case Studies, Mike Pearson (et al.), 2005*.
- *Assessing the effectiveness of habitat offset activities in Canada: Monitoring design and metrics.* Smokorowski et al. 2015.

7.2 Construction Monitoring for Mitigation Measures

This stage of monitoring will occur during construction and is intended to ensure that the project is being carried out in compliance with all applicable legislation and permits and in adherence to the environmental guidance for the project.

Construction Environmental Management Plan for Project Works

A Construction Environmental Monitoring Plan (CEMP) has been developed for the construction of project works and will be supplemented by requirements and recommendations listed in regulatory permits. The CEMP will:

- Set out the requirements and measures that will be adopted to avoid, minimize, and mitigate the potential impacts to fish and fish habitat as a result of the Project.
- Be implemented by the Contractor throughout the project and applies to the construction phase.
- Provide overarching guidance for how environmental considerations will be implemented and monitored during the construction phase of the project.

The CEMP will be a living document and will be updated throughout the construction phase of the Project as planning for work is finalized and as findings from the monitoring program warrant changes in environmental management.

Construction Environmental Monitoring

Construction monitoring will be carried out by a QEP or a team working under the direction of a QEP. The responsibilities of the Environmental Monitor (EM) will be:

- To monitor and provide recommendations to ensure compliance with all applicable permits (i.e., *Fisheries Act* Authorization and *Water Sustainability Act* Change Approval), best management practices, and the Construction Environmental Management Plan.
- To provide additional recommendations to avoid and mitigate impacts to fish and fish habitat to the greatest extent possible.
- To provide recommendations for field fit components of the design and ensure the design is executed as approved.

Reporting

The EM will prepare daily environmental monitoring reports detailing the activities conducted, issues of non-compliance with the CEMPs and mitigation measures implemented to address deficiencies, as well as a representative photo log.

Upon completion of construction, the EM will prepare a brief memo summarizing key incidents; the daily reports will be included in the appendix of the CEMP. The memo will be submitted to DFO and WLRS within 60 days of completion of construction.

7.3 Implementation Monitoring

This stage of monitoring will occur immediately after completion of the works and ensure the works were carried out as planned. Implementation monitoring will evaluate the project works and the five primary offsetting components through a series of monitoring questions detailed below.

Monitoring Objectives

The purpose of implementation monitoring is to ensure project and offsetting works are functioning as designed. The objectives of the project will be used to identify metrics of success for the proposed works. The objectives include:

- Maintaining fish passage in the low flow channel in the sediment basin.
- Creating rearing habitat for juvenile salmonids (LWD reef and rearing habitat channels).
- Increased riparian plant biodiversity and density at the restoration planting sites.

These components will be used to frame metrics of success for the implementation monitoring, as described below.

Monitoring Protocol

Implementation monitoring will be conducted by appropriate QEP or team of QEPs. Generally, it is expected that monitoring will be completed by (or under supervision of) a Registered Professional Biologist (RPBio).

Implementation monitoring will evaluate the project and offsetting components through examining the following questions:

- **Sediment Basin**
  - Does the low-flow channel meet the intent of the design as per the engineering drawing package?
  - Do the materials match the design drawings and function as intended?
  - Are the habitat boulders and large woody debris installed as per the engineering drawings? Will they function as intended?
  - Are stakes in the rip rap installed at the correct elevation and at the correct depth?
- **Taylor Road Bridge Grade Control Structure**
  - Is the grade control structure passable to fish?
- **Timber Deflectors**
  - Do the materials used match the design drawings?
  - Will the structures function as fish habitat during high flows in Nicomen Slough?
- **Alluvial Fan Rearing Channels**
  - Does channel construction match the engineering design drawings?
  - Is the large woody debris installed as per the engineering drawings? Will they function as intended?
- **Large Woody Debris Reef**
  - Do the materials used match the design drawings?
  - Does the debris reef appear to be functioning as bank protections?
  - Does the debris reef appear to be functioning as fish habitat?
- **Riparian Planting**
  - Does the planting match the planting plan? Appropriate number of plants, type of plant (i.e., live stakes versus potted plants), size and condition of planted stock, species, and spacing?
  - Is there sufficient coverage of seed mix in areas with exposed soil?
  - Have plants been installed in the appropriate location and in an appropriate manner to facilitate establishment (i.e., planting depth, stem vertical, no air pockets around root ball)?
  - Is there a watering plan in place with adequate frequency for site moisture conditions?
  - Has all the garbage and any other unnecessary debris been removed from the planting areas?

Any deficiencies identified on site by the QEP during the implementation monitoring will be communicated to the contractor and via email. A follow-up implementation monitoring site visit by the QEP(s) will be conducted to ensure all deficiencies have been addressed.

7.4 Effectiveness Monitoring

This stage of monitoring will occur annually over a multi-year period post-construction and is intended to assess whether the proposed offsetting works are achieving their expected outcomes as per the offsetting plan.

Study Design

Effectiveness monitoring study design will follow a Before, After, Control, Impact (BACI) experimental design. Aquatic habitat effectiveness monitoring will be conducted for five years following construction and riparian monitoring will occur for ten years following construction. This will allow sufficient time to ensure the vegetation has become established, and that all Project components are functioning as intended. Monitoring will occur twice a year, once in late summer (July/August) when plants are leafed out and water levels are lowest, and once in the late fall during Coho and Chum spawning season. This will facilitate accurate assessment of plant growth and survival, assessment of low-flow stream conditions, assessment of high-flow stream conditions, and fish usage. The monitoring and reporting schedule is outlined in Table 7-1. Monitoring goals and methodologies are described in the sections below. Monitoring metrics and locations are summarized in Figure 7-1.

Table 7-1: Effectiveness Monitoring and Reporting Schedule

	Year 1	Year 2	Year 3	Year 5	Year 7	Year 10
Aquatic Habitat Monitoring	S/F	S/F	S/F	S/F	-	-
Riparian Restoration Monitoring	S	S	S	S	S	S
S = Summer, F= Fall						

Offsetting Goals

The purpose of effectiveness monitoring is to ensure project and offsetting works are functioning as designed. The goals of the project will be used to identify metrics of success for the proposed works. The goals include:

- **Goal 1 –** Maintain fish passage in the low flow channel in the sediment basin.
- **Goal 2 –** Improve rearing habitat for juvenile salmonids.
  - **Objective –** Create rearing habitat channels in the Deroche Creek alluvial fan.
  - **Objective** – Create rearing habitat in the low-flow channel with the installation of LWD.
  - **Objective –** Enhance rearing habitat in Nicomen Slough through the addition of the LWD reef.
  - **Objective –** Enhance rearing habitat in Nicomen Slough through installation of the timber deflectors.
- **Goal 3 –** Increase riparian plant biodiversity and density at the restoration planting sites.

These offsetting goals have been used to inform monitoring metrics and methodologies. These are discussed in the section below.

Goal 1: Maintain Fish Passage through the Sediment Basin

Monitoring Question: Are Coho and Chum salmon able to pass through the sediment basin at low flows?

Fish passage will be assessed both qualitatively and quantitatively. The monitor will walk the length of the low-flow channel and will note and measure areas where the channel is dry or there are barriers to fish passage. One transects will be established in the low-flow channel to measure water depth and water velocity. These values will be compared to habitat suitability indices for all life stages of Chum and Coho salmon to assess fish passage.

Goal 2: Creation and Enhancement of Rearing Habitat

Monitoring Question: Are the alluvial fan rearing channels and low-flow channel providing moderate to high quality habitat for rearing salmonids?

Rearing habitat will be assessed using a modified Fish Habitat Assessment Protocol (Johnston and Slaney, 1996). This will include collection of data such as physical stream measurements (wetted width, mean depth, and maximum pool depth), assessments of available instream cover (LWD, deep pools, boulders, in stream vegetation, etc.), and canopy cover. Suitability surveys will be conducted in the low-flow channel in the sediment basin and in the rearing habitat channels in the alluvial fan.

In-situ water quality measurements will be collected in Deroche Creek and in Nicomen Slough. Measurements will include pH, temperature, turbidity, and dissolved oxygen. Values will be compared to provincial Approved or Working Water Quality Guidelines for the Protection of Aquatic Life.

Monitoring Question: Are juvenile salmon utilizing the alluvial fan channels?

Abundance of juvenile salmonids (catch per unit effort) will be conducted in the alluvial fan channels. This data will be compared with abundance data collected in the reference alluvial fan channel on the north side of the fan. However, the reference channel is groundwater fed, so there is a potential that data will not be directly comparable. Data collected at this reference site data will be more of a general indicator of population trends through the five years of effectiveness monitoring. Presence of juvenile salmon in the channels and results from the rearing habitat suitability survey will determine if rearing habitat creation has been successful.

Monitoring Question: Is fish abundance higher in the areas where large wood has been placed in Nicomen Slough?

Abundance of juvenile salmonids (catch per unit effort) will be assessed in the low-flow channel, and in Nicomen Slough (at the LWD Reef and the south deflection berm) using minnow traps. Fish abundance data in Nicomen Slouch will be compared to baseline data and a reference site with no woody debris on the bank of Nicomen Slough near Deroche Creek.

In the low-flow channel, monitoring data will be compared to baseline data collected prior to the start of works.

At the LWD reef, the project will aim to increase the juvenile abundance from baseline conditions. Several published papers were reviewed to determine a suitable target increase. Impacts of LWD installation ranged from no effect on juvenile salmon[8] to resulting in 7.9 times increase in juvenile salmon

[8] Walls, Caroline J., "The Effectiveness of Large Woody Debris Placement at Improving Freshwater Rearing Habitat and Enhancing Juvenile Salmon (Oncorhynchus spp.) Production" (2020). WWU Graduate School Collection. 937. https://cedar.wwu.edu/wwuet/937

abundance[9]. A study conducted in Washington and Oregon, LWD increased juvenile coho density by 1.8 to 3.2 times over reference reaches[10]. Based on this study, the metric of success for the LWD reef will be increasing the density of salmon by 2 times over baseline conditions.

Monitoring Question: Are the installed habitat structures structurally stable?

Large woody debris and habitat boulders in the low flow channel will be assessed for structural stability. The LWD reef area and deflection berms will also be assessed for stability and to ensure they are providing habitat. Structural stability will be based on qualitative observations based on the criteria outlined in Table 7-2.

Table 7-2: Criteria for Monitoring Stability of Large Woody Debris

Score	Description
4	LWD and habitat boulders (low-flow channel only) in excellent condition; all components are solid with no evidence of breakage or wear.
3	LWD and habitat boulders (low-flow channel only) in sufficient condition; normal wear and tear with limited localized damage.
2	LWD and habitat boulders (low-flow channel only) in poor condition; evidence of LWD decay or movement.
1	LWD and habitat boulders (low-flow channel only) in very poor condition; LWD collapsed. LWD collapsed, boulders crumbled, cables rusted and failed. Structure will not last another high flow season.

Goal 3: Improve Riparian Planting Areas

Riparian monitoring will occur in the summer when plants are leafed out. Circular plots with an area of 10 m^2 will be placed randomly throughout the planting areas. The functionality and success of the planted areas will be determined based on the following metrics.

Monitoring Question: Is the planted stock surviving and healthy?

Assessment of the success of plantings based on the proportion of plant survivorship and plant health. Planted shrubs should have a survival rate of 80% and planted trees should have a survival rate of 100%. Plant health will be assessed qualitatively by observing evidence of yellowing, grazing (i.e., uniform height reduction, widespread absence of leaf tips, waterfowl observed grazing on site), and/or other physical damage (e.g., smothering by logs or garbage).

Replacement planting, when deemed necessary, should be tracked to ensure appropriate adjustments to plant numbers and species for future years of monitoring of plant stock health and survivorship.

Quantitative assessment of the mean percent cover of invasive plants in each plant plot. Reed canary grass, Japanese knotweed, and Himalayan blackberry have been identified as invasive plants of note.

[9] C. J. Cederholm, R. E. Bilby, P. A. Bisson, T. W. Bumstead, B. R. Fransen, W. J. Scarlett, J. W. Ward. 1997. Response of Juvenile Coho Salmon and Steelhead to Placement of Large Woody Debris in a Coastal Washington Stream. North American Journal of Fisheries Management. 17(4). 947-963. https://doi.org/10.1577/1548-8675(1997)017<0947:ROJCSA>2.3.CO;2
[10] P. Roni and T. Quinn. 2001. Density and size of juvenile salmonids in response to placement of large woody debris in western Oregon and Washington streams. Canadian Journal of Fisheries and Aquatic Sciences. 58(2). https://doi.org/10.1139/f00-246

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Northwest Hydraulic Consultants
Deroche Creek Long-Term Flood Mitigation

KERR WOOD LEIDAL consulting engineers



Project No.	2838.003
Date	May 2024
Scale	1:2,000

0 12.5 25 50 Metres

Effectiveness Monitoring Plan

Figure 7-1

7.5 Routine Maintenance and Adaptive Management

Routine maintenance is likely to be needed in the years following construction to ensure native vegetation are well established and functioning as intended. Maintenance activities may include:

- Watering of planted stock, especially in the first growing season.
- Replacement planting.
- Invasive plant management (especially in the first few growing seasons).
- Removal of trash.

Further assessment and maintenance may be needed depending on the results of the effectiveness monitoring assessment. All components that receive a score of 2 or lower (based on the assessment in **Error! Reference source not found.**) will require maintenance to bring the component up to target c onditions. However, if multiple components receive a score of 2 or lower, a site diagnostic may be warranted. A site diagnostic can be used to determine the potential underlying causes of poor performance of the restoration prescription and recommend potential solutions.

An adaptive management approach will be used to propose solutions to address the failed components based on greater understanding of localized conditions gained from the site diagnostic. In the case that a novel stressor is identified and/or considerable changes are needed to address an issue on site, additional monitoring frequency and duration may be recommended to ensure the site meets expectations and objectives of the approved design.

Reporting

Implementation Monitoring Report

An implementation monitoring report will be prepared and submitted to DFO and WLRS within 60 days of completion of construction and/or once all deficiencies have been addressed. The report will include:

- An executive summary.
- An as-built survey.
- Detailed documentation of the field fit implementation of planting, habitat complexing structures, and other relevant components.
- An outline of any deficiencies on site and how they were addressed to ensure the works meet the approved design.
- A representative photo log using standardized viewpoints and bearings (where applicable).

Effectiveness Monitoring Reports

A monitoring memo will be prepared following the last site visit of each monitoring year. The memo will include:

- An executive summary.
- An overview of general site conditions.
- Data summary and analysis.
- An overall assessment of site conditions relative to the project objectives and intended function.
- A representative photo log using standardized viewpoints and bearings (where applicable).
- An overview of maintenance needed with revised monitoring schedule, if deemed necessary.
- Findings of the site diagnostic and adaptive management recommendations, if deemed necessary.

The monitoring memo will be submitted to DFO and WLRS within 60 days of the last site visit of each monitoring year.

8. Contingency Measures

8.1 Construction Contingency Measures

If the avoidance and mitigation measures outlined are found, over the course of the monitoring, to be insufficient to prevent harmful impacts to fish and fish habitat, the following contingency measures will be implemented:

- The Environmental Monitor will require works to stop until a suitable strategy to address the issues is implemented by the contractor.
- Works may be completed during different conditions or with different construction techniques if issues are identified by the Environmental Monitor.

8.2 Offsetting Contingency Measures

Effectiveness monitoring will be conducted to assess the success of the offsetting plan. In the event that the offsetting plan does not meet the criteria outlined, the following contingency measures will be implemented:

- Identify which criteria the offsetting plan has not successfully met.
- Determine the cause of the cause of the deficiency.
- Determine how to resolve the cause of the deficiency (e.g. altering the design, addition of new plants, identifying additional maintenance needs).
- Implement and monitor the contingency measures.

In the unlikely event that these contingency steps are unsuccessful in remedying the deficiencies, alternate sites in the region will be identified for additional restoration.

Report Submission

Prepared by:

KERR WOOD LEIDAL ASSOCIATES LTD.



Janice Kwo, M.Sc., RPBio
Project Biologist

Reviewed by:



Patrick Lilley, M.Sc., RPBio, BC-CESCL
Senior Biologist

Statement of Limitations

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Revision History

Revision #	Date	Status	Revision	Author
0	May 28, 2024	Final		JVK

Appendix A

Site Photos

Appendix A – Site Photos



Photo A-1: Deroche Creek flowing through the alluvial fan and entering the Nicomen Slough. November 15, 2023.



Photo A-2: Location of proposed timber deflectors on the Deroche Creek alluvial fan. March 9, 2023.



Photo A-3: Looking upstream at the Taylor Road Bridge and location of proposed grade control structure. Deroche Creek was dry in the section during the site visit in March 2023.



Photo A-4: Location of the proposed Taylor Road grade control structure.



Photo A-5: Reach 2a of Deroche Creek, looking upstream at the location of the proposed sediment basin.



Photo A-6: Upstream end of the proposed sediment basin on Deroche Creek, looking downstream.



Photo A-7: Riparian area on east bank of Deroche Creek within the sediment basin footprint.



Photo A-8: Riparian area on east bank of Deroche Creek within the sediment basin footprint. Berm along the east bank visible in background.

Appendix B

Engineering Drawings

KERR WOOD LEIDAL ASSOCIATES LTD.
consulting engineers

DEROCHE CREEK RECOVERY SOLUTION

ISSUED FOR TENDER, APRIL, 2024

DRAWING INDEX		
SHEET No.	SHEET DESCRIPTION	REVISION
001	TITLE SHEET AND PROJECT LOCATION	
002	EXISTING SITE PLAN	
003	REACH 1 WORKS - PLAN AND PROFILE VIEWS	
004	REACH 2 WORKS - PLAN AND PROFILE VIEWS	
005	REACH 1 - TYPICAL SECTIONS AND PROFILES	
006	REACH 2 - TYPICAL SECTIONS AND PROFILES	
007	SEDIMENT BASIN - STANDARD SECTIONS	
008	LOT 8-3-3 GRADING PLAN	
009	OFF-SETTING WORKS	
010	OFF-SETTING WORKS - TYPICAL SECTIONS AND PROFILES	
011	PLANTING PLAN	



LOCATION MAP
NOT TO SCALE



SITE MAP
NOT TO SCALE

CLIENT:

Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION

nhc northwest hydraulic consultants

SEAL:

2024-05-04

PERMIT TO PRACTICE
NORTHWEST HYDRAULIC CONSULTANTS LTD.
PERMIT NUMBER: 1003221
The Association of Professional Engineers and Geoscientists of British Columbia

DEROCHE CREEK RECOVERY SOLUTION

TITLE SHEET AND PROJECT LOCATION

DESIGNED: DJG	SHEET ID: 3007814-RS-001	SHEET No:	
DRAFTED: CZZ	STATUS: ISSUED FOR TENDER	001	
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 30 APR 2024	REV No:	

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

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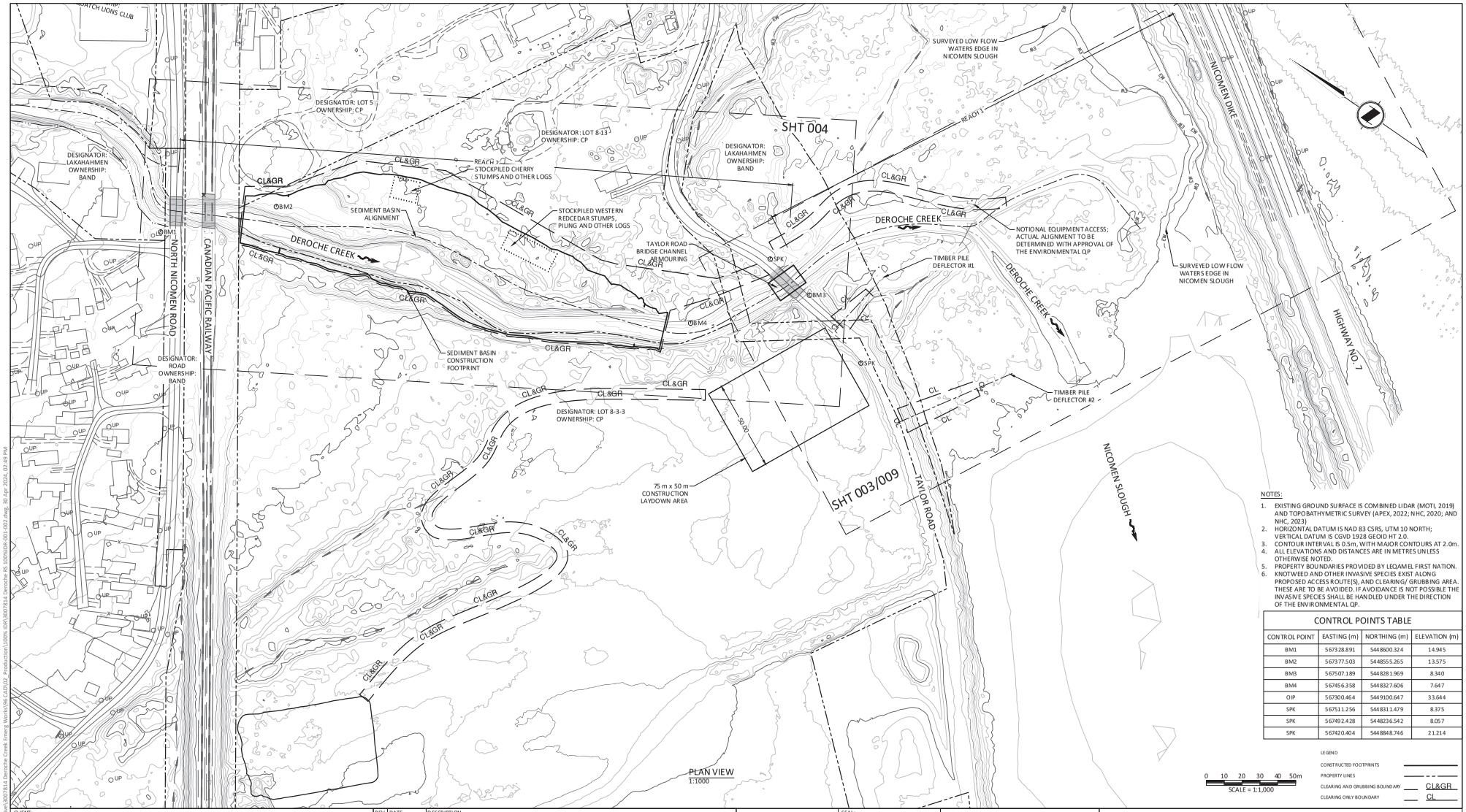

NOTES:

1. EXISTING GROUND SURFACE IS COMBINED LIDAR (MOTI, 2019) AND TOPOBATHYMETRIC SURVEY (APEX, 2022; NHC, 2020; AND NHC, 2023)
2. HORIZONTAL DATUM IS NAD 83 CSRS, UTM 10 NORTH; VERTICAL DATUM IS CGVD 1928 GEOID HT 2.0.
3. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
4. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
5. PROPERTY BOUNDARIES PROVIDED BY LEQAMEL FIRST NATION.
6. KNOTWEED AND OTHER INVASIVE SPECIES EXIST ALONG PROPOSED ACCESS ROUTE(S), AND CLEARING/ GRUBBING AREA. THESE ARE TO BE AVOIDED. IF AVOIDANCE IS NOT POSSIBLE THE INVASIVE SPECIES SHALL BE HANDLED UNDER THE DIRECTION OF THE ENVIRONMENTAL QP.

CONTROL POINTS TABLE

CONTROL POINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
BM1	567328.891	5448600.324	14.945
BM2	567377.503	5448555.265	13.575
BM3	567507.189	5448281.969	8.340
BM4	567456.358	5448327.606	7.647
OIP	567300.464	5449100.647	33.644
SPK	567511.256	5448311.479	8.375
SPK	567492.428	5448236.542	8.057
SPK	567420.404	5448848.746	21.214

LEGEND

CONSTRUCTED FOOTPRINTS
PROPERTY LINES
CLEARING AND GRUBBING BOUNDARY — CL&GR
CLEARING ONLY BOUNDARY — CL

CLIENT: Ministry of Environment and Climate Change Strategy, British Columbia

REV.	DATE	DESCRIPTION

nhc northwest hydraulic consultants

SEAL: D. J. GOULD # 29261 PROFESSIONAL ENGINEERS — 2024-05-04

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NORTHWEST HYDRAULIC CONSULTANTS LTD.
PERMIT NUMBER: 1003221
The Association of Professional Engineers and Geoscientists of British Columbia

DEROCHE CREEK RECOVERY SOLUTION

SITE PLAN

DESIGNED: DJG	SHEET ID: 3007814-RS-002		SHEET No: 002
DRAFTED: CZZ	STATUS: ISSUED FOR TENDER		
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 30 APR 2024		REV No:

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

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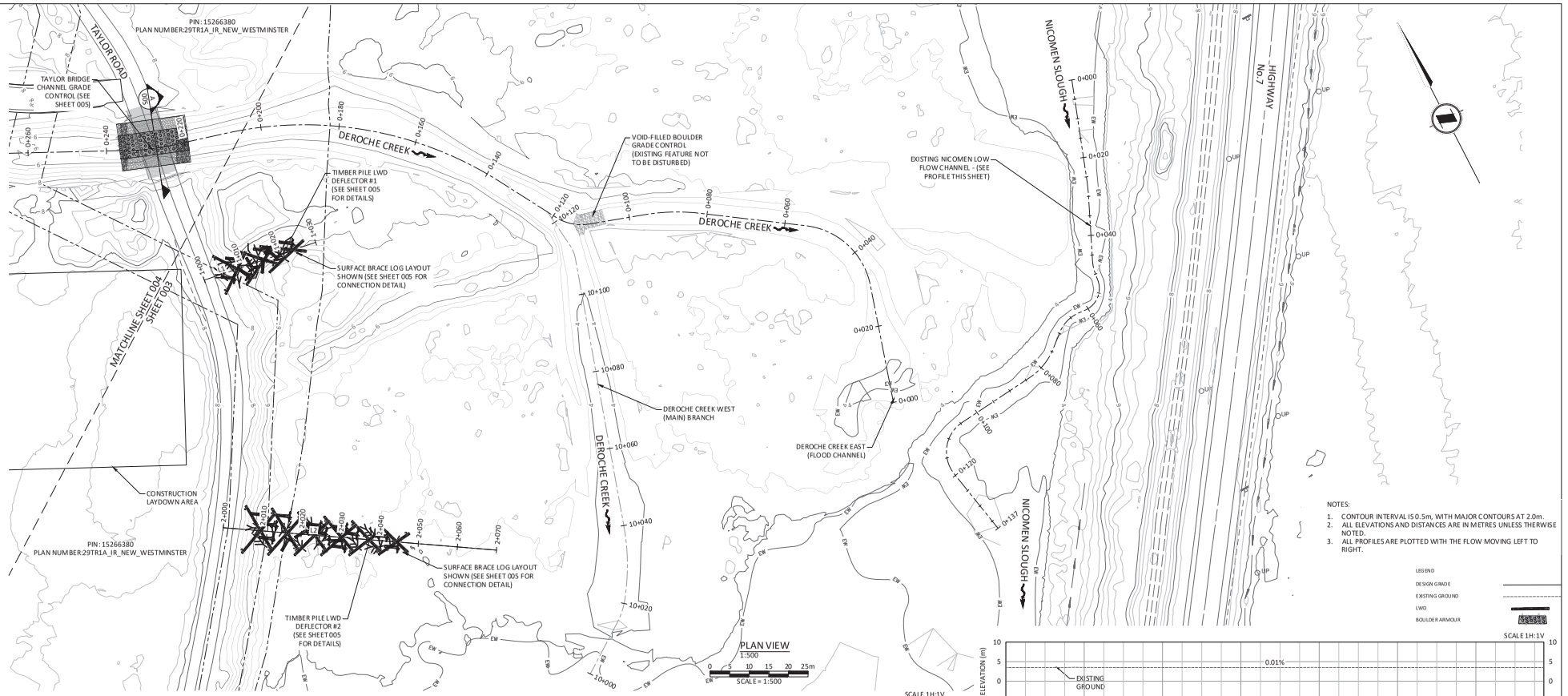
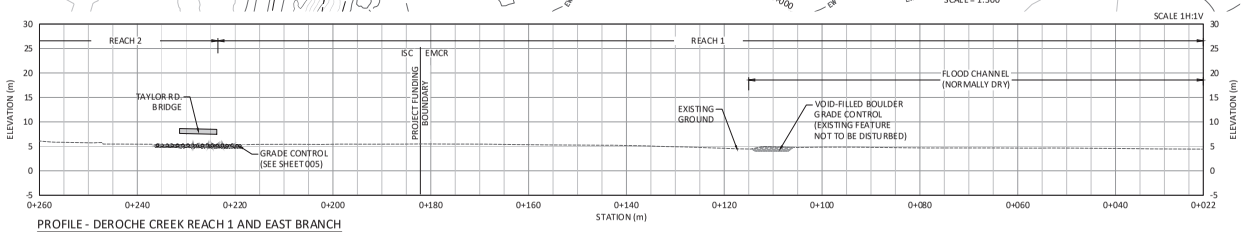
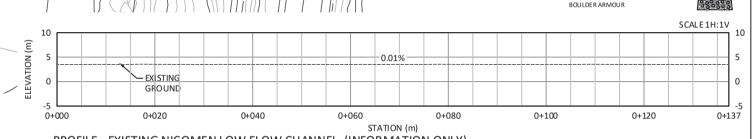


NOTES:

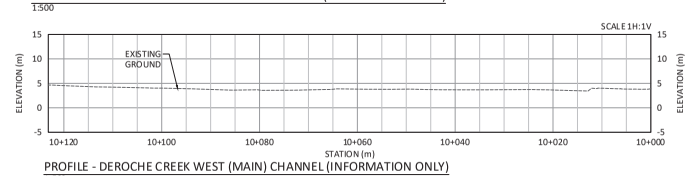
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS THERWISE NOTED.
3. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.



PROFILE - DEROCHE CREEK REACH 1 AND EAST BRANCH
1:500



PROFILE - EXISTING NICOMEN LOW FLOW CHANNEL (INFORMATION ONLY)
1:500



PROFILE - DEROCHE CREEK WEST (MAIN) CHANNEL (INFORMATION ONLY)
1:500

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION

nhc northwest hydraulic consultants

SEAL:

PROFESSIONAL ENGINEER D. J. GOOLD # 28261 BRITISH COLUMBIA
2024-05-04

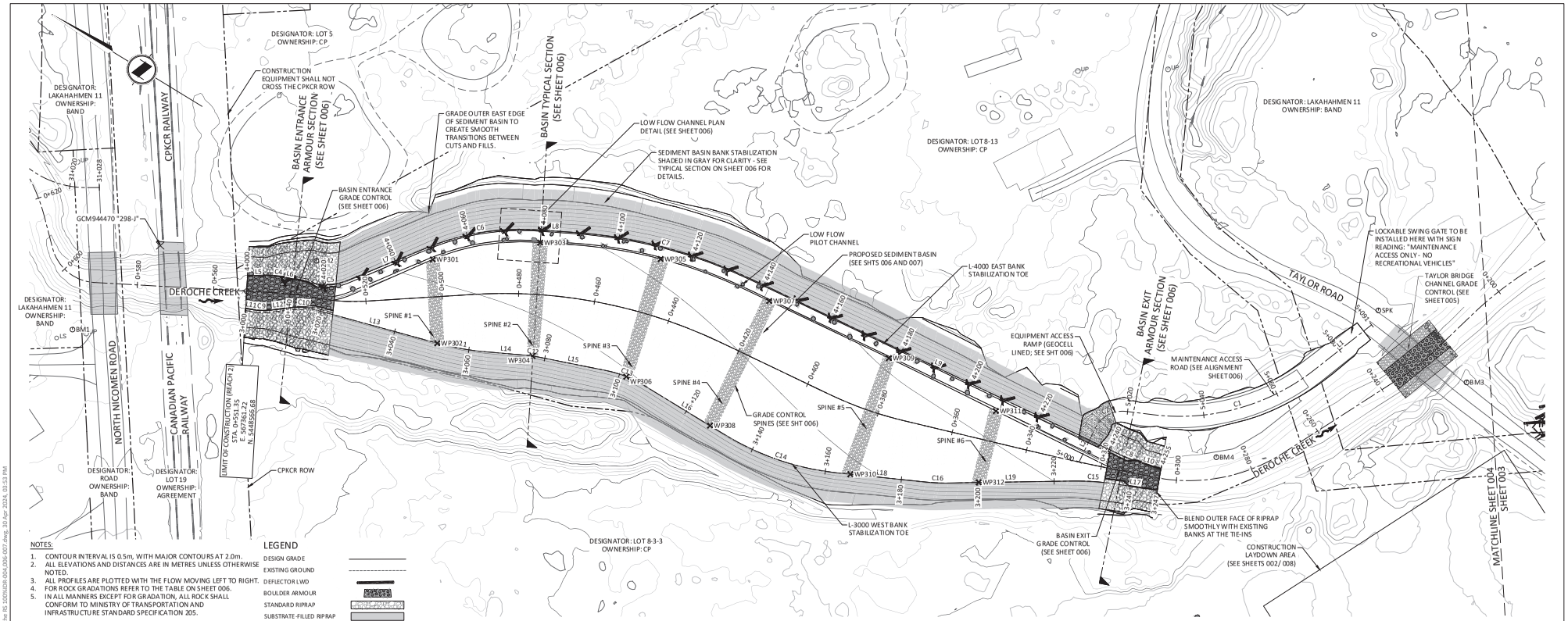
PERMIT TO PRACTICE
NORTHWEST HYDRAULIC CONSULTANTS LTD.
PERMIT NUMBER: 1003221
The Association of Professional Engineers and Geoscientists of British Columbia

DEROCHE CREEK RECOVERY SOLUTION
REACH 1 WORKS
PLAN AND PROFILE

DESIGNED:	DJG	SHEET ID:	3007814-RS-003	SHEET No:
DRAFTED:	CZZ	STATUS:	100% IDR	003
CHECKED:	DJG	SCALE:	AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE:	30 APR 2024	REV No:

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\mainfile-van\Projects\Active\3007814 Deroche Creek Emerg Works\96 CAD\02_Production\100% IDR\3007814 Deroche RS 100%IDR-003,005.dwg, 30 Apr 2024, 03:14 PM



NOTES:

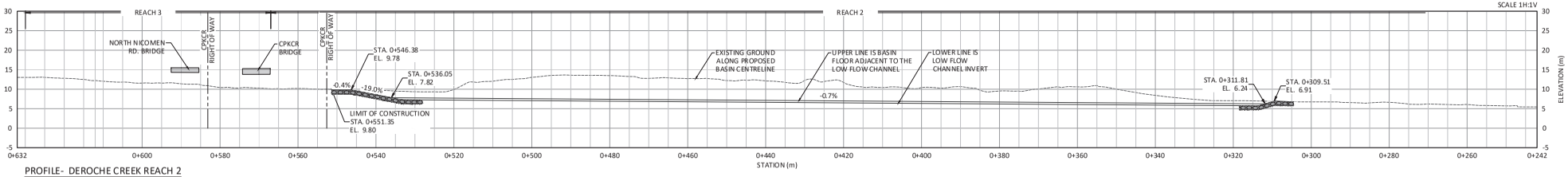
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
3. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.
4. FOR ROCK GRADATIONS REFER TO THE TABLE ON SHEET 006.
5. IN ALL MANNERS EXCEPT FOR GRADATION, ALL ROCK SHALL CONFORM TO MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE STANDARD SPECIFICATION 205.

LEGEND

- DESIGN GRADE
- EXISTING GROUND
- DEFLECTOR LWD
- BOULDER ARMOUR
- STANDARD RIPRAP
- SUBSTRATE-FILLED RIPRAP
- WRC ROOTWADS

PLAN VIEW
1:500

0 5 10 15 20 25m
SCALE = 1:500



PROFILE- DEROCHE CREEK REACH 2
1:500

CLIENT:

Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION

nhc northwest hydraulic consultants

SEAL:

D. J. GOULD # 29261 PROFESSIONAL ENGINEER — 2024-05-04

PERMIT TO PRACTICE
NORTHWEST HYDRAULIC CONSULTANTS LTD.
PERMIT NUMBER: 1003221
The Association of Professional Engineers and Geoscientists of British Columbia

DEROCHE CREEK RECOVERY SOLUTION
REACH 2 WORKS
PLAN AND PROFILE VIEWS

DESIGNED: DJG	SHEET ID: 3007814-RS-004		SHEET No: 004
DRAFTED: CZZ	STATUS: ISSUED FOR TENDER		
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 30 APR 2024		REV No:

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

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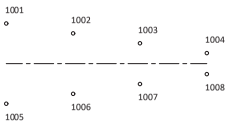
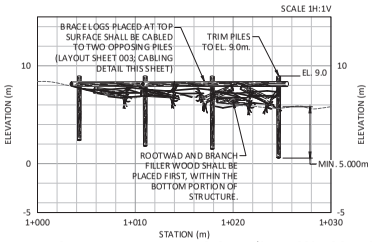


PILING PLAN - DEFLECTOR #1
1:250

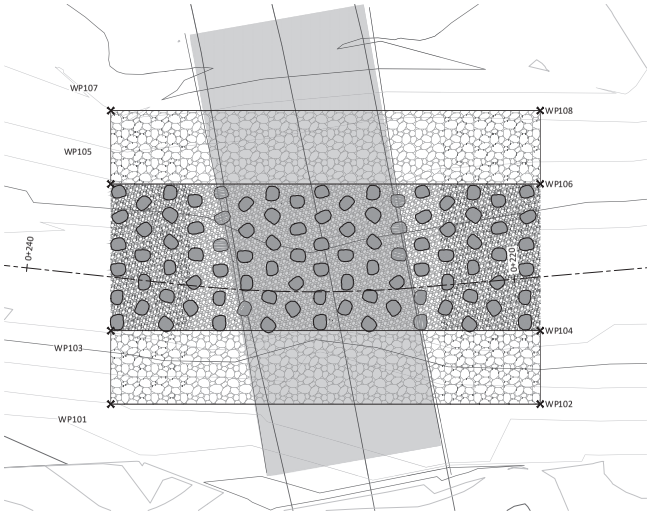
PILE LAYOUT TABLE - DEFLECTOR #1		
PILE #	EASTING (m)	NORTHING (m)
1001	567505.93	5448262.56
1002	567512.54	5448260.55
1003	567519.16	5448258.55
1004	567525.77	5448256.55
1005	567504.73	5448254.45
1006	567511.63	5448254.44
1007	567518.54	5448254.43
1008	567525.45	5448254.42

TIMBER PILE DEFLECTOR #1 ALIGNMENT LAYOUT						
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L1	1+000.000	567501.20	5448259.12	098° 28' 01.01"	30.000	

WORKPOINT TABLE - TAYLOR BRIDGE ARMOURING		
PILE #	EASTING (m)	NORTHING (m)
101	567495.39	5448293.46
102	567511.93	5448287.55
103	567496.40	5448296.29
104	567512.94	5448290.37
105	567498.43	5448301.94
106	567514.96	5448296.02
107	567499.44	5448304.76
108	567515.97	5448298.84



PROFILE - TIMBER PILE DEFLECTOR #1 (SHEET 003; LOOKING NORTH)
1:250



TAYLOR BRIDGE CHANNEL ARMOURING
1:150

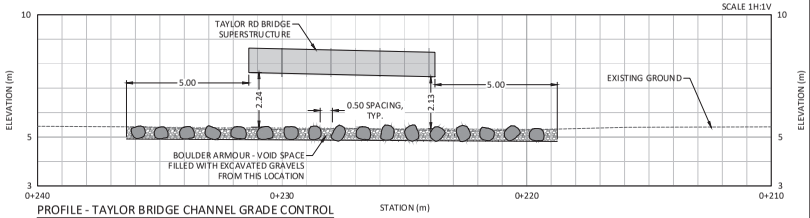


PILING PLAN - DEFLECTOR #2
1:250

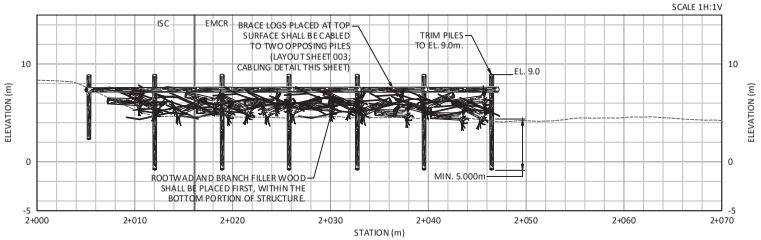
PILE LAYOUT TABLE - DEFLECTOR #2		
PILE #	EASTING (m)	NORTHING (m)
2001	567483.71	5448202.35
2002	567489.33	5448198.33
2003	567494.95	5448194.32
2004	567500.57	5448190.30
2005	567506.19	5448186.28
2006	567511.81	5448182.26
2007	567517.43	5448178.24

PILE LAYOUT TABLE - DEFLECTOR #2		
PILE #	EASTING (m)	NORTHING (m)
2008	567478.26	5448193.60
2009	567484.35	5448190.33
2010	567490.43	5448187.06
2011	567496.52	5448183.79
2012	567502.61	5448180.52
2013	567508.69	5448177.25
2014	567514.78	5448173.98

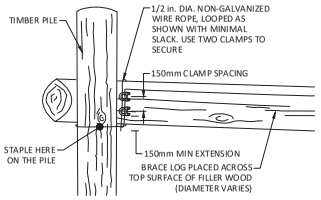
TIMBER PILE DEFLECTOR #2 ALIGNMENT LAYOUT						
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L2	2+000.000	567476.59	5448200.71	121° 53' 59.96"	70.000	



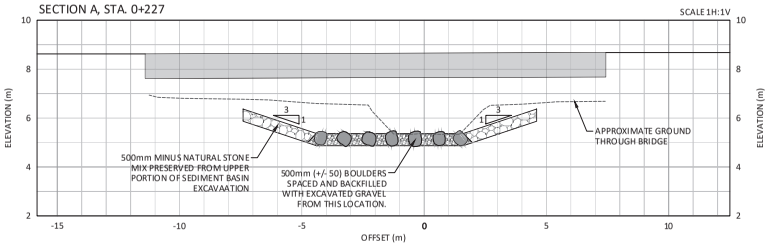
PROFILE - TAYLOR BRIDGE CHANNEL GRADE CONTROL (SHEET 003; LOOKING EAST)
1:100



PROFILE - TIMBER PILE DEFLECTOR #2 (SHEET 003; LOOKING NORTH)
1:250



BRACE LOG CABLING DETAIL
1:25



A / 003 TAYLOR BRIDGE CHANNEL GRADE CONTROL (LOOKING SOUTH)
1:100

LEGEND
DESIGN GRADE
EXISTING (2023) GROUND
LARGE WOODY DEBRIS
TIMBER PILE
VOID-FILLED BOULDER ARMOURING

NOTES:
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
3. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.
4. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
5. IN ALL MANNERS EXCEPT FOR GRADATION, ROCK QUALITY SHALL CONFORM TO MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE STANDARD SPECIFICATION 205.

CLIENT:
BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION

nhc northwest hydraulic consultants

SEAL:
PROFESSIONAL ENGINEER D. J. GOULD # 28261 PROVINCE OF BRITISH COLUMBIA
2024-05-04

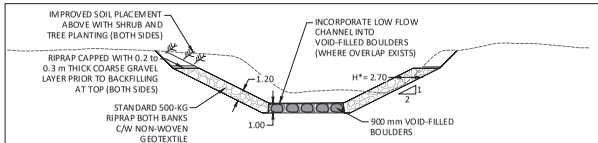
PERMIT TO PRACTICE
NORTHWEST HYDRAULIC CONSULTANTS LTD.
PERMIT NUMBER: 1003221
The Association of Professional Engineers and Geoscientists of British Columbia

DEROCHE CREEK RECOVERY SOLUTION
REACH 1
TYPICAL SECTIONS AND PROFILE DETAILS

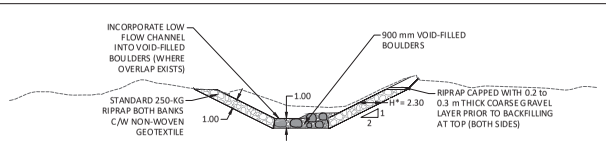
DESIGNED:	DJG	SHEET ID: 3007814-RS-005	SHEET No: 005
DRAFTED:	CZZ	STATUS: 100% IDR	
CHECKED:	DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE: 30 APR 2024	REV No:

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

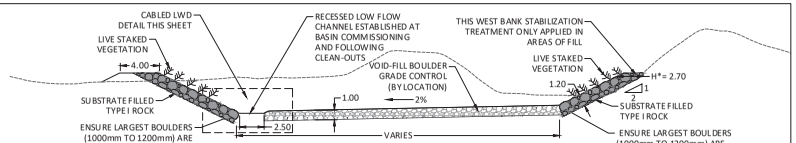
FILENAME: \\nwhfile-svr\Projects\Active\3007814 Deroche Creek Emerg Works\06 CAD\02_Production\100% IDR\3007814 Deroche RS 100%IDR-003.005.dwg, 30 Apr 2024, 03:14 PM



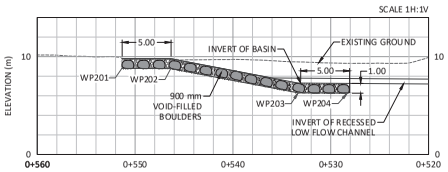
TYPICAL SECTION - BASIN ENTRANCE ARMOUR (SEE SHEET 004)
1:250



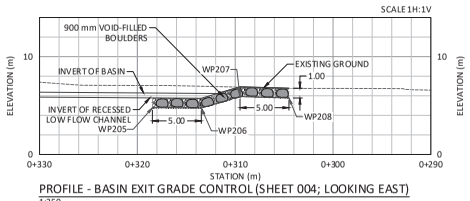
TYPICAL SECTION - BASIN EXIT ARMOUR (SEE SHEET 004)
1:250



TYPICAL SECTION - BASIN (SEE SHEET 004)
1:250



PROFILE - BASIN ENTRANCE GRADE CONTROL (SHEET 004; LOOKING EAST)
1:250



PROFILE - BASIN EXIT GRADE CONTROL (SHEET 004; LOOKING EAST)
1:250

WEST BANK STABILIZATION ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L11	3+000.000	567357.14	5448564.62	157° 30' 27.32"	2.803	
C9	3+002.803	567358.21	5448562.03	149° 56' 14.47"	2.907	11.000
L12	3+005.709	567359.66	5448559.52	142° 22' 01.61"	7.605	
C10	3+013.314	567364.30	5448553.50	153° 08' 19.07"	3.948	10.500
L13	3+017.262	567366.08	5448550.00	163° 54' 36.53"	34.242	
C11	3+051.504	567375.57	5448517.10	158° 44' 00.11"	12.649	70.000
L14	3+064.153	567380.15	5448505.32	153° 33' 23.68"	10.947	
C12	3+075.100	567385.02	5448495.52	156° 43' 38.64"	3.320	30.000
L15	3+078.420	567386.34	5448492.47	159° 53' 53.60"	17.959	
C13	3+096.379	567392.51	5448475.61	169° 55' 09.83"	10.494	30.000
L16	3+106.873	567394.33	5448465.33	179° 56' 26.06"	25.234	
C14	3+132.107	567394.36	5448440.09	167° 11' 53.43"	31.136	70.000
L18	3+163.243	567401.20	5448409.98	154° 27' 20.79"	23.184	
C16	3+186.427	567411.20	5448389.07	151° 03' 18.30"	5.935	50.000
L19	3+192.362	567414.07	5448383.87	147° 39' 15.81"	32.521	
C15	3+224.884	567431.47	5448356.40	152° 15' 55.54"	10.462	65.000
L17	3+235.346	567436.33	5448347.15	156° 52' 35.26"	11.832	

EAST BANK STABILIZATION ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L5	4+000.000	567364.60	5448568.54	148° 11' 05.50"	5.815	
C4	4+005.815	567367.66	5448563.59	154° 10' 14.71"	4.387	20.995
C5	4+017.349	567372.00	5448552.93	143° 10' 38.73"	9.399	15.858
L7	4+026.748	567377.55	5448545.52	126° 11' 53.53"	22.305	
C6	4+049.053	567395.55	5448532.34	139° 21' 17.98"	29.393	64.000
L8	4+078.446	567414.53	5448510.24	152° 30' 42.42"	9.419	
C7	4+087.864	567418.87	5448501.88	163° 16' 57.04"	48.500	129.000
L9	4+136.364	567432.74	5448455.70	174° 03' 11.66"	107.249	
C8	4+243.613	567443.85	5448349.03	170° 38' 17.75"	3.576	30.000
L10	4+247.189	567444.43	5448345.51	167° 13' 23.84"	7.393	

ENTRANCE GRADE CONTROL WORKPOINTS TABLE

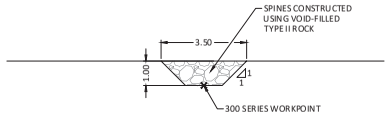
WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP201	567361.22	5448566.68	8.80
WP202	567363.57	5448562.29	8.74
WP203	567369.12	5448550.51	6.30
WP204	567371.06	5448545.87	6.26

EXIT GRADE CONTROL WORKPOINTS TABLE

WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP201	567361.22	5448566.68	8.80
WP202	567363.57	5448562.29	8.74
WP203	567369.12	5448550.51	6.30
WP204	567371.06	5448545.87	6.26

BASIN MAINTENANCE ACCESS ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L2	5+000.000	567436.58	5448357.58	083° 59' 09.03"	9.673	
C2	5+009.673	567446.20	5448358.59	119° 46' 07.66"	9.992	8.000
C1	5+026.784	567457.27	5448347.47	132° 57' 25.88"	44.956	57.000
L1	5+071.740	567489.32	5448317.62	110° 21' 45.47"	18.959	



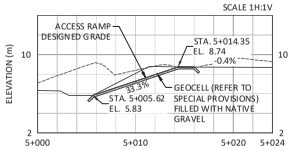
TYPICAL SECTION - GRADE CONTROL SPINE
1:100

GRADE CONTROL SPINE WORKPOINTS TABLE

WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP301	567393.69	5448529.45	6.39
WP302	567375.58	5448517.03	6.83
WP303	567412.07	5448507.78	6.12
WP304	567385.73	5448494.04	6.72
WP305	567424.84	5448478.65	5.90
WP306	567393.90	5448470.28	6.55

GRADE CONTROL SPINE WORKPOINTS TABLE

WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP307	567430.27	5448448.70	5.69
WP308	567394.39	5448444.92	6.41
WP309	567433.83	5448414.20	5.45
WP310	567402.65	5448406.96	6.09
WP311	567436.62	5448383.10	5.36
WP312	567418.34	5448377.21	5.74



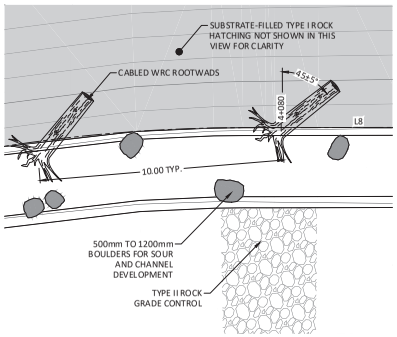
PROFILE - ACCESS RAMP (SHEET 004; LOOKING NORTH)
1:250

WEST BANK STABILIZATION OFFSET/ELEVATION TABLE

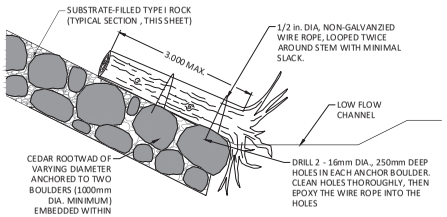
STATION	O/S TO TOE OF CUT	ELEV TOE OF CUT	O/S TO TOP OF CUT	ELEV TOP OF CUT
3+000.000	0.16	8.60	7.53	12.31
3+002.803	0.11	8.60	7.36	12.24
3+005.709	0.13	8.48	7.86	12.16
3+010.000	0.14	7.65	9.60	12.08
3+013.314	0.15	6.99	10.86	11.95
3+017.262	-0.64	6.20	10.85	11.96
3+020.000	-0.84	6.09	10.73	11.90
3+030.000	0.27	6.63	10.39	11.84
3+040.000	0.27	6.63	9.79	11.66
3+050.000	0.27	6.62	9.33	11.41
3+060.000	0.26	6.61	9.19	11.19
3+070.000	0.28	6.56	9.56	11.22
3+080.000	0.28	6.49	9.37	11.08
3+090.000	0.28	6.43	9.00	10.79
3+096.379	0.28	6.37	8.44	10.44
3+100.000	0.31	6.34	8.31	10.35
3+110.000	0.28	6.29	8.07	10.28
3+120.000	0.28	6.24	8.05	10.16
3+130.000	0.28	6.19	7.39	9.77
3+140.000	0.26	6.13	7.32	9.66
3+150.000	0.27	6.05	7.49	9.69
3+160.000	0.21	5.95	7.51	9.66
3+170.000	0.28	5.84	7.41	9.46
3+180.000	0.28	5.75	7.34	9.30
3+190.000	0.28	5.65	7.09	9.13
3+200.000	0.27	5.53	6.94	8.96
3+210.000	0.27	5.42	6.97	8.85
3+220.000	0.28	5.30	7.07	8.77
3+230.000	0.28	5.19	7.34	8.74
3+235.346	-0.91	4.77	6.98	8.72
3+240.000	0.10	5.31	6.72	8.73
3+247.178	0.11	5.77	5.96	8.70

EAST BANK STABILIZATION OFFSET/ELEVATION TABLE

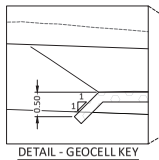
STATION	O/S TO TOE OF CUT	ELEV TOE OF CUT	O/S TO TOP OF CUT	ELEV TOP OF CUT
4+000.000	0.37	8.60	7.77	12.30
4+003.275	0.37	8.60	7.62	12.26
4+007.661	0.37	8.24	8.24	12.15
4+010.000	0.39	7.90	8.78	12.11
4+017.298	-0.41	6.40	10.54	11.97
4+020.000	-0.50	6.09	10.78	11.92
4+026.696	0.46	6.43	10.49	11.86
4+030.000	0.32	6.39	10.09	11.82
4+040.000	0.27	6.25	10.24	11.59
4+050.000	0.21	6.12	10.06	11.37
4+060.000	0.12	6.01	10.43	11.29
4+070.000	0.06	5.92	10.44	11.14
4+080.000	0.21	5.85	10.60	11.05
4+090.000	0.18	5.79	10.50	10.96
4+100.000	0.18	5.71	10.07	10.67
4+110.000	0.21	5.65	9.60	10.34
4+120.000	0.25	5.58	9.63	10.27
4+130.000	0.26	5.52	9.66	10.22
4+136.313	0.22	5.47	9.45	10.08
4+140.000	0.27	5.45	9.37	10.00
4+150.000	0.28	5.38	9.01	9.74
4+160.000	0.28	5.31	8.98	9.66
4+170.000	0.28	5.24	9.17	9.68
4+180.000	0.28	5.17	8.77	9.46
4+190.000	0.28	5.13	8.36	9.26
4+200.000	0.28	5.10	8.10	9.10
4+210.000	0.28	5.08	7.83	8.93
4+220.000	0.28	5.05	7.68	8.83
4+230.000	0.28	5.03	7.58	8.77
4+240.000	0.27	5.00	7.07	8.73
4+243.562	-0.61	4.76	7.16	8.73
4+247.138	0.19	5.16	6.93	8.73
4+250.000	0.35	5.90	5.87	8.67
4+254.531	0.34	5.77	6.17	8.69



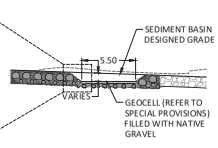
DETAIL - LOW FLOW CHANNEL PLAN
1:100



DETAIL - WRC ROOTWAD
1:50



DETAIL - GEOCELL KEY
1:50



TYPICAL SECTION - ACCESS RAMP (LOOKING WEST)
1:250

GRADATION TABLE

	ROCK DIAMETER (mm)					
	250-KG RIPRAP	500-KG RIPRAP	TYPE I ROCK	TYPE II ROCK	900mm BOULDERS	500mm BOULDERS
D_{100}	1000	1250	1250	750	-	-
D_{85}	830	1050	1050	610	-	-
D_{50}	575	725	725	425	900 (± 100)	500 (± 50)
D_{15}	270	340	550	350	-	-
D_{0}	200	250	450	300	-	-

NOTES:
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
3. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.
4. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
5. FOR ROCK GRADATIONS REFER TO THE TABLE ON THIS SHEET.
6. IN ALL MANNERS EXCEPT FOR GRADATION, ROCK QUALITY SHALL CONFORM TO MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE STANDARD SPECIFICATION 205.

LEGEND
DESIGN GRADE
EXISTING (2023) GROUND
SUBSTRATE FILLED RIPRAP
BOULDER ARMOUR
STANDARD RIPRAP
6-INCH MINUS STREAM GRAVEL

CLIENT:
BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION

nhc northwest hydraulic consultants

SEAL:
PROFESSIONAL ENGINEER D. J. GOULD # 28261 PROVINCE OF BRITISH COLUMBIA
2024-05-04

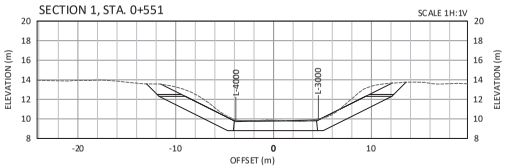
PERMIT TO PRACTICE
NORTHWEST HYDRAULIC CONSULTANTS LTD.
PERMIT NUMBER: 1003221
The Association of Professional Engineers and Geoscientists of British Columbia

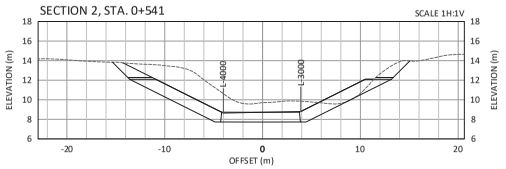
DEROCHE CREEK RECOVERY SOLUTION
REACH 2
TYPICAL SECTIONS AND PROFILE DETAILS

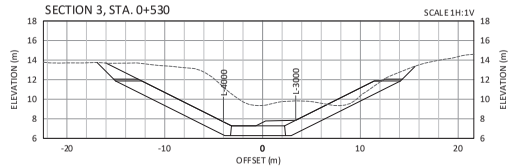
DESIGNED:	DJG	SHEET ID: 3007814-RS-006	SHEET No: 006
DRAFTED:	CZZ	STATUS: ISSUED FOR TENDER	
CHECKED:	DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE: 30 APR 2024	REV No:

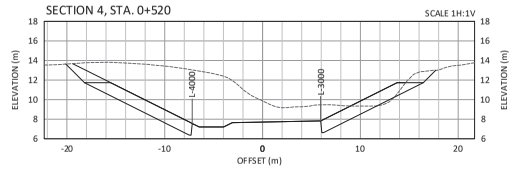
SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

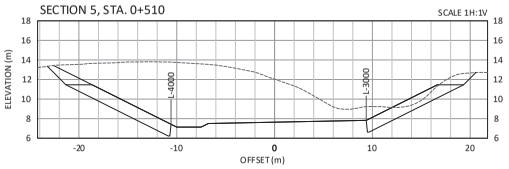
FILENAME: \\nwhfile-van\Projects\Active\3007814 Deroche Creek Energ Works\06 CAD\02_Production\100% ISFI\3007814 Deroche RS 100%ISFI-006.006-007.dwg, 30 Apr 2024, 03:53 PM

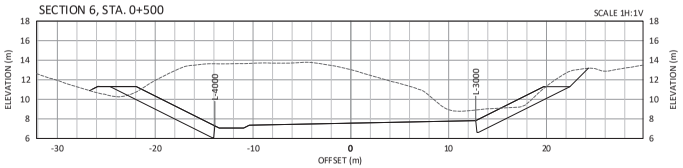


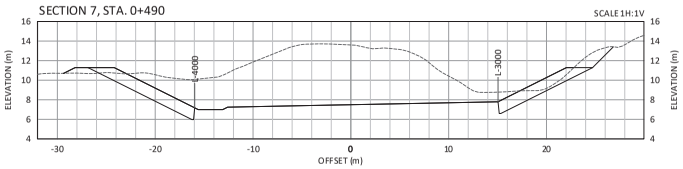


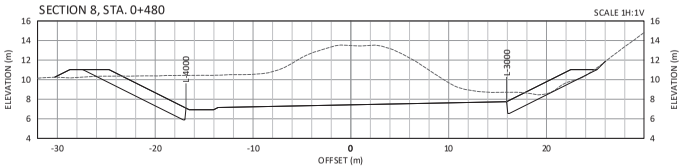


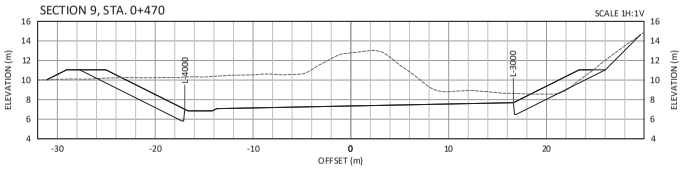


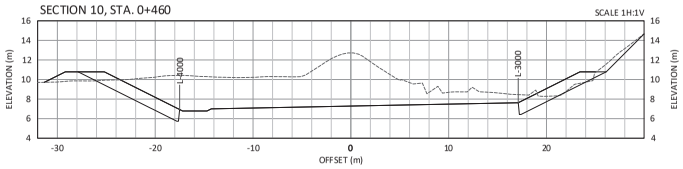


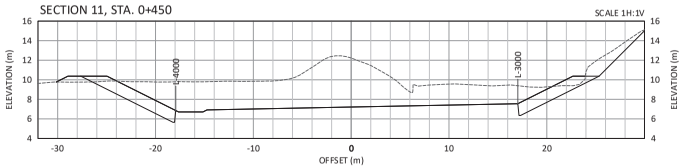


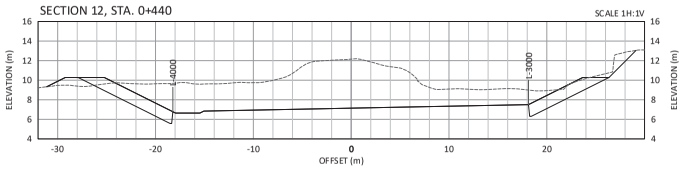


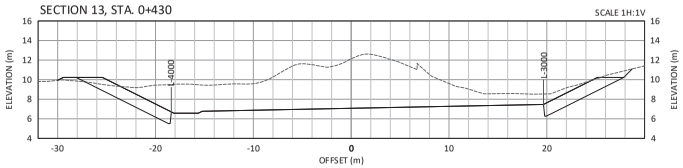


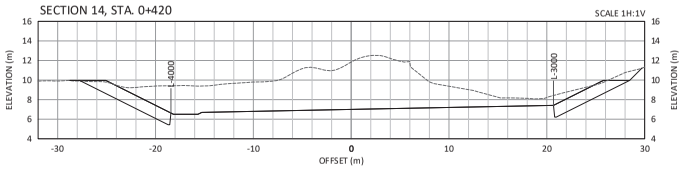


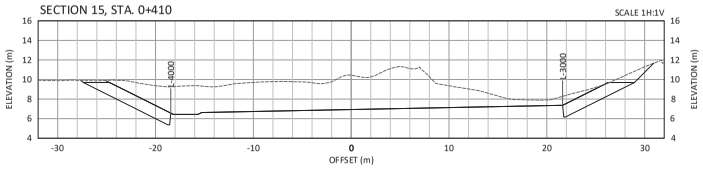












LEGEND

DESIGN GRADE

EXISTING (2023) GROUND

NOTES:

1. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
2. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
3. REFER TO SHEET 006 FOR L-3000 AND L-4000 ALIGNMENT TABLES, AND OFFSET/ ELEVATION TABLES

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION

nhc northwest hydraulic consultants

SEAL:

PROFESSIONAL ENGINEER D. J. GOOLD # 28261 BRITISH COLUMBIA

2024-05-04

PERMIT TO PRACTICE

NORTHWEST HYDRAULIC CONSULTANTS LTD.

PERMIT NUMBER: 1003221

The Association of Professional Engineers and Geoscientists of British Columbia

DEROCHE CREEK RECOVERY SOLUTION

SEDIMENT BASIN

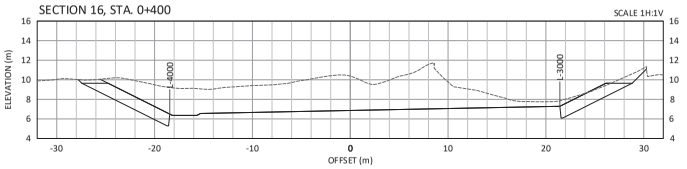
STANDARD SECTIONS

DESIGNED:	DJG	SHEET ID:	3007814-RS-007A	SHEET No:
DRAFTED:	CZZ	STATUS:	ISSUED FOR TENDER	007A
CHECKED:	DJG	SCALE:	AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE:	30 APR 2024	REV No:

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\mainfile-van\Projects\Active\3007814 Deroche Creek Emerg Works\96 CAD\02_Production\100% IDR\3007814 Deroche RS 100%IDR-004,006-007.dwg, 30 Apr 2024, 03:53 PM

SECTION 16, STA. 0+400



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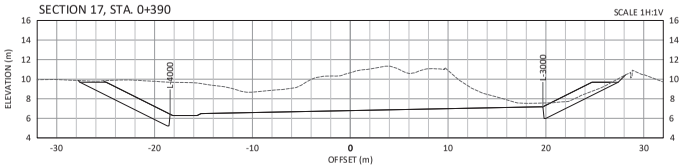

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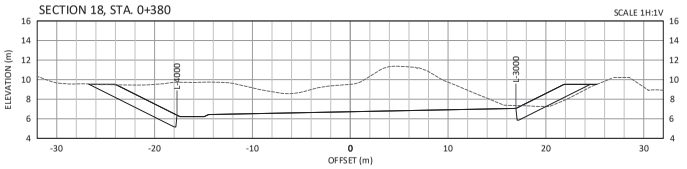

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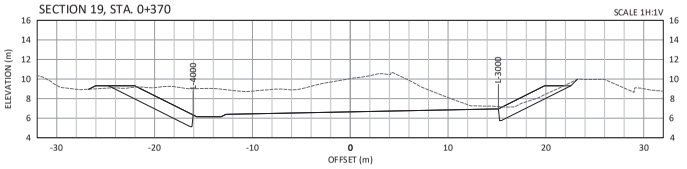

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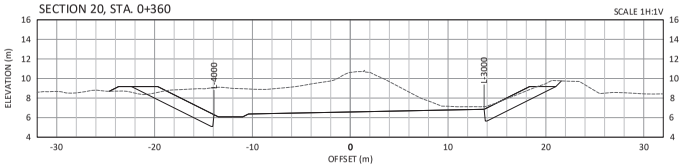
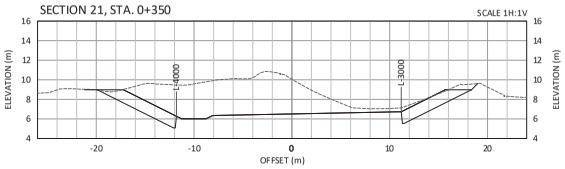


SECTION 21, STA. 0+350



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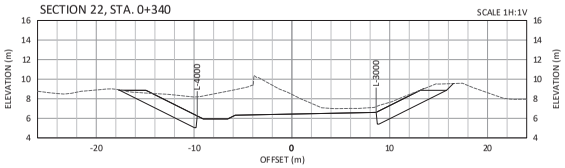

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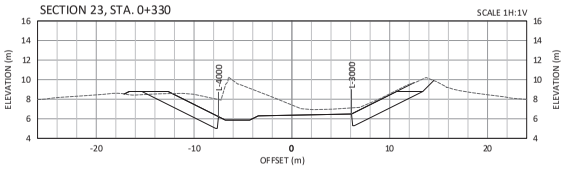

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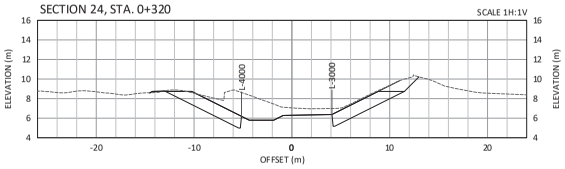

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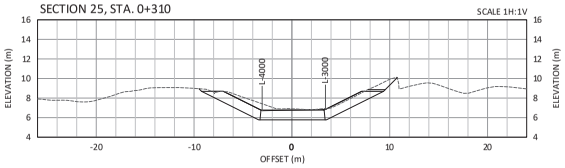
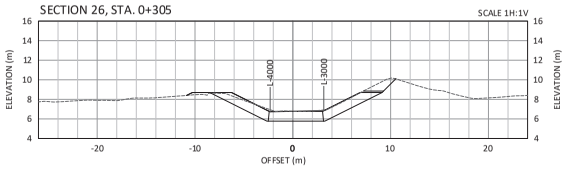


SECTION 26, STA. 0+305



LEGEND

DESIGN GRADE

EXISTING (2023) GROUND

NOTES:

1. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
2. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
3. REFER TO SHEET 006 FOR L-3000 AND L-4000 ALIGNMENT TABLES, AND OFFSET/ ELEVATION TABLES

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION

nhc northwest hydraulic consultants

SEAL:

PROFESSIONAL ENGINEER D. J. GOOLD # 28261 BRITISH COLUMBIA

2024-05-04

PERMIT TO PRACTICE

NORTHWEST HYDRAULIC CONSULTANTS LTD.

PERMIT NUMBER: 1003221

The Association of Professional Engineers and Geoscientists of British Columbia

DEROCHE CREEK RECOVERY SOLUTION

SEDIMENT BASIN

STANDARD SECTIONS

DESIGNED:	DJG	SHEET ID:	3007814-RS-007B	SHEET No:
DRAFTED:	CZZ	STATUS:	ISSUED FOR TENDER	007B
CHECKED:	DJG	SCALE:	AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE:	30 APR 2024	REV No:

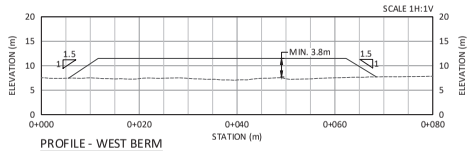
SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\mainfile-van\Projects\Active\3007814 Deroche Creek Emerg Works\96 CAD\02_Production\100% IDR\3007814 Deroche RS 100%IDR-004,006-007.dwg, 30 Apr 2024, 03:53 PM

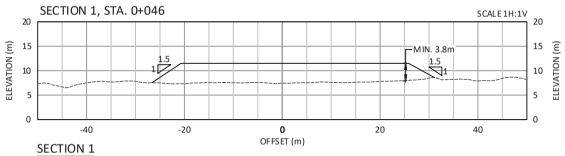


PLAN VIEW - LOT 8-3-3
1:1000

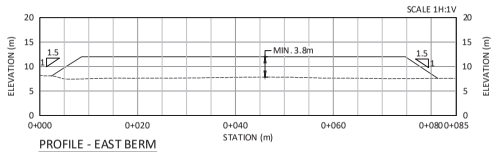
0 10 20 30 40 50m
SCALE = 1:1,000



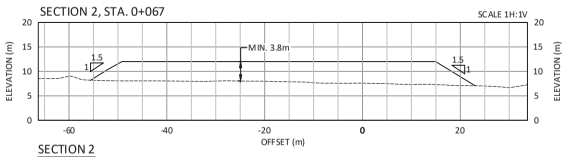
PROFILE - WEST BERM
1:500



SECTION 1
1:500



PROFILE - EAST BERM
1:500



SECTION 2
1:500

LEGEND
DESIGN GRADE
EXISTING (2023) GROUND

CLIENT:
BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION

nhc northwest hydraulic consultants

SEAL:
PROFESSIONAL ENGINEER D. J. GOULD # 29261 PROVINCE OF BRITISH COLUMBIA
2024-05-04

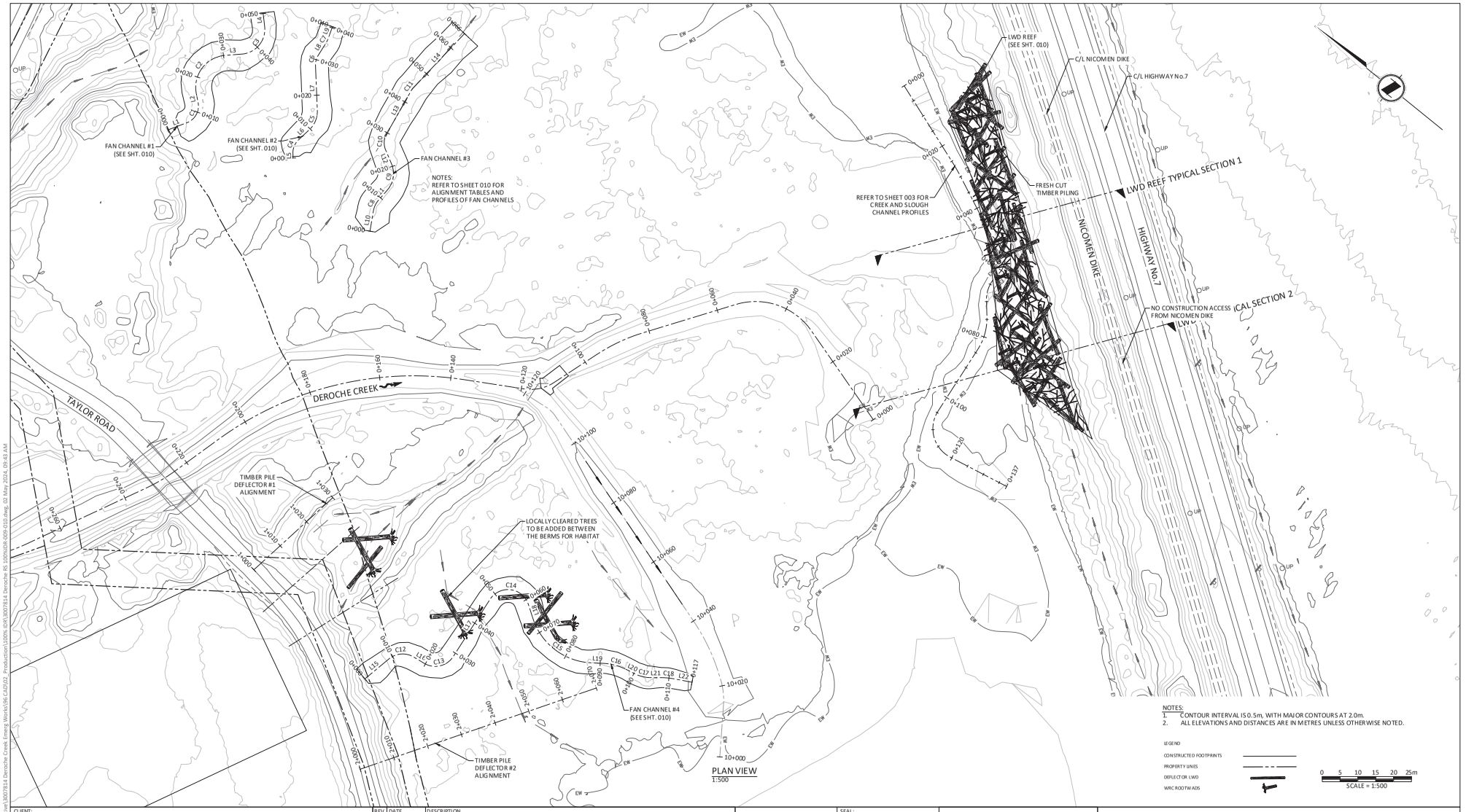
PERMIT TO PRACTICE
NORTHWEST HYDRAULIC CONSULTANTS LTD.
PERMIT NUMBER: 1003221
The Association of Professional Engineers and Geoscientists of British Columbia

DEROCHE CREEK RECOVERY SOLUTION
REACH 2
LOT 8-3-3 GRADING

DESIGNED: DJG	SHEET ID: 3007814-RS-008	SHEET No:	008
DRAFTED: CZZ	STATUS: ISSUED FOR TENDER		
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 3 MAY 2024	REV No:	

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nanlfile-van\Projects\Active\3007814 Deroche Creek Emerg Works\06 CAD\02_Production\100% IDIR\3007814 Deroche RS 100%IDIR-008.dwg, 03 May 2024, 07:38 PM



NOTES:
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.

LEGEND
CONSTRUCTED FOOTPRINTS
PROPERTY LINES
DEFLECTOR LWD
WRC ROOTWADS

0 5 10 15 20 25m
SCALE = 1:500

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION

nhc northwest hydraulic consultants

SEAL:

PROFESSIONAL ENGINEER D. J. GOOLD # 28261 BRITISH COLUMBIA
2024-05-04

PERMIT TO PRACTICE
NORTHWEST HYDRAULIC CONSULTANTS LTD.
PERMIT NUMBER: 1003221
The Association of Professional Engineers and Geoscientists of British Columbia

DEROCHE CREEK RECOVERY SOLUTION
OFF-SETTING WORKS
PLAN

DESIGNED:	DJG	SHEET ID:	3007814-RS-009	SHEET No:
DRAFTED:	CZZ	STATUS:	100% IDR	009
CHECKED:	DJG	SCALE:	AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE:	2 MAY 2024	REV No:

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

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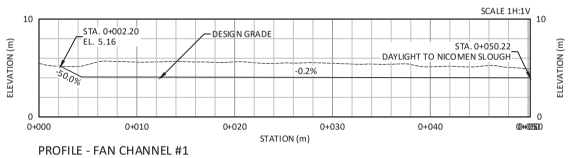
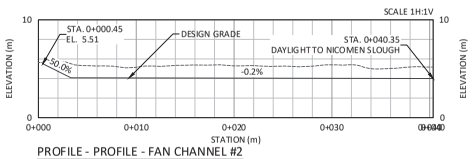
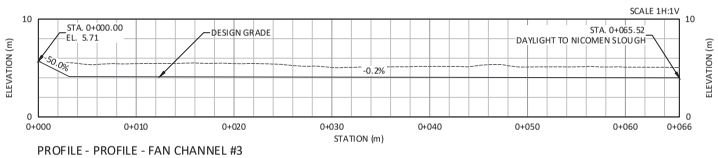


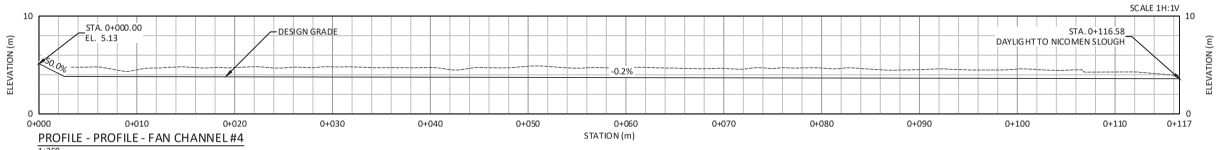
PROFILE - FAN CHANNEL #1
1:250



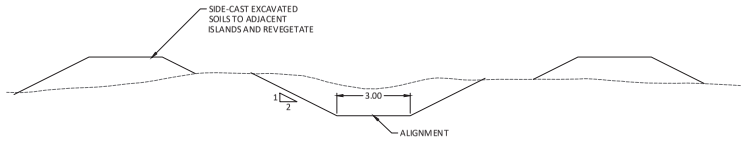
PROFILE - PROFILE - FAN CHANNEL #2
1:250



PROFILE - PROFILE - FAN CHANNEL #3
1:250



PROFILE - PROFILE - FAN CHANNEL #4
1:250



TYPICAL SECTION, FAN CHANNEL 1-4 (SEE SHEET 006)
1:100

FAN CHANNEL 1 ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L1	0+000.000	567581.74	5448355.64	120° 08' 23.70"	5.708	
C1	0+005.708	567586.68	5448352.77	079° 47' 38.43"	7.042	5.000
L2	0+012.750	567593.05	5448353.92	039° 26' 53.15"	2.514	
C2	0+015.264	567594.65	5448355.86	088° 01' 06.32"	15.259	9.000
L3	0+030.522	567608.14	5448356.33	136° 35' 19.49"	4.601	
C3	0+035.123	567611.30	5448352.98	090° 20' 15.26"	11.301	7.000
L4	0+046.425	567621.41	5448352.92	044° 05' 11.03"	3.796	

FAN CHANNEL 2 ALIGNMENT LAYOUT

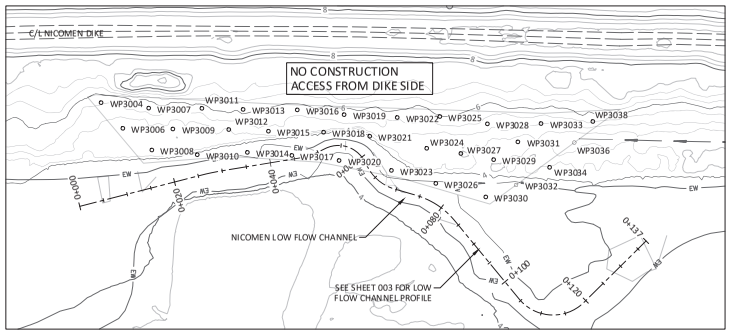
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L5	0+000.000	567597.76	5448323.44	049° 11' 11.75"	1.308	
C4	0+001.308	567598.75	5448324.29	073° 26' 20.84"	4.233	5.000
L6	0+005.541	567602.69	5448325.47	097° 41' 29.92"	4.208	
C5	0+009.749	567606.86	5448324.90	073° 06' 58.60"	6.005	7.000
L7	0+015.754	567612.43	5448326.59	048° 32' 27.27"	12.583	
C6	0+028.337	567621.86	5448334.92	065° 58' 50.42"	3.044	5.000
L8	0+031.381	567624.60	5448336.14	083° 25' 13.57"	3.757	
C7	0+035.137	567628.33	5448336.57	077° 14' 38.75"	1.725	8.000
L9	0+036.862	567630.01	5448336.95	071° 04' 03.94"	3.490	

FAN CHANNEL 3 ALIGNMENT LAYOUT

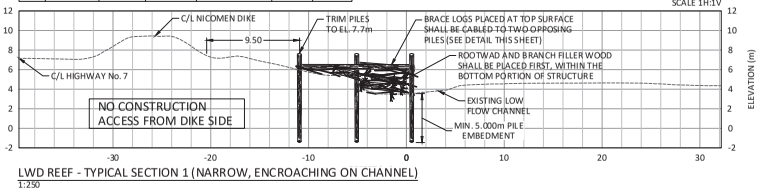
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L10	0+000.000	567595.44	5448293.77	060° 26' 57.00"	5.781	
C8	0+005.781	567600.47	5448296.62	076° 13' 04.29"	3.303	6.000
L11	0+009.083	567603.64	5448297.39	091° 59' 11.59"	3.829	
C9	0+012.912	567607.47	5448297.26	059° 58' 33.88"	7.822	7.000
L12	0+020.734	567613.89	5448300.97	027° 57' 56.17"	4.282	
C10	0+025.016	567615.90	5448304.76	054° 14' 40.76"	4.587	5.000
L13	0+029.603	567619.49	5448307.34	080° 31' 25.34"	13.955	
C11	0+043.558	567633.26	5448309.64	087° 23' 24.85"	1.198	5.000
L14	0+044.756	567634.45	5448309.70	094° 15' 24.36"	20.764	

FAN CHANNEL 4 ALIGNMENT LAYOUT

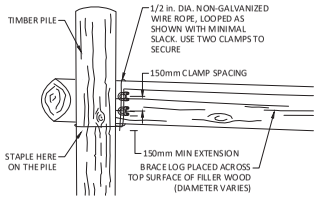
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L15	0+000.000	567497.09	5448215.67	101° 10' 45.55"	8.777	
C12	0+008.777	567505.70	5448213.96	136° 30' 31.15"	7.399	6.000
L16	0+016.176	567510.47	5448208.93	171° 50' 16.75"	3.456	
C13	0+019.632	567510.96	5448205.51	127° 43' 43.89"	9.238	6.000
L17	0+028.870	567517.57	5448200.40	083° 37' 11.03"	19.059	
C14	0+047.930	567536.51	5448202.52	148° 17' 09.33"	13.544	6.000
L18	0+061.473	567542.21	5448193.29	212° 57' 07.62"	4.159	
C15	0+065.632	567539.95	5448189.80	178° 12' 11.59"	21.833	18.000
L19	0+087.466	567540.59	5448169.29	143° 27' 15.55"	3.321	
C16	0+090.786	567542.57	5448166.62	155° 33' 49.34"	6.763	16.000
L20	0+097.550	567545.35	5448160.51	167° 40' 23.13"	2.743	
C17	0+100.292	567545.93	5448157.83	154° 18' 28.02"	4.665	10.000
L21	0+104.957	567547.94	5448153.66	140° 56' 32.91"	2.870	
C18	0+107.827	567549.75	5448151.44	146° 19' 52.20"	3.762	20.000
L22	0+111.589	567551.83	5448148.31	151° 43' 11.49"	4.995	



PILING PLAN - LWD REEF
1:500

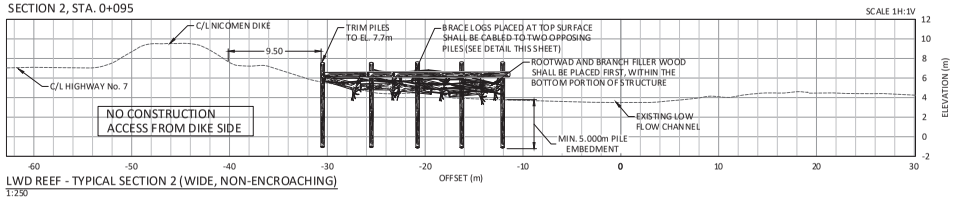


LWD REEF - TYPICAL SECTION 1 (NARROW, ENCROACHING ON CHANNEL)
1:250



BRACE LOG CABLING DETAIL
1:25

SECTION 2, STA. 0+095



LWD REEF - TYPICAL SECTION 2 (WIDE, NON-ENCROACHING)
1:250

LEGEND
DESIGN GRADE
EXISTING (2023) GROUND
DEFLECTOR LWD
WRC ROOTWADS

NOTES:
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
3. CROSS-SECTIONS ARE VIEWED DOWNSTREAM.

PILE LAYOUT TABLE - LWD REEF

PILE #	EASTING (m)	NORTHING (m)
3004	567736.93	5448188.08
3006	567730.10	5448187.21
3007	567730.67	5448180.54
3008	567723.15	5448184.66
3009	567724.39	5448178.72
3010	567717.27	5448177.41
3011	567724.70	5448171.44
3012	567718.06	5448169.20
3013	567719.92	5448164.50
3014	567712.09	5448168.56
3015	567713.36	5448162.59

PILE LAYOUT TABLE - LWD REEF

PILE #	EASTING (m)	NORTHING (m)
3016	567713.80	5448155.27
3017	567706.59	5448161.28
3018	567707.04	5448153.25
3019	567707.75	5448147.78
3020	567700.46	5448153.76
3021	567701.20	5448145.80
3022	567701.35	5448139.00
3023	567692.93	5448145.89
3024	567692.78	5448137.38
3025	567696.75	5448131.58
3026	567685.74	5448139.73

PILE LAYOUT TABLE - LWD REEF

PILE #	EASTING (m)	NORTHING (m)
3027	567688.07	5448132.11
3028	567690.20	5448124.25
3029	567683.37	5448127.17
3030	567677.85	5448132.68
3031	567683.71	5448121.04
3032	567676.53	5448126.14
3033	567684.27	5448115.03
3034	567675.81	5448118.45
3036	567677.29	5448111.45
3038	567678.84	5448105.92

CLIENT:
BRITISH COLUMBIA — Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION

nhc northwest hydraulic consultants

SEAL:
PROFESSIONAL ENGINEER — D. J. GOULD — # 28261 — PROVINCE OF BRITISH COLUMBIA
2024-05-04

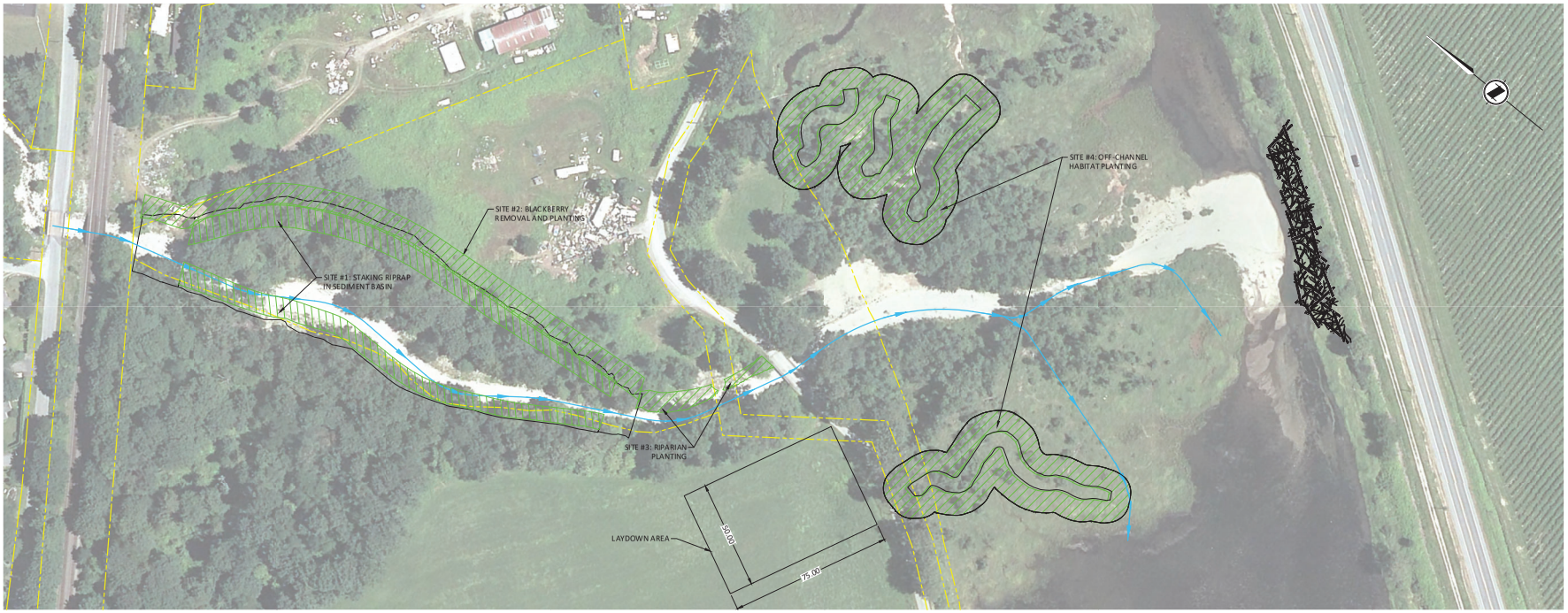
PERMIT TO PRACTICE
NORTHWEST HYDRAULIC CONSULTANTS LTD.
PERMIT NUMBER: 1003221
The Association of Professional Engineers and Geoscientists of British Columbia

DEROCHE CREEK RECOVERY SOLUTION
OFF-SETTING WORKS
TYPICAL SECTIONS AND PROFILE

DESIGNED:	DJG	SHEET ID: 3007814-RS-010	SHEET No: 010
DRAFTED:	CZZ	STATUS: 100% IDR	
CHECKED:	DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE: 2 MAY 2024	REV No:

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nanaimo-van\Projects\Active\3007814 Deroche Creek Emerg Works\06 CAD\02_Production\100% IDR\3007814 Deroche RS 100%IDR-009-010.dwg, 02 May 2024, 09:43 AM



PLANTING PLAN
1:1000

SITE PREPARATION:

1. THE PLANTING AREA SHALL BE CLEARED OF ANY INVASIVE PLANT AND PLANT PARTS, GARBAGE, OR DEBRIS PRIOR TO PLANTING.
2. INVASIVE PLANT MATERIAL SHALL BE REMOVED FROM THE SITE AND DISPOSED OF APPROPRIATELY AT A FACILITY EQUIPPED TO BURY OR BURN INVASIVE PLANT MATERIAL TO PREVENT ITS PROPAGATION.
3. MINIMAL SOIL AMENDMENTS, EARTHWORKS, AND DISTURBANCE ARE RECOMMENDED TO MINIMIZE THE LIKELIHOOD OF COLONIZATION BY INVASIVE PLANTS (I.E., HIMALAYAN BLACKBERRY).

GENERAL RIPARIAN PLANTING NOTES

1. LIVE STAKES, SHRUBS, AND TREES ARE TO BE ARRANGED IN A TRIANGULAR GRID AND SPACED ACCORDING TO THE PLANTING TABLES ON THIS DRAWING.
2. CONFORM TO PLANTING LAYOUT AS SHOWN ON THE PLANTING PLAN. PLANS MAY BE SUBJECT TO CHANGE BASED ON FIELD CONSTRAINTS AND LIMITATIONS. ALL CHANGES MUST BE APPROVED BY THE QEP.
3. CONTAINER STOCK INSTALLATION SHOULD OCCUR DURING THE FALL (SEP-OCT) TO REDUCE WATERING REQUIREMENTS AND IMPROVE SURVIVAL.
4. PLANTS MAY BE FERTILIZED WITH PELLETS OR TEA-BAG TYPE FERTILIZERS HIGH IN NITROGEN AND PHOSPHATE TO ENCOURAGE GROWTH. THIS CAN BE DONE BY PLACING FERTILIZER IN THE BASE OF THE HOLE BEFORE PLANT INSTALLATION.
5. CAREFULLY REMOVE PLANTS FROM CONTAINERS WITHOUT INJURING THE ROOT BALLS, ROOT BOUND STOCK SHOULD BE GENTLY AGITATED TO ENSURE THE ROOTS ARE PLACED IN THEIR NATURAL GROWING POSITION. GENTLY FIRM THE GROWING MEDIUM AROUND THE ROOT SYSTEM AND SETTLE THE SOIL WITH WATER AFTER PLANTING.
6. PLANTING AREAS AND LAYDOWN AREAS SHALL BE SEEDED WITH FALL RYE AT A DENSITY OF 50 KG/HA.

LIVE STAKE INSTALLATION

1. LIVE STAKES SHOULD BE INSERTED SO THAT THE NATURAL ORIENTATION OF THE CUTTING IS PRESERVED. THAT IS, THE OLDER PORTION OF THE PLANT SHOULD BE INSERTED INTO THE GROUND AND THE YOUNGER PORTION SHOULD BE EXPOSED. THE BOTTOM OF THE CUTTING SHOULD BE IDENTIFIABLE BY A 45° TAPER AND THE TOP SHALL BE FLAT. LIVE STAKES SHOULD BE INSTALLED PERPENDICULAR TO THE SURFACE.
2. RATHER THAN DIGGING A HOLE FOR THE CUTTINGS, PUSH CUTTINGS INTO THE SOIL TO A DEPTH EQUAL TO APPROXIMATELY 70% OF THEIR LENGTH.
3. IF THE SOIL IS TOO FIRM TO PUSH THE CUTTING INTO THE SOIL, A PILOT HOLE CAN BE FORMED FIRST USING A MALLET AND METAL ROD OR AN AUGER. THEN THE CUTTING CAN BE PLACED INTO THE HOLE. THE HOLE DIAMETER SHALL BE SMALLER THAN THE CUTTING DIAMETER TO PREVENT AIR POCKET FORMATION.
4. AT LEAST 50 MM AND NOT MORE THAN 100 MM OF THE LIVE STAKE SHOULD BE EXPOSED.
5. AVOID DAMAGING BUDS WHEN INSERTING OR DRIVING THE CUTTING INTO THE GROUND.
6. IF THE CUTTING IS SPLIT WHILE DRIVING, TRIM THE CUTTING BELOW THE SPLIT TO PREVENT DESICCATION AND PLANT MORTALITY.
7. THERE MUST BE FIRM CONTACT BETWEEN THE CUTTING AND THE SOIL. AVOID CREATING AIR POCKETS AROUND THE CUTTING THAT CAN PREVENT ROOTS FROM DEVELOPING. TAMP THE SOIL AROUND THE CUTTING TO FILL IN ANY AIR POCKETS.
8. WATER THE CUTTING IMMEDIATELY AFTER PLANTING, AND DAILY DURING THE INSTALLATION PHASE.

PLANT MATERIALS

1. NURSERIES MUST BE SELECTED IN ADVANCE OF PLANTING. PLANT VOLUMES SHOULD BE ORDERED AS SOON AS POSSIBLE, TO ENSURE ADEQUATE QUALITY STOCK AND SEED IS AVAILABLE AND/OR HARDENED OFF PRIOR TO PLANTING. THIS WILL HELP MEET THE SURVIVORSHIP REQUIREMENTS IN THE PLANT WARRANTY BELOW.
2. ALL PLANT MATERIAL SHALL CONFORM TO BCSLA/BCNLA LANDSCAPE STANDARD.
3. PLANT MATERIAL SHALL BE INSPECTED BY A QUALIFIED ENVIRONMENTAL PROFESSIONAL (QEP) FOR QUALITY AND HEALTH AND MUST BE APPROVED PRIOR TO INSTALLATION.
4. NO SUBSTITUTIONS OF PLANT MATERIALS WITHOUT APPROVAL FROM A QEP.
5. NURSERY STOCK SHOULD BE NATIVE TO THE LOCAL AREA (NO NON-NATIVE CULTIVARS) AND, WHERE AVAILABLE, OF GUARANTEED NURSERY STOCK. PURCHASED PLANT STOCK SHOULD BE A MINIMUM OF TWO YEARS OLD (EXCEPT FOR LIVE STAKES).
6. PLANTS SHOULD HAVE A WELL-DEVELOPED ROOT STRUCTURE AND A HIGH ROOT-TO-SHOOT RATIO.
7. IMPLEMENTATION MONITORING WILL OCCUR IMMEDIATELY AFTER COMPLETION OF WORKS, WILL BE CONDUCTED BY KWL, AND WILL ASSESS THE FOLLOWING COMPONENTS:
   a. GENERAL SITE CONDITIONS:
      I. TOTAL AREA PLANTED,
      II. MATERIALS USED (I.E., TYPE AND SIZE),
      III. IS THERE GARBAGE, REMNANT CONSTRUCTION MATERIALS, OR ANY OTHER DEBRIS ON THE PROJECT SITE?
   b. VEGETATION:
      I. DOES THE PLANTING MATCH THE PLANTING PLAN? APPROPRIATE NUMBER OF PLANTS, SIZE, AND CONDITION OF PLANTED STOCK, SPECIES, AND SPACING?
      II. IS THERE A PLAN IN PLACE FOR ONGOING INVASIVE PLANT MANAGEMENT, ESPECIALLY OVER THE FIRST GROWING SEASON.

WATERING

1. PLANTED MATERIAL SHALL BE WATERED AS NEEDED TO PROMOTE ESTABLISHMENT DURING THE FIRST FORTY-FIVE (45) DAYS FOLLOWING INSTALLATION AND THROUGHOUT THE GROWING SEASONS (MAY 1 - OCT 15) FOR THE TWO (2) YEAR GUARANTEE PERIOD TO PREVENT PLANTS FROM DRYING OUT DURING PERIODS OF INFREQUENT PRECIPITATION.
2. WATER MAY BE SPRAYED FROM A WATER TRUCK OR DISTRIBUTED USING TEMPORARY IRRIGATION LINES. PLANTS MUST BE WATERED AT A VOLUME AND FREQUENCY WHICH WILL SUPPORT DEEP ROOT GROWTH FOLLOWING THESE CRITERIA:
   c. FOLLOWING WATERING, PROBE THE SOIL TO ENSURE WATER PENETRATES TO A DEPTH OF 50 CM.
   d. ADJUST WATERING VOLUME TO ENSURE WATER IS PERCOLATING TO APPROPRIATE DEPTH.
3. 3 DAYS AFTER WATERING AND AGAIN EVERY 3 DAYS, PROBE SOIL TO DETERMINE MOISTURE CONTENT AT 50 CM DEPTH.
4. MAINTAIN A WATERING FREQUENCY WHICH KEEPS SOIL MOIST TO A DEPTH OF 50 CM.
5. PLANTED CONIFER TREES SHOULD BE EQUIPPED WITH WATER BAGS FOR AT LEAST THE FIRST TWO GROWING SEASONS TO INCREASE THE LIKELIHOOD OF SURVIVAL.
6. IF TEMPORARY IRRIGATION LINES ARE USED, ALL IRRIGATION MATERIALS MUST BE REMOVED FROM SITE AFTER THE SECOND GROWING SEASON.

INVASIVE PLANT MANAGEMENT DURING CONSTRUCTION

1. A QEP TRAINED IN THE IDENTIFICATION OF INVASIVE PLANTS FOUND WITHIN THE LOWER MAINLAND OF BRITISH COLUMBIA WILL MONITOR PLANTING ACTIVITIES TO HELP THE CONTRACTOR PREVENT THE INTRODUCTION OF AND THE SPREAD OF INVASIVE PLANTS AT THE SITE.
2. ALL MACHINERY AND HAND TOOLS WILL BE CLEAN, RECENTLY WASHED, AND FREE OF WEED SEEDS OR PLANT MATERIAL UPON ARRIVAL TO SITE.
3. THE CONTRACTOR WILL ENSURE THAT PLANTING ACTIVITIES DO NOT INADVERTENTLY INTRODUCE INVASIVE SPECIES TO THE SITE.
4. THE CONTRACTOR WILL WORK CLOSELY WITH THE BCMOECCS TO ENSURE EARLY DETECTION AND TREATMENT OF INVASIVE SPECIES ON SITE.

PLANT WARRANTY

1. THE CONTRACTOR SHALL PROPOSE A MAINTENANCE SCHEDULE TO THE BCMOECCS. THIS MAY INCLUDE BUT NOT BE LIMITED TO INVASIVE SPECIES MANAGEMENT, SEASONAL WATERING, REPLACEMENT PLANTING.
2. PLANTS SHOULD HAVE MINIMUM 80% SURVIVAL FOR TREES AND SHRUBS AFTER THE FIRST TWO YEARS AFTER PLANTING. LIVE STAKES SHOULD HAVE SUFFICIENT SURVIVORSHIP TO DENSIFY THE UNDERSTOREY.
3. PLANTINGS SHOULD ACHIEVE 65% COVER BY THE THIRD YEAR AFTER PLANTING.
4. PLANT SURVIVAL WILL BE ASSESSED BY A QUALIFIED ENVIRONMENTAL PROFESSIONAL (QEP) IN ACCORDANCE WITH THE FOLLOWING:
   a. NATIVE VEGETATION COVER
   b. RELATIVE COVER OF NATIVE PLANTS COMPARED TO INVASIVE PLANTS.
5. THE CONTRACTOR IS RESPONSIBLE FOR MEETING THE WARRANTY REQUIREMENTS ABOVE AND PROVIDING ADDITIONAL PLANTING IF NECESSARY.

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV	DATE	DESCRIPTION

SEAL:

COLLEGE OF APPLIED BIOLOGISTS — Janice Kwo — RPBio 3279 — CAB

DEROCHE CREEK RECOVERY SOLUTION

PLANTING PLAN

DESIGNED:	JK	SHEET ID: 3007814-RS-011	SHEET No: 011
DRAFTED:	TR	STATUS: ISSUED FOR TENDER	
CHECKED:	JK	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	PL	DATE: 2 MAY 2024	REV No:

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\main\file-ver\Projects\Active\3007814 Deroche Creek Energ Works\06 CAD\02_Production\100% ISFI\3007814 Deroche RS 100%ISFI-011.dwg, 02 May 2024, 08:10 AM

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Appendix D

Archeological Report

KERR WOOD LEIDAL ASSOCIATES LTD.
consulting engineers

Leq’á:mel First Nation Permit Report
Archaeological Assessment Deroche Creek, Phase 1

(LFNIUP# 2023-003, October 2, 2023)

Prepared for: Stephen McGlenn Leq’á:mel First Nation Lands Department.
Des Goold (NHC) Northwest Hydraulic Consultants, Project Permittee.

Prepared by: Gordon Mohs, M.A., Summit Earthworks Inc. Sr. Archaeologist, First Nations Community & Business Relations.

October 31, 2023

Subject: Permit Report, Archaeological Assessment Deroche Creek, Phase 1, Leq'á:mel First Nation Permit LFNIUP# 2023-003, October 2, 2023.

Date: October 31, 2023

Attention: Stephen McGlenn (stephen@leqamel.ca), Leq'á:mel First Nation Lands Department.
Des Goold (DGoold@nhcweb.com) NHC Northwest Hydraulic Consultants, Project Permittee.

Prepared by: Gordon Mohs, M.A., Summit Earthworks Inc. Sr. Archaeologist, First Nations Community & Business Relations.

EXECUTIVE SUMMARY

Phase 1 Archaeological Investigations are now complete at Lakahahmen IR 11 on the left bank of Deroche Creek within the site of a proposed Sediment Basin. A one (1) hectare area was closely inspected for surface archaeological deposits, after the site area was cleared of surface vegetation. No trees were disturbed and no archaeological excavations occurred. Brush clearing and grubbing occurred to a maximum depth of @ 25cm.

Following 5.5 days of investigations, nothing of an archaeological nature was found within the boundaries of the proposed Sediment Basin, with the possible exception of a small (2x3 inch/5x7.5cm), flat, chipped, river pebble found near the centre of the proposed sediment basin. The chipped pebble is not identified as an archaeological artifact as there is no evidence of use-wear or microdenticulation on the piece. The flake scars at either end of the chipped pebble could have occurred from natural causes. At the same time, the pebble itself is likely a 'manuport' to the site (something carried to the site from somewhere else), as the stone is uncharactistic of all other stones observed at the site.

Three small, glassy-basalt, waterworn artifacts were recovered from the creekbed of Deroche Creek near the northern end of the proposed sediment basin. They are not associated with the site and were likely carried downstream from a location much further up Deroche Creek. The presence of these 3 artifacts is proof of indigenous land-use and occupancy of Deroche Creek and the area in general.

A 'mound' spotted within the densely covered blackberry underbrush of the Sediment Basin area in the spring of 2023, was initially considered a possible 'ancestral burial mound'. Ancestral burial mounds dating between 1,400 – 1,600 years ago are common throughout the region, with many occurring within a 10km radius. Upon brushing and clearing, the mound feature was identified as a mound of glacial/river till deposits, probably associated with construction of the original dike containing Deroche Creek. Altogether, three mounds of this nature were identified, all within the southern third of the of the proposed Sediment Basin.

The southern third of the proposed Sediment Basin is characterized by very minimal soil (humus) cover and significant amounts of historic garbage. One notable historic artifact, a horse-drawn plow, was identified and recovered, at the request of LFN resident Rick McKamey (Willow Creek Environmental Services, Environmental Programs Manager), who identified the plow as belonging to his grandmother. Historically, she owned the farm immediately east of the site area. In addition to the plow, an historic 'dog burial' was identified by LFN Guardian Erik Still at the base of a large cedar tree near Spillway Marker (0+360). Mr. McKamey confirmed Mr. Still's assessment and suggested the dog burial be removed and transported to an adjacent site immediately east of the Sediment Basin.

In summary, further monitoring is recommended during future (Phase 2) excavation works associated with the Sediment Basin.

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SEDIMENT BASIN BACKGROUND

The proposed Sediment Basin at Deroche Creek is envisioned as a Long-Term Solution to major flooding episodes and excessive sediment deposition, associated with extreme weather events in the Lower Mainland Region. Emergency sediment removals took place in the fall of 2022, at the request of Leq'á:mel First Nation and the BC Ministry of Environment and Climate Change Strategy. Summit Earthworks (Summit) was prime contractor for this emergency work through its Joint Venture partnership with Leq'á:mel First Nation (LDLP-SEW JV). Summit responded immediately to requests to mitigate the damage caused to Deroche Creek associated with the atmospheric river weather storms that occurred in the fall of 2021. The 2022 Emergency Sediment Removal Project involved clearing and grubbing along Deroche Creek, the creation of two access points north and south of the Deroche Creek Bridge on Taylor Road; embankment repairs within Deroche Creek, and the in-stream removal of massive amounts of flood-deposited fill from Deroche Creek to enable Chum Salmon migration and spawning within Deroche Creek; Chum Salmon were in Nicomen Slough waiting to spawn while Project Works were taking place. The Deroche Creek Emergency Sediment Removal Project was very successful and resulted in Summit Earthworks & Leq'á:mel First Nation being awarded the 2022 (EMA) Environmental Managers Association of BC prestigious Environmental Remediation Project of the Year Award (Figure 1). The proposed sediment basin covers an area of approximately one (1) hectare and is designed to be excavated to a depth between 3 and 6 meters below the existing floodplain level. Design plans for the sediment basin are near completion (Figure 4). The purpose of the sediment basin is to allow the capture of sediments during flood events, thereby limiting the volume of sediments reaching Nicomen Slough, a major salmon spawning habitat.

ARCHAEOLOGICAL PROJECT SUMMARY

This Project Permit Report describes Phase 1 Archaeological Investigations at Lakahahmen IR 11 associated with the construction of the proposed Sediment Basin bordering Deroche Creek located between Taylor Road and North Nicomen Road along the east side of Deroche Creek (Figures 2 & 3). The sediment basin is key component of the Long-Term Solution to manage sediment deposition in Deroche Creek, designed under the guidance of Northwest Hydraulic Consultants Ltd. (Design Consultant) and Kerr Wood Leidal Consultants Ltd. (Environmental and Construction Management Consultant).

As this Project occurred on Lakahahmen IR 11 (First Nation Reserve Lands), a Provincial Permit was not required. However, a comprehensive Heritage Investigation Permit was applied for—and obtained—from Leq'á:mel First Nation (Appendix 1). In addition to the LFN Investigation Permit, a comprehensive Chance Find Procedure (Appendix 2) was developed for the LFN Lands Department, prior to Archaeological Investigations commencing. A training/orientation program (Appendix 3) was also developed for LFN Guardians/Technicians (and all Project equipment operators) to familiarize them with the LFN Permitting process, Chance Find Procedure requirements, and proposed investigations at the site. Supporting materials for this training included a comprehensive PowerPoint presentation, hands-on familiarization with real artifacts, an on-site orientation, and familiarization with Summit Earthworks Safety Protocols for all individuals working at the site, which included a Site Specific Health & Safety Binder.

ARCHAEOLOGICAL ASSESSMENT OVERVIEW

Summit Earthworks' resident archaeologist, Gordon Mohs, M.A., participated in two preliminary field inspections at Deroche Creek in March and April of 2023. Following these visitations and his observations, Mohs recommended to the Deroche Creek Task Force Committee that the area of the proposed Sediment Basin be thoroughly examined for archaeological/cultural remains, prior to excavation of the basin proper, and that all excavation works be monitored throughout construction. He ascertained a moderate to high probability of archaeological/cultural remains occurring within the area, based on his field observations and background knowledge of the area (detailed comments below). In

this regard, he recommended a 2-Phase Assessment Plan, including the development of a comprehensive Chance Find Procedure (CFP) and Monitoring Plan & Training Program involving Leq'á:mel First Nation Field Technicians.

In addition to the Sediment Basin, it should be noted there are other proposed features associated with this Project, including two Deflection Berms southwest of the Taylor Road Bridge, protection of a Cemetery Berm southeast of the CP/Kansas City Rail Bridge which crosses Deroche Creek on North Nicomen Road, and additional bank stabilization activities. Based on preliminary field inspections, Mohs assessed these activities as having limited surface impact disturbances, as the focus is to be on 'capping' construction activities. Archaeological Monitoring of these areas is, however, recommended to occur as part of the overall heritage resources assessment.

In summary, Cultural Heritage Resources/Archaeological Monitoring of the eastern floodplain of Deroche Creek was the core activity recommended for the Sediment Basin Project, proposed to occur in 2 Phases to coincide with the construction activities:

1) **Phase 1**: A preliminary archaeological investigation to ascertain the presence of any surface cultural/ archaeological features/deposits within the proposed Sediment Basin area, with brush (notably blackberries) and other forest understory cleared by a size 60 excavator to allow a comprehensive inspection of the site area.

2) **Phase 2**: A more comprehensive Monitoring program to occur during deep excavation activities of the proposed Sediment Basin.

Each of these Phases is described in further detail below.

1) Phase 1: Archaeological Assessment Supported by Light Clearing: STATUS = COMPLETE.

Phase 1 Archaeological Investigations are now complete. Investigations involved detailed surface inspections of the proposed sediment basin area east of Deroche Creek within a forested area. Brush and other forest understory was cleared and grubbed to a maximum depth of 25cm by a size 60 excavator to allow inspection.

Phase 1 Archaeological investigations occurred between October 3 – 12, 2023, led by Gordon Mohs M.A., resident archaeologist at Summit Earthworks Inc. (Sub-Contractor to NHC) with key support of Leq'á:mel First Nation (LFN) Lands Department Guardians/Field Technicians: Erik Still, Megan Friesen, and Melissa Friesen.

- 5.5 days were required to complete detailed archaeological investigations.
- Field Investigations activities involved clearing the understory, primarily a heavy cover of blackberries, with a size 60 excavator.
    - No trees greater than 4-inches diameter were removed.
- Comprehensive Archaeological monitoring activities were conducted by a 3-person crew comprised of Archaeologist Gordon Mohs and two Archaeological Technicians/Guardians from Leq'á:mel FN Lands Department. Monitoring Procedures were set out in an Archaeological Chance Find Procedures document, developed as part of this project.

Observations associated with Field Inspections are described in detail below.

2) **Phase 2 Archaeological Monitoring: to Occur During Construction of the Sediment Basin & Berms in Spring/Summer of 2024**

Phase 2 Archaeological Monitoring is to involve detailed inspections of excavation activities associated with the Sediment Basin and Berm construction (Phase 1 & Phase 2 Works) during the construction/excavation stage. It is anticipated that limited materials of a cultural/archaeological nature will be found during this phase of the Monitoring process, except for excavations associated with the Sediment Basin, within the first meter or so of the surface.

- Estimated duration 16 weeks.
- Phase 2 archaeological monitoring is to take place during construction, which is proposed between June - September 2024.
- The focus of Phase 2 is monitoring the removal of subsurface deposits and disturbance of surface deposit by excavator.
- LFN Permit Regulations & Chance Find Procedures will apply during project works.
- As with surface monitoring, inspections during this phase will be conducted by a crew of Summit Earthworks Sr. Archaeologist, Gordon Mohs, and two Leq'á:mel First Nation Guardians/Archaeological Technicians.

CULTURAL BACKGROUND INFORMATION

Cultural background information was important in making archaeological assessments for this Project.

Lakahahmen IR 11: Place Name & Gathering Place

Lakahahmen IR 11 (Leq'á:mel) comprises the eastern part of the historic 1864 'Tlatwaas' (aka Tlat-whas, Klat-waas, Clatwass) Douglas Reserve. Although this Reserve no longer exists, the eastern portion was designated Lakahahmen IR 11.

In 1977, Sto:lo Linguist Brent Galloway recorded ….

> "*IR No. 11 is called "Lakahahmen." "The word for this place means "level place". It was an important gathering place for parties, dances, sports days, feasts, and other occasions. Another meaning is based on this use. The word "la:leq'el" means "visiting one another", and deals with a place where people go to have a big visit (from Elders meeting July 13, 1977)*".

Longhouse

There is evidence that there used to be an old longhouse in the general area, as described to Gordon Mohs by Leq'á:mel Elder Sam Kelly, December 2nd, 1997. One of Sam's stories was about the old longhouse near to where the Big E Restaurant on Taylor Road is now located. Sam said that there used to be a big longhouse here that stretched downriver along the slough about 400 feet and that Jeff Paul's house sits on top of part of it. Sam said he remembered pulling out an old house post when he was younger and that the house post was over 2 feet in diameter. He also said the area has since been ploughed and bulldozed. Sam commented on how the house was constructed and organized. He described it as a shed-type longhouse that ran parallel to Nicomen Slough along Taylor Road. He said that family compartments stretched all along the back wall of the house; the whole front half running along the slough was the common area. Here is where the people did their dancing and where half-a-dozen or more fires were located. Sam said that the broken rock from the fires stretched in an elongated mound along the whole back of the house and that most of this had been leveled out over the years.

Burial Mounds

A major component of archaeological sites in the immediate and regional area are burial mounds, several of which were identified and excavated by Anthropologist/Archaeologist Charles Hill-Tout at Hatzic and at Harrison Mills at the turn of the century (late 1800s – early 1900s). Further excavations of burial mounds occurred in the 1990s. These burial mounds

were located on the right bank of the Harrison River at its confluence with the Fraser River and involved teams of archaeologists from the University of British Columbia and Simon Fraser University. These mounds date to about 1,400 years ago and are very complex burial structures for important tribal ancestors, rich in grave inclusions and elaborate burial features. Examples are showcased in Appendix 2 of the Chance Find Procedure.

PRIMARY OBSERVATIONS AT SEDIMENT BASIN SITE

At Lakahahmen IR 11, within or in close proximity to the proposed Sediment Basin, is a relatively large mound, observed Thursday, March 9, 2023, during a site visitation by Summit's resident archaeologist, Gordon Mohs. At the time, Mohs noted that he was uncertain if this mound was a cultural feature, a natural feature, or a more recent historic feature within the development zone. He also noted that it was impossible to get anywhere near the mound during the March site visitation, as the entire area is heavily overgrown with blackberries.

CHANCE FIND PROCEDURES

Chace Find Procedures for Archaeological investigations were developed by Gordon Mohs in August 2023 (Appendix 2). LFN First Nation Guardians/Field Technicians and Summit's Excavator Operator were oriented to CFP procedures, related documents, maps, and diagrams at the LFN Lands Department office October 4th, 2023 (See Appendix 3 for more information).

POTENTIAL FOR DISCOVERY

The potential for discovery of archaeological deposits was originally assessed as 'Moderate to High', but has subsequently been revised to 'moderate' status, based on current archaeological investigations. In this regard, it should not be overlooked that artifacts were identified within Deroche Creek, that there are significant cultural traditions associated with Deroche Creek, that Deroche Creek is a salmon-bearing creek, that there is an LFN cemetery located in close proximity, at the up-creek boundary of the proposed sediment basin, that historically there was a former longhouse located nearby the outlet of Deroche Creek, and that 'Lakahahmen' was a noted gathering place utilized by the Leq'á:mel peoples and their neighbours in pre-contact and early contact times.

OBSERVATIONS ASSOCIATED WITH 2023 FIELD INSPECTIONS

Phase 1 Archaeological Investigations at Lakahahmen IR 11 on the left bank of Deroche Creek, associated with a proposed 1-hectare Sediment Basin, between the Taylor Road Bridge and the North Nicomen Road Bridge, are now complete. Following 5.5 days of investigations, between October 4-12, 2023, nothing of an archaeological nature was found in the area, with the possible exception of a small (2x3 inch/5x7.5cm), flat, chipped, river pebble found near the centre of the proposed Sediment Basin (Photo 12). The chipped pebble is not identified as an archaeological artifact as there is no evidence of use-wear or microdenticulation on the piece. The flake scars at either end of the pebble could be from natural causes (e.g., dropping, river tumble, machine fracture). However, it should be noted that the pebble itself is likely a 'manuport' to the site (something carried to the site from somewhere else), as it is uncharactistic of all other stones (glacial till/river till deposits) observed at the site.

Three small, glassy-basalt, waterworn artifacts were recovered from the creekbed of Deroche Creek near the northern end of the proposed sediment basin (Photos 11a, 11b, 11c). They are not associated with the site and were likely carried downstream from a location further up Deroche Creek. While not associated with the Sediment Basin, the presence of these 3 artifacts is proof of indigenous land-use and occupancy of Deroche Creek and the general area.

A ‘mound’ was spotted within the densely covered blackberry underbrush of the Sediment Basin in the spring of 2023, and was initially considered a possible ‘ancestral burial mound’ by Archaeologist Gordon Mohs. Ancestral burial mounds dating between 1,400 – 1,600 years ago are common throughout the region, with many recorded within a 10 km radius of Lakahahmen IR 11 (Photos 9, 10 and CFP pp 15-16). Upon brushing and clearing of the extensive blackberry brush cover, three mound features were identified, all characterized as glacial till deposits, possibly associated with construction of the original dike containing Deroche Creek. All 3 mounds were identified within the southern third of the of the proposed Sediment Basin.

To the north of the gravel mounds, north of Spillway Marker (0+380), soils are characterized by a thin to moderate humus layer (10 – 30 cm thick), underlain by a yellow, sandy-gravel layer or silty-loam. Within this area, one notable historic artifact, a horse-drawn plow (Photo 13), was identified and recovered. LFN resident Rick McKamey (Willow Creek Environmental Services, Environmental Programs Manager) identified the plow as belonging to his grandmother, who owned the farm immediately east of the site area. Also within this area, an historic ‘dog burial’ (Photos 7-8) was identified by LFN Guardian Erik Still at the base of a large cedar tree near Spillway Marker (0+360). Mr. McKamey suggested the dog burial be removed and transported to an adjacent site immediately east of the Sediment Basin.

Within the southern third of the proposed Sediment Basin (between survey marker 0+380 and the Taylor Road Deroche Creek Bridge – Figure 4), it is unlikely that anything of a cultural/archaeological nature will be found, as the soils in this area are characterised by glacial till deposits. This area was a former creekbed, materials of which were excavated and utilized to construct the current dike along the east (left) bank of Deroche Creek. Significant amounts of historic garbage occur throughout this area.

North of Sediment Basin Spillway Marker (0+360) there is a ‘Moderate’ likelihood that additional objects of a cultural/archaeological nature may be found. As a consequence, further monitoring is recommended during future (Phase 2) excavation works associated with the Sediment Basin.

SUMMARY

In summary, nothing of archaeological significance was found during Phase 1 investigations associated with the proposed Sediment Basin at Deroche Creek. However, given the probability of cultural heritage resources within the area, further monitoring is recommended during future (Phase 2) excavation works associated with the Sediment Basin and other features associated with this Project.

Sincerely yours



Gordon Mohs, M.A.
Sx̱wōx̱wíyam, El:ólìye, Pop’qo’les
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Photo 1

Summit Excavator Clearing & Grubbing Underbrush



LFN GUARDIAN Melissa Friesen in foreground at Spill Channel Stake (0+360)

Note: one of three Till Mounds just beyond Melissa at Spillway location (0+370)

Glacial till deposits predominate south of Sediment Basin Spillway Channel Marker (0+380)

Photo 2

Summit Excavator Clearing & Grubbing Underbrush



Excavator working near Spillway Channel Marker (0+440)

Note: Entire Sediment Basin north of Spillway Marker 0 + 380 appears relatively undisturbed but was extension of historic farm (Rick McKamey, Willow Creek Environmental Services, Environmental Programs Manager, personal communication).

There are few blackberries in this area, except along the dike embankment.

The soils north of Spillway Marker 0 + 380 are characterized by a thin to relatively thick humus layer (10 – 30 cm thick), underlain by a yellow sandy gravel layer or silty loam. Relatively fine till deposits can be seen on left (west) and right (east) sides of picture.

Photos 3 & 4

LFN Guardians Melissa Friesen & Erik Still conducting detailed site inspections



LFN Guardian Melissa Friesen in foreground at Spillway Channel east-boundary Stake (0+320)



LFN Guardian Erik Still inspecting exposed surface after rainfall within the Sediment Basin in proximity to Spill Channel Marker (0 + 440)

FIGURE 5



LFN Guardians Megan Friesen & Erik Still conducting detailed site inspections within the Sediment Basin in proximity to Spillway Channel Marker (0+420)

Note: Surface glacial till deposits in this area decrease in size moving northwards within the Sediment Basin

FIGURE 6

LFN Guardians Melissa Friesen & Erik Still conducting site inspections within the Sediment Basin adjacent the Deroche Creek dike in proximity to Spillway Channel Marker (0+360)



Note: there is significant historic garbage within this area of the Sediment Basin from Spillway Channel Marker (0 + 280) to Spillway Channel Marker (0 + 380)

FIGURES 7 & 8
Historic Structural Feature: Dog Burial





LFN Guardian Eric Still identified this feature as a Dog Burial. Apparently, Bella was poisoned and buried by her owners at this location. Erik's comments were confirmed by Rick McKamey (Willow Creek Environmental Services, Environmental Programs Manager) whose grandmother formerly lived on a farm immediately east of the proposed Sediment Basin.

Rick suggested the dog burial could be moved immediately east of the proposed Sediment Basin utilizing an excavator. Rick noted that his own (former) dog is buried nearby.

***It should be noted that none of the stones associated with the feature displayed any characteristics of artifact manufacture such as chipping, pecking, grinding, etc.

FIGURES 9 & 10
GRAVEL/TILL MOUNDS



Three Gravel Mounds were identified between Sediment Basin Markers (0 + 340) and (0 + 380)



These mounds were first identified in the spring of 2023 and were covered with blackberries

GLASSY VOLCANIC BASALT ARTIFACTS

FIGURE 11a



Three water-worn glassy volcanic basalt artifacts were discovered within the current Deroche Creek channel adjacent Sediment Basin Marker (0+460).

FIGURE 11b



FIGURE 11c



***It is very unlikely these artifacts are associated with the proposed Sediment Basin area. Deroche Creek is a dynamic creek and these artifacts likely rolled down the creek a significant distance. They are all quite water-worn. The adjacent creek embankment was carefully examined for archaeological deposits by Erik and Melena and nothing but gravel was noted. In addition, the adjacent Sediment Basin area was carefully inspected following two October rain events (one of the best times for searching for artifacts), and nothing was found.

***Of note: A significant amount of fill was removed from Deroche Creek in 2022 where the artifacts were found.

FIGURE 12 CHIPPED PEBBLE (77 x 52cm)



(actual size)

A small, chipped river pebble was identified on the surface within the Sediment Basin in proximity to Spill Channel Marker (0 + 380).

There are 2 small fractures at the wider end (right end in photo), including a small curved fracture (top right) that is fairly recent (assessment based on the lack of patination), and a larger composite fracture below the smaller fracture, estimated to be much older (based on the patination). Neither fracture is characterized by microdenticulaton or use-wear.

There is also a small chip/fracture at the opposite end of the river pebble. It too is lacking micro-denticlation or use-wear and is characterized by patination, similar to that of larger fracture on the right end of the pebble. There are also recent scratchmarks across the surface of the stone, possibly related to Summit's excavator activity.

***Of Note: this pebble is interesting as it uncharacteristic of all the other stones (till deposits & creekbed deposits) on site, which strongly suggests it is a 'manuport' (an object transported or carried to the site).

FIGURE 13
Historic Horse-Drawn Plow



Plow was found partially buried in silty humus layer within the Sediment Basin in proximity to Spill Channel Marker (0+440)

Note: Rick McKamey (Willow Creek Environmental Services, Environmental Programs Manager) commented that the plow belonged to his grandmother who formerly lived on the property immediately east of the proposed Sediment Basin.

FIGURES 14 & 15
HISTORIC GARBAGE



Historic garbage was observed throughout the southern third of of the proposed Sediment Basin extending from Spill Channel Marker (0+280) to (0+400+). Garbage observed included tires, casettes, foam, metal piping, car parts, bottles, wire, metal containers, purses, etc.



6. Operation and Maintenance of the Sediment Basin

For guidelines and recommendations of continued maintenance of the Deroche Creek area, see the Operation and Maintenance Manual (NHC, 2026).

7.

7. Environmental Effectiveness Monitoring

Environmental effectiveness monitoring will over a multi-year period post-construction to fulfil the terms outlined in the DFO *Fisheries Act* Authorization. It is intended to assess whether the proposed offsetting works (LWD reef, fan channels, and planting) are achieving their expected outcomes as per the offsetting plan. Aquatic habitat will be monitored in the summer and fall in years 1, 2, 3, and 5 following construction. Riparian restoration monitoring will occur in years 1, 2, 3, 5, 7, and 10 following construction. For each of these monitoring years, am inspection report should be created to document the site observations, any information received during the inspection, any need for repairs or maintenance, and any other issues arising from the inspection. Relevant photographs should be included in the inspection report.

Environmental effectiveness monitoring will assess fish passage, fish use of created rearing habitat, and survivorship of planted stock in the riparian area. Reporting will be submitted to DFO.

Report Submission

Prepared by:

KERR WOOD LEIDAL ASSOCIATES LTD.



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Revision History

Revision #	Date	Status	Revision	Author
0	April 28, 2026	Final		LSK/BB

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Appendix A

NHC Design Brief

KERR WOOD LEIDAL ASSOCIATES LTD.
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NHC Reference 3007814

May 27, 2024

BC Ministry of Environment and Climate Change Strategy
Flood Debris Management Secretariat
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Victoria, BC V8W 9M2

Attention: Amy Vallarino, Senior Project Manager
Copy to: Carter McNaught, Project Manager (WSP)
Via email: Amy.Vallarino@gov.bc.ca
carter.mcnaught@wsp.com

Re: **Deroche Creek Recovery Solution Project**
Final Hydrotechnical Design Report Rev.0

Dear Amy:

1 Project Location

The Deroche Creek Long-Term Solution Project (the Project) encompasses Reaches 1 and 2 on the lower alluvial fan shown on Sheet 002 of the attached drawing package.

- Downstream end of Project at Nicomen Slough: E. 567704.63, N 5448149.07
- Upstream end of Project at the eastern edge of the Canadian Pacific Kansas City Railway right-of-way: E 567363.45, N. 5448567.09

The Project footprint lies on both reserve and non-reserve land. Property boundaries are shown on the drawings.

2 Background

The BC Ministry of Environment and Climate Change Strategy (ENV) is assessing and addressing the impacts of sediment introduced during the November 2021 Atmospheric River Event (ARE). ENV is coordinating and planning assessments, response and recovery work related to sedimentation impacts of the atmospheric river (AR) events that occurred in November and December 2021. The ENV Program is broken into three phases:

- ENV Phase 1 – Assessments
- ENV Phase 2 – Emergency Work (AR response)

- ENV Phase 3 – Long-term Solutions (AR recovery)

Northwest Hydraulic Consultants (NHC) has been engaged to provide hydrotechnical services for the ENV Program, including ENV Phase 3 works for the Project. Previously, in the fall of 2022, NHC provided hydrotechnical design services for the Deroche Creek Emergency Sediment Removal Project as part of Phase 2.

NHC's workplan for The Project under ENV Phase 3 is broken into additional phases as follows:

- Phase 2.2 – Detailed Assessment and Design
- Phase 3 – Development of Work Packages for Construction
- Phase 4 – Field Engineering and Contract Administration

Leq'a:mel First Nation (LFN) is the Owner of the Project. For portions of the work occurring on-reserve, LFN is also the governing authority, pursuant to the Leq'á:mel Land Code.

Funding for the Project will be provided jointly by the BC Ministry of Emergency Management and Climate Readiness (EMCR) and by Indigenous Services Canada (ISC). NHC is the engineer-of-record for the Project. Kerr Wood Leidal and Associates Ltd. (KWL) is providing environmental services, contract administration and construction management services. WSP Global (WSP) is providing project management and coordination services, and Summit Earthworks (Summit) will provide Archaeological services.

3 Scope of the Project

The scope of the Project includes the following major work items as shown on the attached set of drawings:

- Construction of two, timber-pile supported, large woody debris (LWD) Deflectors extending out from Taylor Road into Nicomen Slough, located west of the creek in Reach 1 (Downstream of Taylor Road).
- Construction of a sediment basin in Reach 2 (between Taylor Road and North Nicomen Road), including: armouring of the inlet/ outlet of the basin for grade control and bank stabilization
- Armouring of the channel bed at the Taylor Road Bridge to prevent future degradation due to the presence of the sediment basin.

In addition there will be habitat offsetting works constructed, including:

- Construction of a complexed, low-flow channel along the eastern boundary of the Sediment Basin; and modification of the basin geometry to help encourage and concentrate low flows within that channel;
- Construction of an LWD Reef where Nicomen Slough interfaces with the Nicomen Dike in Reach 1; and

- Excavation of off-channel rearing habitat on the Deroche Fan within Reach 1, complexed with LWD, and with the excavated material side-cast to “mounds” that will be revegetated with native plant species.

4 Design Codes and References

The following design codes and reference documents are the basis for the hydrotechnical design:

- BC MoTI Standard Specifications for Highway Construction (2020)
    - Primarily for the specification of rock riprap classes and quality parameters, where applicable.
- TAC Guide to Bridge Hydraulics (2004)
    - For scour estimation and rock sizing procedures.
- Professional Practice Guidelines – Legislated Flood Assessments in a Changing Climate in BC (V2.1; EGBC, 2018)
- Report: Deroche Creek Geomorphological Assessment and Hydrotechnical Scoping. A report prepared for Mott MacDonald Canada Ltd. and the BC Ministry of Transportation and Infrastructure in March 2021 (restricted use).
    - Some outcomes of this reporting provide and early design basis for the Deroche Creek Long-term Solutions Project.

5 Deroche Creek

5.1 Basin overview

Deroche Creek is located in the Coast Mountains of British Columbia, on the northern side of the Fraser Valley, approximately 15 km east of the community of Mission. The creek drains a watershed area of 8.1 km^2 (Figure 1) and flows into Nicomen Slough, a relict side channel of the Fraser River that now only carries local flow, as the inflow from the main river channel was cut off by the Nicomen Island Dike System in the 1920s.

The Deroche Creek alluvial fan, on which the Deroche community and the Project is located, began forming around 10,000 years ago during the last deglaciation when large amounts of water remobilized the loose sediments on the slopes upstream and glaciers retreated from the Fraser valley—allowing material to begin accumulating on the valley bottom.

The area is part of the Sto:lo Territory. The Leq'á:mel never ceded or surrendered their governing authority over these areas and still assert their jurisdiction as an Indigenous Government. While Leq'á:mel has a recognized self-governing authority over their reserve lands, the Leq'á:mel people do

not condone the establishment of Indian Reserves and continue to exercise their Indigenous rights throughout “Solh Temexw - Our Territory” (McGlenn, 2023).

Large impacts on the landscape occurred after the colonization by European settlers in the 19th century. As the area offered both access to the railway and good farming opportunities, dikes were constructed on the Fraser River floodplain to claim more land for colonial farming.

The watershed also has a history of harmful logging practices, with clear-cut logging reportedly affecting 40 percent of the upper watershed (Hayco, 2000). The Leq'á:mel people never consented to any logging or other resource extractions in their Territory. Between the 1960s and 1980s, clear-cutting caused sediment accumulation in the channel crossing the fan as cutting roads and clearing vegetation mobilized sediment from the basin. Better forest management guidelines to reduce landslide hazards due to logging were only introduced with the Forest Practices Code in 1995 (Chilliwack Forest District, 2006).

Today, logging activity in the Deroche Creek Watershed is greatly reduced and supervised with a stronger focus on reducing landslides and sediment-related hazards (FPS, 2011).

5.1.1 Geologic History

The bedrock geology underlying the basin consists of rocks formed during the middle Jurassic as andesitic volcanic deposits (flows and ejecta) intermixed with sedimentary rocks (Hayco, 2000). The weathering of these underlying rocks creates fine material, likely increasing geohazards in the watershed as fine stratigraphic layers can provide slip surfaces for landslides. Notably, neighboring watersheds show less volcanic and more plutonic base rock (Hayco, 2000), probably causing the Deroche Creek watershed to be relatively more active in sediment transport.

Glacial till from ice ages is also present, transported into the area as a wide range of rock type and sediment sizes. During the deglaciation, the formation of lakes behind the retreating glaciers caused the deposition of finer sediment towards the Fraser Valley, and channelized flow began forming the Deroche Creek fan on top of these lake deposits (Hayco, 2000). During the Holocene, the Fraser River floodplain interacted with the Deroche Fan going through phases when fan deposits overlayed the floodplain and vice versa.

Weathered bedrock and glacial till formed a veneer of relatively fine sediment in the watershed. While the deglaciation caused a lot of that material to be transported downstream, vegetation growing in the warmer climate of the Holocene stabilized the slopes. Recent logging related impacts, such as road construction and reduced vegetation cover decreased slope stability, are now reactivating more of those sediment sources.

Figure 1. Deroche Creek Watershed

Terrain stability is already low in areas where steep, deeply cut valleys are filled with relatively fine sediment. Prolonged and/ or intense rainfall events, like those of the November 2021 ARE, can cause the slipping of sediment in these locations, initiating landslides. While this is a natural phenomenon, human impacts can increase the number of landslides. For example, poorly constructed logging roads can lead to inadequate drainage, causing landslide initiation points (FPS, 2011).

When large runoff events occur, the sediment mass movement can convert to a highly mobile movement type likes debris flows or debris floods. Several historical debris flows and debris floods have occurred in the watershed, including in 1962 or 1963 and November 1989, but the future likelihood for events to reach the Deroche Creek fan has been deemed low in the past (Hayco, 2000). More contemporary studies are underway (by Others) to re-assess the likelihood of geo-hazards in the face of a changing climate.

5.2 Alluvial Fan

Localized bank erosion can shift the channel laterally across the fan and impact land near the creek. However, because of sedimentation patterns and the convex shape of alluvial fans, avulsions are the primary mode of channel migration in this environment. An avulsion is a process where a fluvial channel rapidly changes its course into a different channel or creates a new channel. On a settled alluvial fan, the danger of avulsion is that there might be little indication of the location and timing.

Avulsions occur when some mechanism (e.g., sediment accumulation, large wood blockage, or breaching of a levee) causes the flow to spill out of the channel on to the surface of the fan and find a steeper path away from the previously elevated channel. Given the characteristic scale of these potential blocking mechanisms, avulsions are plausible anywhere the fan surface is within approximately 2 m of the channel bed elevation (Rapp & Abbe, 2003). The Creek has a history of avulsions following such blockages (Hayco, 2000), and future occurrences should be expected. Such an avulsion would tend to follow locally low pathways that radiate away from the creek and could result in a new creek channel crossing North Nicomen Road, North Deroche Road, Lougheed Highway, or other local roads at locations up to 600 m away from the current bridge crossings (Figure 2).

Preferential sediment accumulation near the top of the alluvial fan has resulted in the formation of a concave channel profile, where the gradient of the Creek decreases with increasing distance downstream. Locally, gradients range from more than 0.1 m/ m to as little as 0.0003 m/ m. The average gradient decreases from 0.08 m/m near the fan apex to 0.01 m/m in the lowest reach above Nicomen Slough (Figure 2).

5.3 Nicomen Slough

Nicomen Slough formed as a natural meander arm of the Fraser River, forming Nicomen Island in between the two water bodies. A dike constructed on the northern end of Nicomen Slough cut off the

Fraser River flow in the 1920s (NHC, 2000). Nicomen Island was flooded in 1948, leading to dike improvements in 1949-1950 (NHC, 2000). Near Deroche, Nicomen Slough is between 170 m and 250 m wide and Deroche Creek has formed a delta spanning the whole width of the Slough (Figure 2).

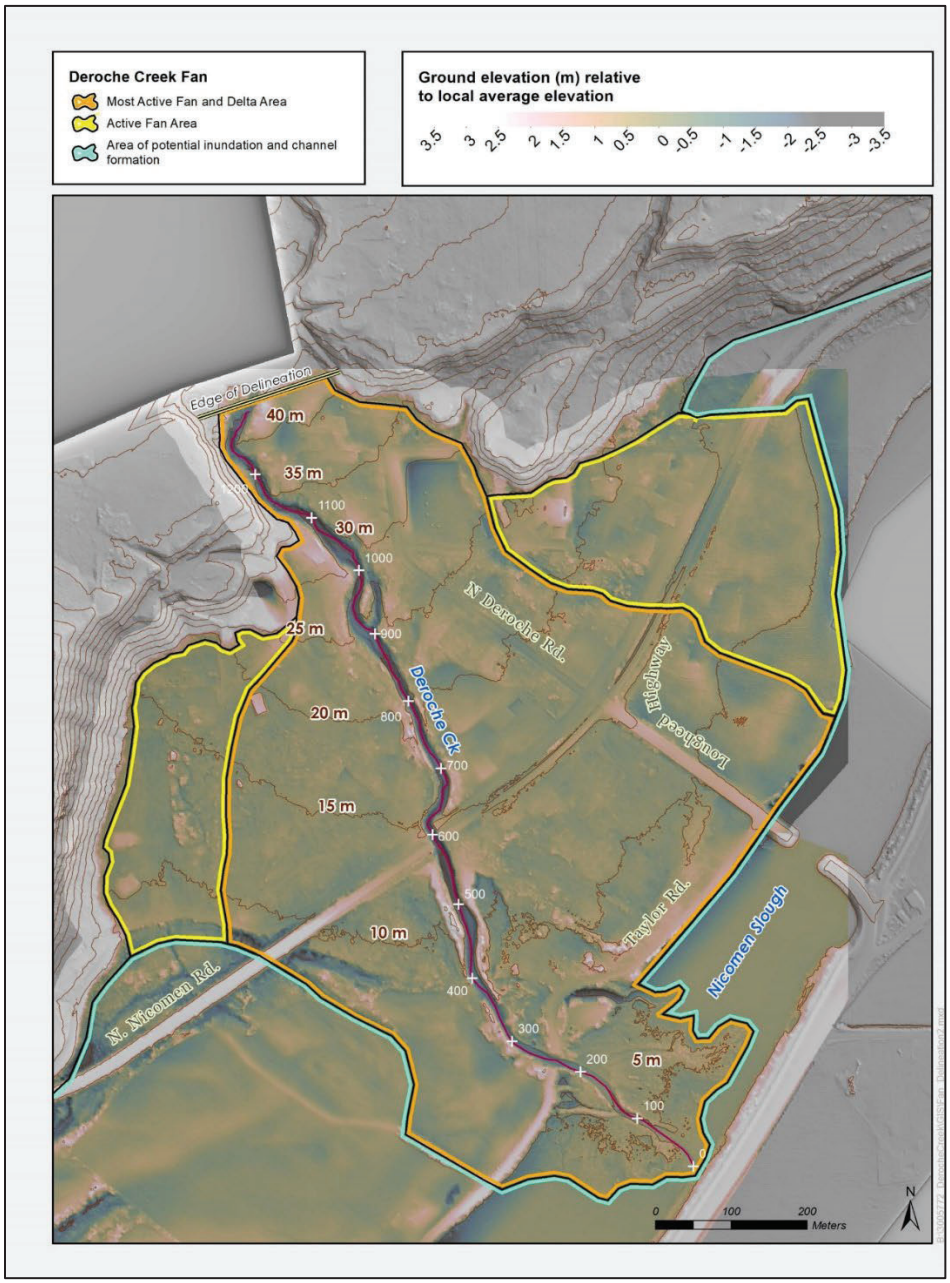

Figure 2. Extent of Deroche Creek Alluvial Fan delineated from 2018 LiDAR data.

5.4 Channel Morphology in the Lower Reaches of the Alluvial Fan

As part of a previous geomorphological assessment of Deroche Creek undertaken in September 2020, NHC divided the creek on the alluvial fan into five distinct reaches, each of which has relatively consistent character. The Project spans Reaches 1 and 2 (Figure 3).

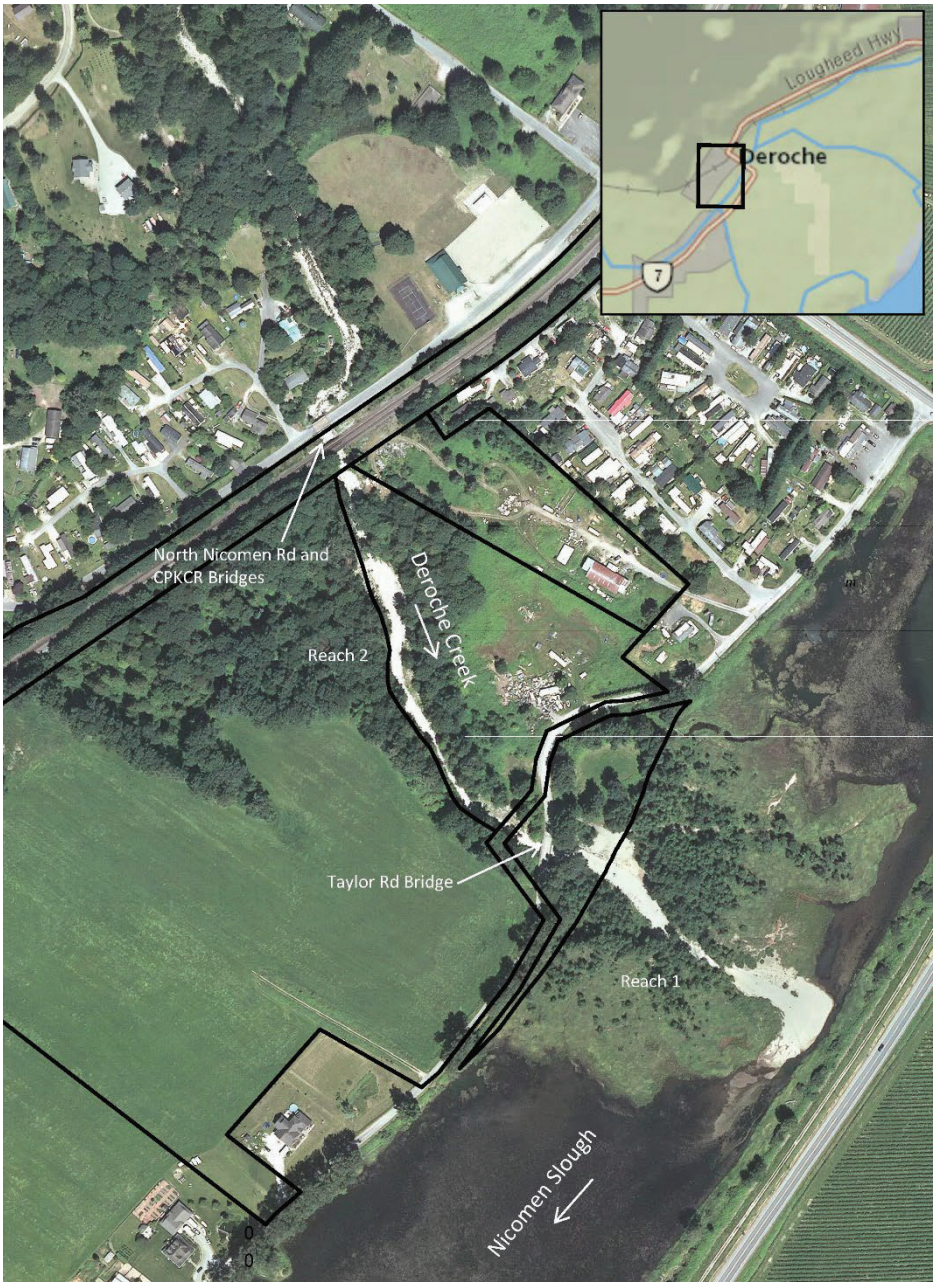

Figure 3. NHC's Reach divisions on the Deroche Creek alluvial fan. The black lines delineate Lakahahmen IR 11 Properties within the Project footprint.

5.4.1 Reach 1

The lowest (most downstream) reach of Deroche Creek crosses a sediment delta that spans Nicomen Slough's width. This sediment is interpreted to have accumulated since diking cut off the Slough in the 1920s from the main Fraser River flow, which had previously provided the energy to transport sediment away from the toe of the fan. This interpretation is based on the consistent geometry of the Slough upstream and downstream of the delta and the form of the delta itself. The delta is 220m long and 300 m wide and consists of relatively fine bed material comprised of sandy gravel. Photo-based grain size analysis of surficial material shows a mean grain size (D50) of around 19 mm, and 55 mm for the larger size fractions (called D84, meaning that 84% of the size distribution is finer than 55 mm). The average channel slope in this reach is 0.015 m/m.

The channel tends to be dry and featureless most years from about mid-summer until fall rains begin (Photo 1). During these times, water from Deroche Creek drains from the upper alluvial fan reaches towards Nicomen Slough as groundwater. Under flowing water the channel would likely demonstrate a plane bed morphology due the excessive sediment supply. The mean flow depth would be around 0.5m under bankfull flow conditions.

Upstream, closer to the Taylor Road Bridge, the channel is relatively flat and varies in width between 12 and 18 m. The bridge often has little clearance and heavy equipment is regularly used to remove material from the area under the bridge (Photo 2). The 2022 Deroche Creek Emergency Sediment Removal Project was undertaken shortly after Photo 2 was taken.



Photo 1. Looking downstream along Reach 1 in October 2022 with Highway 7 in the background.



Photo 2. Looking upstream to Taylor Road Bridge in September 2022, prior to Emergency Sediment Removal.

The upper quarter of Reach 1 is on-reserve and crosses privately held (Alloted, also known as Certificate of Possession or CP held lands; see Figure 3). Development on these lands is subject to the LFN Land Code and must obtain the consent of all property owners.

5.4.2 Reach 2

In Reach 2 extends 275 m from Taylor Road Bridge to roughly 50 m downstream of the Canadian Pacific Kansas City Railway (CPKCR) Bridge and North Nicomen Road Bridge. The channel is homogeneous in form and bed material, and again, mostly featureless due to heavy sediment loads. The morphology would be plane-bed under flowing conditions, and bed material is dominantly cobble intermixed with gravel and large cobble, with the largest stones reaching 500 mm. Photo-based grain sieving indicated a D50 of 34 mm and a D84 of 120 mm. The channel width varies between 7 and 17 meters, and the channel banks are raised 1 to 2 m above the bed. Vegetation encroaches on the dry channel bed at many locations (Photo 3). The channel slope in this reach decreases from 0.03 m/m upstream to 0.015 m/m downstream.

All of Reach 2 is on-reserve and crosses CP held lands (Figure 3). Development on these lands is subject to the LFN Land Code and must obtain the consent of all property owners.



Photo 3. Looking upstream along Reach 2 in September 2022.

5.5 Flood Hydrology and Climate Change Effects

Single station frequency analysis has been carried out on the record of annual maximum daily flow at Water Survey of Canada Station: Norrish Creek above Rose Creek (WSC 08MH150). Frequency analysis results using a 2-parameter Gumbel distribution are shown in Table 1.

Table 1. Annual Maximum Daily Flow estimates for WSC 08MH150

Return Period (years)	Annual Maximum Daily Flow, m^3/s WSC 08MH150
2	63
5	86
10	101
20	116
100	149
200	164

The annual maximum daily flow estimates from 08MH150 have been transferred to Deroche Creek using the following equation:

$$Q_A = Q_B \cdot \left(\frac{A_A}{A_B}\right)^{0.85}$$

The scaling exponent of 0.85 has been selected for consistency with recent studies in nearby watersheds (NHC, 2020).

To estimate annual instantaneous peak flow for Deroche Creek a peaking factor of 1.9 is applied to the transferred annual maximum daily flow estimates. The value is based on evaluation of the ratio of QPI to QPD for basins in the Lower Mainland of similar size and topography, namely Mackay Creek near Montroyal Boulevard (WSC-Mackey; 08GA061) and Noons Creek above Meridian Substation Road (WSC-Noons; 08GA065).

The estimated peak flows for Deroche Creek are given in Table 2. The estimates for Deroche Creek have been checked against estimates using the Rational Method (Water Management Method; MoTI, 2019) and previous estimates (Hayco, 2000). The 2 and 5-year return period estimates have also been compared against flow data from the Deroche Creek, from the now-discontinued WSC gauge: 08MH070), which operated from 1960 to 1964.

Table 2. Flood flow estimates for Deroche Creek

Flood quantile	Flow estimate (m^3/s)
2-yr daily (NHW[1])	9.1
2-year peak	17.3
5-yr peak	23.8
10-yr peak	27.9
20-yr peak	32.1
100-yr peak	41.2
200-yr peak	45.4
200-yr daily	23.9

Notes:
1. NHW is an acronym for Normal High Water. For the purposes of the Project, the 2-year annual daily maximum flow is considered to produce normal high water in Deroche Creek.

5.5.1 Climate Change Considerations

Climate projections for the Fraser Valley suggest overall year-round increase in temperature and reduction of the percent of precipitation falling as snow. Precipitation is expected to decrease in the summer, but increase in the winter (PCIC, 2020).

Peak flows on Deroche Creek tend to occur during the fall and winter because of prolonged or intense periods of rain or rain-on-snow. The projected increase in frequency and intensity of heavy precipitation is expected to lead to increases in peak flows. The potential for more intense 'pineapple express' atmospheric river events following snowfall may also contribute to increased peak flows in the future (Radic et al., 2015).

NHC reviewed the following to determine potential impacts of climate change on peak flows:

- Tests for non-stationarity in observed peak flows;
- Pacific Climate Impacts Consortium (PCIC) Climate Explorer tool (PCIC, 2020);
- University of Western Ontario's Intensity Duration Frequency Climate Change (IDF-CC) tool (UWO, 2020).

5.5.1.1 Mann-Kendall Trend Test

The Mann-Kendall trend test has been applied to the Norrish Creek record at WSC 08MH150. The test checks whether observed peak flow data is increasing or decreasing with time, which can be an indication of climate change or other changes in the basin that may modify the flood risk profile. No statistically significant trend is detectable in the station record (significance level 0.05).

5.5.1.2 PCIC Climate Explorer

The PCIC Climate Explorer Tool is a data visualizer of climate model output. The projected increase in annual maximum, one-day precipitation amounts for the 5-year, 20-year, and 50-year return periods is 19, 22, and 25 percent over historical, respectively (PCIC12 model ensemble; RCP 8.5). Extrapolating to the 200-year return period suggests increases near 30 percent over historical.

5.5.1.3 IDF-CC Projections

The IDF-CC tool provides estimates of the increase in rainfall duration and intensity under future climate scenarios. Projections for Mission West Abbey and Agassiz CS have been reviewed and suggest increases in rainfall intensity of up to 21 percent over historical baseline (model ensemble; RCP 8.5).

5.5.1.4 Climate Allowance Recommendations

NHC recommends applying a 30 percent increase to the 200-year flood estimate to allow for the potential impacts of climate change. The value is in line with projections from the PCIC Climate Explorer for the study area, assuming the projected increase in rainfall corresponds to an increase in flow. The recommended 200-year annual peak instantaneous flow estimate is therefore 59 m^3/s.

5.6 Flood Hydraulics

Hydraulic modeling has been carried out on roughly 1 km long reach of Deroche Creek, from the mouth at Nicomen Slough to a few hundred metres upstream of the Reach 3/ Reach 4 boundary (well upstream of the Project area). Nicomen Slough is included in the model and the modelled boundary extends roughly 150m upstream of the Deroche Bridge on Highway 7, and 1.7 km downstream of Deroche Creek Fan. The model has been developed to allow assessment of flood hydraulics for a variety of return periods and provide hydraulic information for a sediment transport analysis.

The HEC-RAS (River Analysis System), a computer program developed by the U.S. Army Corps of Engineers Hydrologic Engineering Center (HEC), has been used to develop the hydraulic model. Version 6.3 is used for this study. The program is designed to perform one-dimensional (1D), two-dimensional (2D), or combined 1D and 2D hydraulic calculations for a full network of channels. For this project, a 2D steady flow model (RAS2D) is used.

For the 2D computations, the RAS2D uses the full 2D Saint-Venant equations. The 2D computational cells have been pre-processed to develop detailed hydraulic property tables based on the underlying terrain. (This allowed for larger cells to be partially wet with the correct water volume based on the modelled water surface and DEM resolution). Although RAS2D is a sophisticated modelling tool, it assumes a fixed geometry for the channel and floodplain despite the possibility of bank erosion, scour, deposition, and potential avulsions taking place during high flows. Therefore, the model may underpredict the water surface elevation where there is episodic deposition or blockages, may overpredict the water surface elevation where there is scour and will under-predict the hydraulics associated with avulsions.

5.6.1 Model Terrain

The model geometry is represented by a digital terrain model (DEM), built by combining September 2020 and January 2023 topographic and bathymetric surveys, with 2018 LiDAR[1]. Break lines are used liberally to shape the channel topography as needed. In areas of sparse data (such as between downstream of Deroche Creek Fan on Nicomen Slough), riverbed elevations have been interpolated using available data and professional judgement.

[1] The LiDAR data supplied by the BC Ministry of Transportation and infrastructure was collected in early September 2018 by Terra Remote Sensing Inc. Horizontal Datum: UTM Zone 10 NAD 83; Vertical Datum: CGVD28 HT2.0

5.6.2 Hydraulic Roughness

Hydraulic roughness coefficients, represented by Manning's n-values, strongly influence the computed profile. Appropriate values are based on bed grain size observations, channel slope and geometry, technical literature, and professional judgement.

In a 2D model much of the friction losses (variations in channel shape and alignment) are accounted for in the momentum equation and consequently Manning's n-values are generally lower than they would be in a 1D model.

Each reach of Deroche Creek has been assigned a roughness value for the in-channel portion of the reach based on field observations of channel bed composition and verified with values referenced in the literature (Chow, 1959; Cowan, W.L., 1956; Engelund and Hansen, 1967; Jarrett, 1984; Limerinous, 1970; MaynoRoad, 1991).

Table 3. Channel roughness values used in hydraulic modelling.

River	Reach (Figure 2)	Reach Location / Stationing	Manning's Coefficient (n)
Deroche Creek	Reach 1	Slough Fan	0.04
	Reach 2	Taylor Road to River Station 400	0.04
	Reach 2	River Station 400 to North Nicomen Road	0.059
Nicomen Slough	All	All	0.024

There is limited flow beyond the banks of the creek except in one location where the flow floods the agricultural fields on the west bank upstream of Taylor Road. The adopted overbank roughness value is 0.06.

5.6.3 Boundary Conditions

Estimated design flows described in Section 5.5 are used as upstream boundary conditions for Deroche Creek and Nicomen Slough.

The outlet for Deroche Creek is within the model and is controlled by the conditions modelled in Nicomen Slough. Two different downstream boundary conditions are modelled for Nicomen Slough. The first condition uses a normal depth with a very shallow slope (0.001%).

The second downstream boundary condition is a high-water level boundary controlled / contributed to by backwater from the Norrish Creek confluence with Nicomen Slough, located more than 5 km west of

the mouth of Deroche Creek. An approximate rating curve at the Norrish-Nicomen confluence has been developed to determine the water level on Nicomen Slough during floods on Norrish Creek. A 10-year return period annual peak instantaneous flood on Norrish Creek produces an estimated water surface elevation of El. 6.25 m. A 10-year return period is considered suitable as a high-water boundary condition because Norrish Creek and Deroche are quite different in size and not likely to experience the same size of flood coincidently. The estimated 10-year peak flow on Norrish creek has been increased by 10% to account for climate change[2]. The estimated 10-year peak flow (with and without climate change) is used as the downstream boundary for the hydraulic model.

Backwater effects from the Fraser river have also been considered in establishing a water level boundary condition. If Deroche Creek were to experience a spring or summer flood due to intense, localized rainfall, the potential for backwater from the Fraser River exists. Backwater elevations caused by the Fraser River at Nicomen Slough are shown in Table 6.2. The range in water surface elevation reflects the influence of tides. A reasonable assumption for a Fraser River flood event that is coincident with a Deroche Creek flood might be the mean annual flood or a flow slightly higher. The mean annual flood level for the Fraser River at the mouth of Nicomen Slough cis about El. 5.9 m. Since this is reasonably close to the Norrish 10-year peak water level (El. 6.25 m), the latter is used for all simulations involving a high-water level boundary condition.

5.6.4 Model Results

A summary of modelled flow depth and local velocity ranges for select floods is provided in Table 4. The high end of ranges for the recommended 200-year design flood is used as the basis for scour analysis, and riprap and channel armour sizing for the Project.

The 2-year maximum daily flow is considered normal high-water (NWH) flow for Deroche Creek. The normal high-water inundation area is an important parameter used in environmental assessment. The NWH inundation area is plotted on blue on Sheet 002 of the attached drawing set.

[2] The lower climate change adjustment for Norrish Creek, compared to that used for Deroche and Nicomen Slough, reflects the assumption that Norrish Creek is not likely to be as sensitive to future increases in rainfall intensity due to the size of its watershed, and especially not in the context of coincident flooding with Deroche Creek.

Table 4. Summary of channel flow depth and velocity ranges for the Project area

Flow Scenario	Flow (m^3/s)	Flow Depth (m)	Velocity (m/s)
Reach 1			
2-year max. daily (NWH)	9.1	0.5 to 0.8	1.0 to 1.3[1]
10-year peak	27.9	0.9 to 1.2	1.2 to 1.8[1]
200-year peak +30%	59.0	1.2 to 1.8	2.0 to 2.5[1]
Reach 2			
2-year max. daily (NWH)	9.1	0.6 to 1.0	1.3 to 1.6
10-year peak	27.9	1.4 to 1.7	1.7 to 2.9
200-year peak +30%	59.0	2.2 to 2.5	2.5 to 3.2

Notes.

1. The ranges listed are typical of the reach. Velocities through, and in the tail-out of Taylor Road Bridge tend to be 33% to 50% higher than the upper end of this range (a local effect due to the constriction caused by the bridge).

5.6.5 Hydraulic model sensitivity

Model sensitivity analyses have been carried out to determine the effects of changing model parameters on water levels, flow depths, and inundation extents. The sensitivity analyses included analysis of the impacts of varying the following parameters within a credible range:

- Roughness values
- Downstream boundary conditions

The analysis shows there is a small amount of sensitivity to roughness in the channel within Reach 2 (< 10 cm variation in water surface elevation).

Reach 1 hydraulics are sensitive to the assumed downstream boundary condition in Nicomen Slough. Under high water level boundary conditions (i.e. coincident flooding with Norrish Creek), the backwater can impact hydraulics as far upstream as Taylor Road Bridge. Under normal depth boundary conditions there is little sensitivity since current hydrologic conditions in the Slough produce very little flow and the slope is already very flat.

5.7 Annual sediment load in the lower reaches

This section is a brief summary of previous bedload transport study for Deroche Creek that NHC conducted for Mott MacDonald Canada Ltd. and the BC Ministry of Transportation and Infrastructure (NHC, 2021). For more detail on the subject, please refer to that report.

To estimate annual sediment loads, NHC used the hydraulic modelling results discussed in Section 5.6 to calculate sediment transport rates along the channel, which give an indication of both where sediment

deposition is most likely to occur and what sediment volume can be transported by floods of different magnitudes. NHC validated these estimates by calculating the sediment volume deposited within the delta in Nicomen Slough over the last 100 years (NHC, 2021).

Assuming a constant channel bed width of 10 m and an event duration of 6 hours, NHC calculated event-based sediment transport rates shown in Figure 4. Peak flow estimates are used for the flood classes, as sediment transport depends more on peak shear stress during a flood than on the daily average shear stresses.

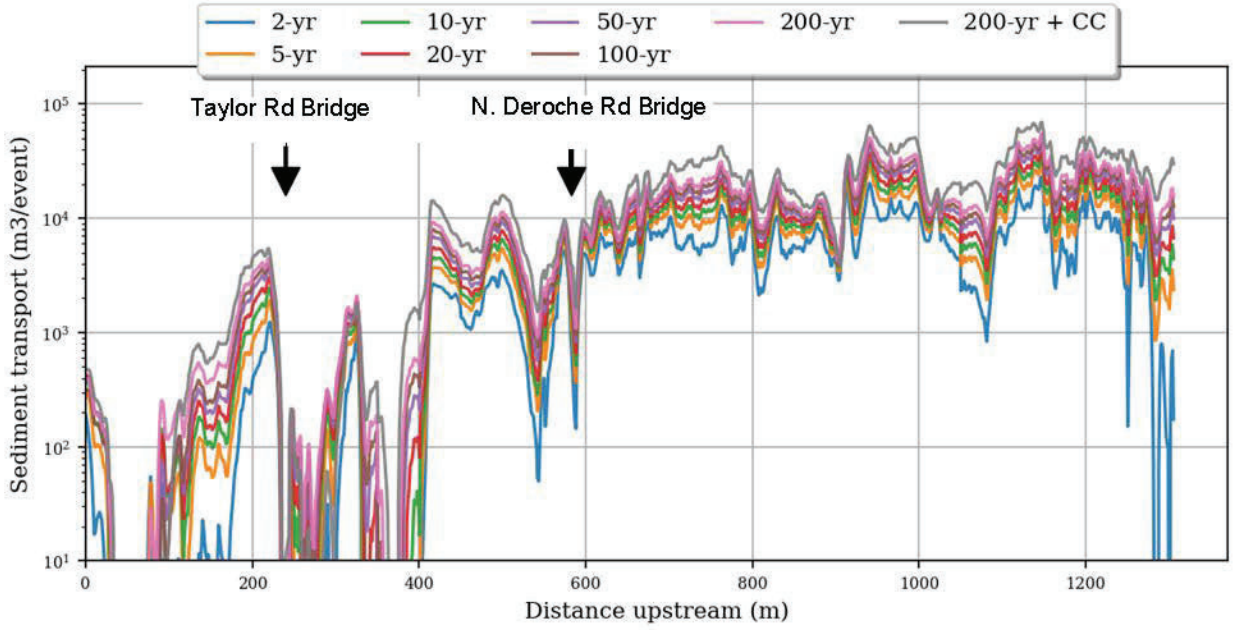

Figure 4. Calculated sediment transport (m^3) in Deroche Creek per event.

From Figure 4, a 2-year flood transports as much as 2,500 to 4,000 m^3 of sediment within Reach 2, whereas the design flood event (200-year + 30% for climate change) can transport on the order of 13,000 to 14,000 m^3.

Figure 5 shows the annualized volumetric sediment load per flood class. The cumulative statistical effect of the flood events is shown as a sum with the black dashed line, which represents a statistical average load per year. The general pattern of sediment transport shows the highest activity occurring in the channel upstream of station 400 m, about the halfway point of Reach 2.

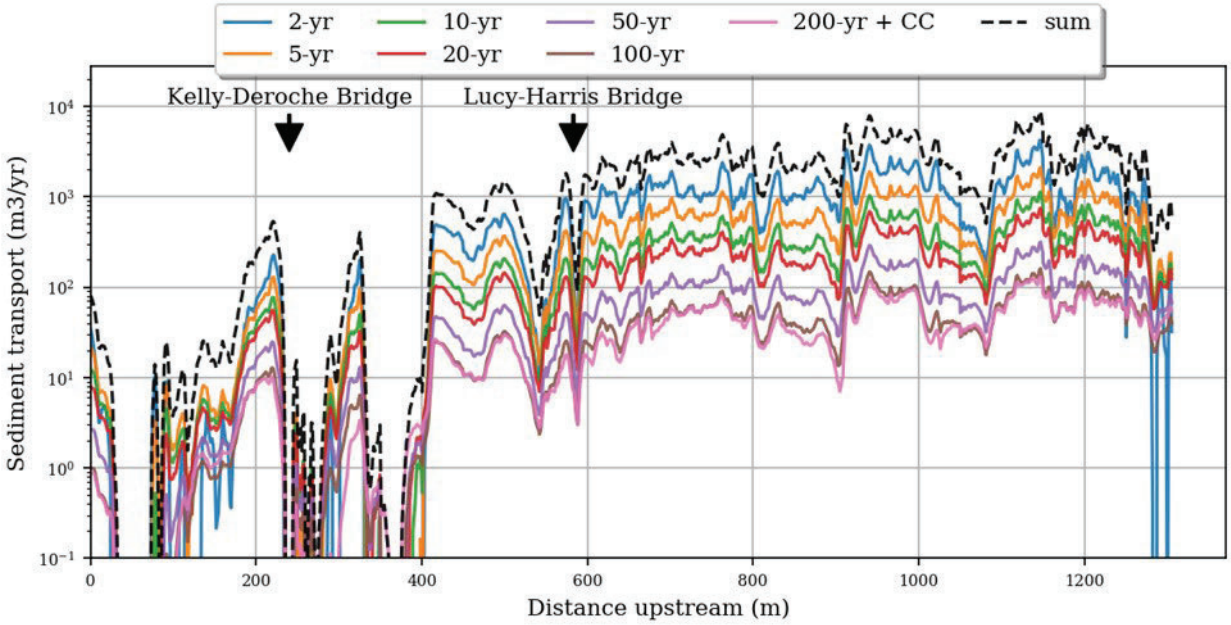

Figure 5. Calculated sediment transport (m^3) in Deroche Creek per year.

In Figure 5, the average annual load for smaller return periods is higher since these floods occur more often and thus moves a higher total sediment amount. The total annual sediment transport near the top of Reach 2, at the North Deroche Road Bridge, is estimated to average 1,800 m^3 per year.

5.8 Environmental Values

KWL has carried out an environmental assessment and produced a report, which identifies fish and other aquatic resources, wildlife, and vegetation within the Project area, assesses impacts, and identifies mitigation measures to be undertaken (KWL, 2023). The report, issued under separate cover, is currently under review by the Leq'á:mel Lands Office, in compliance with Leq'á:mel Environmental Assessment Law.

5.9 Archaeological and Cultural Values

The Leq'á:mel people have lived on, used, occupied, benefited from, governed, and defended the project area since time immemorial. The Cultural Heritage value of Deroche Creek to the Leq'á:mel people is difficult to qualify and quantify. Deroche Creek flows adjacent to the modern-day resting place of Leq'á:mel ancestors, located on the Northeastern corner of Lakahahmen IR 11. Reach 2 flows adjacent to a well-known and significant longhouse and village site.

The presence of cultural heritage features indicates a strong link to Leq'á:mel Governance. The project lies within the core of Leq'á:mel Territory and great care must be taken to document and preserve both

Leq'á:mel cultural heritage resources as well as recognize and promote Leq'a:mel's ongoing governing authority, which was nearly eradicated by European colonization.

Summit has carried out a preliminary archaeological investigation with the sediment basin footprint in October 2023. The intent of the investigation was to determine whether culturally significant items exist within the proposed Project footprint (e.g. burial mounds, culturally modified trees, tools, etc.) and to establish a means of preserving such items. Following 5.5 days of investigations, nothing of an archaeological nature was found within the boundaries of the proposed Sediment Basin. Further monitoring is recommended during future (Phase 2) excavation works associated with the Sediment Basin. Summit's full report can be found in Appendix B[3].

6 Major Works: Rationale and Design Basis

6.1 Reach 1 Timber-Pile, LWD Deflectors

The Reach 1 Timber Pile LWD Deflectors are a set of structures that project out from Taylor Road into Nicomen Slough just to the south of Deroche Creek, Reach 1. Deflector #1 is the shorter of the two at 23 m in length; Deflector #2 is 65 m in length. The rationale for constructing the Deflectors is that they will deflect Deroche Creek flow that overtops either Taylor Road Bridge or south approach, or the south bank of Deroche Creek downstream Taylor Road Bridge, and prevent that flow from posing an erosion risk to Taylor Road itself and the Nicomen Road Dike farther downstream. The northern end of the Nicomen Road Dike is located about 100 m south of Deflector #2.

The trunk sections of both Deflectors will comprise locally milled timber piling sourced from trees removed for construction of the Sediment Basin. The piles will be driven to form an "A" shape, with the wide base against the Taylor Road embankment and the pointed end projecting into the Slough. Additional LWD, including tree stems with or without rootballs, and smaller branches and brush, will be interlaced between the piles. A few of the larger LWD pieces will be ballasted to the piles, using steel cable, to prevent floatation of the interlaced LWD during high-water events. Following construction, disturbed areas around the Deflectors will be revegetated with native plant species.

The Deflectors are not intended to be routinely maintained. In a relatively short time-frame – say 5 to 10 years, it is anticipated that vegetative re-growth will enable them to blend with the landscape. In future, it should be straightforward to add additional piling and/ or inter-laced LWD if desired.

[3] Summit's Archaeological Report makes some mention of Project work in Reach 3 of Deroche Creek (Cemetery Berm and Bank Stabilization), however that work has since been removed from the Project scope.

A little more than half of the Reach 1 Deflectors footprint is located off of LFN Reserve Land; the remainder is on-reserve.

6.1.1 Scour estimate for the Deflectors

Natural scour will occur at the heads of the Deflectors. The scour is difficult to estimate since hydraulic conditions associated with an overtopping event in Deroche Creek are unpredictable. The Deflector piles will be driven a minimum of 5 m below ground level NHC considers this a suitably conservative approach in terms of scour protection for the piles.

6.2 Reach 2 Sediment Basin

The Reach 2 Sediment Basin is the largest, single piece of work in the Project. The in-line basin is a 250 m long excavation within Reach 2 of Deroche Creek. The excavation width is up to 50 m and its widest point and the excavation depth below existing ground varies between 2 m and 6 m.

The purpose of a sediment basin is to improve the capture of sediment in a stream within or upstream of areas that are particularly vulnerable to negative impacts of sediment aggradation. Too much sediment supply results in channel instability, increased flooding, infrastructure damage and degradation of aquatic habitat. All of these are issues in Reaches 1 and 2 of Deroche Creek.

The rationale for siting the basin within Reach 2 of Deroche Creek are as follows:

- Basins should be located where the rate of sediment transport is relatively high. The sediment transport analysis described in Section 5.7 shows the upper portion of Reach 2 is one such location.

- The proposed location is adjacent to or upstream of vulnerable infrastructure (e.g. on-reserve housing, Taylor Road and Bridge) and vulnerable aquatic habitat (e.g. Reach 1 of Deroche Creek and Nicomen Slough).

- The proposed location is in an area with easy equipment access for maintenance, and in a reach that routinely runs dry in the mid- to late summer, which will simplify maintenance.

The intent is not to capture all of the sediment transported within Reach 2 – maintaining some level of sediment supply to Reach 1 is critical for controlling scour and degradation, and for maintaining spawning habitat downstream. Sometimes facilities are constructed to act more like a dam that traps almost all incoming sediment and debris; for instance, in areas that may be affected by debris floods or debris flows. This is not the intent of the Deroche Creek sediment basin.

Sediment basins are usually designed to be “in-line” with the stream channel, as is the case here at Deroche Creek, and they are made significantly wider than the existing channel up- and downstream in

order to reduce sediment transport within the basin (wide channels do not transport sediment as effectively as narrow ones). Having the basin "in-line" improves performance for obvious reasons – if the basin were off-line, a large and sustained effort would have to be expended to redirect the sediment to the basin without dewatering the rest of the creek.

The amount of sediment captured, and over what time frame, depends mostly on the width, depth and slope of the basin. There are limits though – for instance, the width of the basin should not be larger than the upper limit of what is known as the regime width of the stream in question.

The Deroche Creek Sediment Basin has a minimum storage capacity of approximately 10,000 m^3, measured from the design invert up to the level of sediment build-up that occurred during the November 2021 ARE. In reality, the basin will be able to store an additional 0.3 m to 0.5 m of additional sediment before sediment levels begin to pose a threat to surrounding infrastructure – that amount of accumulation results in a capacity of roughly 15,000 m^3.

The banks of the basin will be stabilized using substrate-filled, medium class graded rock akin to MoTI Class 250-kg, but lacking the smaller end of the gradation that is standard to 250-kg. The substrate infill will be comprised of stream gravel at the toe, and native soil above the toe. All substrate fill will be locally sourced from the excavation of the basin. The native soil portion will be revegetated using native plant species. Cabled large woody debris rootballs will be placed at intervals of 10 m along the left (east) bank of the basin. The streambed at the entrance and exit of the basin will be armoured with void-filled boulders – this will provide a natural appearance while being scour resistant to discourage head-cutting upstream and scour/ degradation downstream.

6.2.1.1 Environmental and Property Considerations

The Sediment Basin is located entirely on LFN Reserve Land. Soil relocation and deposition on-reserve subject to the LFN Soil Law. Planting plans are also subject to the review and approval of LFN.

The basin requires the clearing of approximately 229 trees of mixed species; the dominant species are Western redcedar(55), Bigleaf maple (70) and Black cottonwood (53), with less numbers of Western hemlock, Red alder and Bitter cherry. The intent is to utilize suitable tree species and sizes on the Project, for construction of other works and habitat complexing. The largest Western redcedar are too large for construction and are likely to be retained for traditional use by LFN.

The Sediment Basin footprint overlaps a few CP held land lots as summarized in Table 3, and the consent of the property owners and LFN is required. Consultation with the property owners is ongoing.

Table 3. Certificate-of-Possession (CP) Lots overlapped by the Sediment Basin footprint

CP Lot	Area of Overlap (m^2)
1158927, 75462 CLSR BC, Lot 5	18
1186469, 3538R RSBS BC, Lot 8-13	10,668
1236657, 96858 CLSR BC, Lot 8-3-3	1,200

Notes:

1. Areas of overlap relate to construction footprint and do not include an easement that will be established for future maintenance of the Sediment Basin.

6.2.2 Scour estimate

Natural scour will occur within the sediment basin as flow accelerates along the rigid banks of the basin. It will also occur as a result of the thalweg shifting within the relative wide basin. There is potential for the flow to be directed against the rigid banks at sharp angles.

Natural scour at the 200-year design flow has been estimated using a modified version of Blench procedure (TAC 2004) with the following inputs:

- Channel top width at approach and bridge waterway opening = 15 m
- Design flow = 59 m^3/s
- Energy slope = 0.012 m/m (expected maximum slope along deposited sediment)
- D50 of bed material = 34 mm (Section 5.4.2)
- Z factor = 2.75 (upper range of values recommended in TAC 2004)

The channel top width is set to 15 m, which applies near the basin inlet and outlet. The natural scour level is estimated to be 2.75 m below the 200-year flood level. The 200-year flood level will vary over time as the basin fills with sediment. For the purposes of this calculation, NHC has assumed a full-basin condition in which the basin channel invert matches the inverts of the inlet and outlet grade controls and a constant slope of 0.12 is established in between. To be conservative, the toe elevation of riprap has been set 3.4 m below the 200-year flood level for this condition, 0.65 m deeper than the scour estimate suggests it needs to be.

6.2.3 Substrate-Filled Riprap Sizing

The sizing for riprap within the sediment basin has been determined using the U.S. Army Corps of Engineers method (TAC, 2004; USACE, 1991), and the following inputs:

- Design velocity along bank: 3.2 m/s (maximum from the 2D model)
- Depth of water along protected slopes: 1.2 m (minimum from the 2D model)
- Factor of Safety (S_f): 1.5 (Standard is 1.2)

- Coefficient of Stability (C_s): 0.3
- Velocity Distribution Coefficient (C_v): 1.2
- Thickness Coefficient (C_t): 1.0
- Side Slope Factor (K): 0.9 (2H:1V slope)

The resulting estimates of D_{30} and D_{50} for graded riprap are 380 mm and 560 mm, respectively, which is comparable to MoTI Class 250-kg riprap. The minimized depth used in the calculation leads to more conservative results. The high factor of safety is used since the rock with be void-filled with natural substrates (stream gravel at the toe, and in-situ organic soils within the planting zone), so there will be far less rock-to-rock contact within the matrix. The substrates will add some stability in the short-term, and the establishment of vegetation root systems will add stability over the long-term.

6.2.4 Grade Control Boulder Sizing

The Densimetric Froude Number approach (Aguirre-Pe at al, 2003) is used to size boulder bed armour at the entrance and exit to the sediment basin. The hydraulics for sizing is taken from the basin entrance and assumes a design flow could occur when the basin in newly maintained, and so could act of the entrance grade control slope of 0.15 m/m. A Manning's "n" of 0.06 is used for the bed of the steep grade control, which results in a design velocity of 6 m/s at the 200-year design flow, or about twice the maximum velocity modelled in the existing channel (pre-construction). The hydraulics at the exit grade control will not be as severe, however, for sake of simplicity and conservativeness during construction, all bed armour will be sized according to the calculation described here, with the following inputs:

- Channel slope 0.15 m/m
- Design velocity: 6.0 m/s
- Specific gravity of rock: : 2.6
- Angle of repose of rock: 40 degrees
- Depth of flow: 1.1 m

The resulting stable rock size has a median diameter of 850 mm.

6.3 Reach 2 Bed Armouring at Taylor Road Bridge

The Reach 2 Bed Armouing at Taylor Road Bridge will be comprised of void-filled boulder protection similar to the entrance and exit sections of the sediment basin upstream. The rationale for this work is that it will prevent degradation of the streambed through the bridge, which would otherwise lead to undermining of the abutment ballast walls. Degradation is a risk downstream of sediment basins.

The sizing of boulders is consistent with the entrance and exit channels of the sediment basin – rock with a median diameter of 850 mm.

The Reach 2 Bed Armouring at Taylor Road Bridge is located entirely on LFN Reserve Land.

6.4 Off-setting Works

6.4.1 LWD Reef (Reach 1)

A large woody debris "Reef" will be constructed adjacent to the Nicomen Dike at the southeasterly extent of Deroche Creek within Nicomen Slough. The Reef will create fish habitat and improve bank stability adjacent to the dike. Construction of the reef will be similar to that of the Timber Pile LWD Deflectors, except that the Reef will not have an "A" shape to it, and will instead be of roughly uniform shape along its length.

6.4.2 Habitat Channels (Reach 1)

Three habitat channels will be excavated along north edge of the Deroche Creek fan and one will be excavated between the Timber Pile LWD Deflectors. The channels will have 2 to 3 m bottom widths, and 2H: 1V side slopes. Excavated material will be side-cast to create low mounds that will be vegetated with native tree and shrubs providing overhead cover. The channel between the Deflector Berms will be complexed using large woody debris sourced from the Sediment Basin.

6.4.3 Sediment Basin Low-flow Channel and other modifications

As small, 2 m wide, low-flow channel will run the length of the Sediment Basin east bank. The low-flow channel will allow for fish passage during initial, seasonal inflow to the basin. LWD stems with rootballs, and boulders will be added to the low flow channel to promote complexity. Sloping the Sediment Basin invert at 2% toward the low flow channel and installing void-filled grade control weirs flush with the sloping invert will help encourage low flows to concentrate along the east bank.

7 Construction Cost Estimate

A construction cost estimate is being developed; the total cost of the project is expected to be in the range of $3 Million to $4 Million.

8 Maintenance Clean-out of the Sediment Basin

Sediment will accumulate in the sediment basin both laterally and vertically over time, and its efficacy must be maintained by removing accumulated sediment on a regular basis. If the sediment is allowed to accumulate without such maintenance, there will be adverse impacts on the upstream reach (Reach 3), increased risk of flood damage to road and rail infrastructure and adjacent lands, and of course increase

environmental damage to Reach 1 and Nicomen Slough. As the Owner of the Sediment Basin, LFN would be responsible for its maintenance, with the necessary funding provided by ISC.

There is a balance that must be struck between basin design and maintenance requirements. Ideally the basin should be effective enough to capture harmful amounts of sediment for a period of 5 to 10 years without needing to be cleaned out. The high end of that range assumes that flood events over the period carry an average volume of sediment (1,800 m3 as noted in Section 5.7 of this report), and assuming 50-70% of the incoming sediment is retained in the basin. The low end of the range assumes one or two lower probably floods occur over the period. The sediment capture efficiency of the basin will be reduced as it fills. A very large flood, like a 200-year event, would likely fill the basin in a single event and require maintenance clean-out, even if the basin was just maintained a year or two prior.

In today's dollars, each bout of maintenance is likely to cost about $800,000, broken down as follows:

- Mob/ Demob: $20,000
- Quality and Construction Management: $100,000
- Access: $5,000
- Traffic Mgmt.: $40,000
- Environmental Protection: $60,000 (incl. QP fees)
- Excavation to Off-Site: $500,000
- Revegetation: $5,000
- Owner's agent fees: $25,000
- Contingency: $37,750
- **Total $792,750 (round to $800,000)**

Averaged over a 5-to-10-year period, this breaks down to between $80,000 and $160,000 average cost per year. In addition there should be a $5,000 to $10,000 allowance for annual inspection.

As a rule, the basin should be cleaned out to its baseline design condition when sediment accumulation reaches the inverts of both the entrance and exit grade controls, and is continuous across the full length and width of the basin. This equates to about 10,000 m^3 of stored sediment. Additional vertical accumulation of 0.5 m (~15,000 m^3) should not carry much short-term risk, but there should be no delay in cleanout if sediment reaches those level since there will be heightened risk during subsequent fall and winter flood events

Maintenance must be carried out in the least risk window for salmonids, which is in August. The least risk window typically coincides with dry conditions in the creek, with subsurface flow throughout Reaches 1 and 2. Cleanout operations may require 4 to 6 weeks construction time, but regulatory agencies may be willing to extend instream work windows as long as there is no surface water in the

creek and harm to fish can be avoided. There should be standing environmental permits for basin maintenance to avoid administrative delays when maintenance is required.

DISCLAIMER

This report has been prepared by **Northwest Hydraulic Consultants Ltd.** for the benefit of **BC Ministry of Environment and Climate Change Strategy** for specific application to the **Deroche Creek Recovery Solution Project.** The information and data contained herein represent **Northwest Hydraulic Consultants Ltd.** best professional judgment in light of the knowledge and information available to **Northwest Hydraulic Consultants Ltd.** at the time of preparation and was prepared in accordance with generally accepted engineering and geoscience practices.

Except as required by law, this report and the information and data contained herein are to be treated as confidential and may be used and relied upon only by **BC Ministry of Environment and Climate Change Strategy**, its officers and employees. **Northwest Hydraulic Consultants Ltd.** denies any liability whatsoever to other parties who may obtain access to this report for any injury, loss or damage suffered by such parties arising from their use of, or reliance upon, this report or any of its contents.

Report prepared under the direction of:



Des Goold, P.Eng.
Principal

Permit to Practice No: 1003221

9 References

BC Forests, Lands and Natural Resources (2008). Freshwater Atlas Stream Network. GeoBC. [online] Available from: https://apps.gov.bc.ca/pub/geometadata/metadataDetail.do?recoRoadUID=50648&recoRoadSet=ISO19115 (Accessed August 2020)

Campbell, D., & Church, M. (2003). Reconnaissance sediment budgets for Lynn Valley, British Columbia: Holocene and contemporary time scales. *Canadian Journal of Earth Sciences* , 701-713.

Chilliwack Forest District. (2006). *An Overview Assessment of Forest Development-Related Issues in the Deroche Creek Area, Forest License A74688.*

EGBC (2020). *Developing Climate Change-Resilient Designs for Highway Infrastructure in British Columbia V2.0*. [online] Available from: https://www.egbc.ca/getmedia/b60921fc-a820-41be-868f-02f0d3d92892/EGBC-BCMOTI-Climate-Resilient-Design-Highway-V2-0.pdf.aspx.

FPS, F. P. (2011). *Logging in the Deroche Creek Community Watershed.*

Hayco. (2000). *Deroche Creek Flood HazaRoad Management Study.* Vancouver, BC.

Meyer-Peter, E., & Müller, R. (1948). Formulas for Bed-Load transport. *IAHSR 2nd meeting.* Stockholm: IAHR.

Blench, T. (1957). *Regime behaviour of canals and rivers*. Butterworth Scientific Publications, London, UK.

Kerr Wood Leidal Associates Ltd. (2023). Deroche Creek Long-Term Solutions Project, Environmental Assessment Report.

Campbell, D., & Church, M. (2003). Reconnaissance sediment budgets for Lynn Valley, British Columbia: Holocene and contemporary time scales. *Canadian Journal of Earth Sciences* , 701-713.

Chilliwack Forest District. (2006). *An Overview Assessment of Forest Development-Related Issues in the Deroche Creek Area, Forest License A74688.*

EGBC (2020). *Developing Climate Change-Resilient Designs for Highway Infrastructure in British Columbia V2.0*. [online] Available from: https://www.egbc.ca/getmedia/b60921fc-a820-41be-868f-02f0d3d92892/EGBC-BCMOTI-Climate-Resilient-Design-Highway-V2-0.pdf.aspx.

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Hayco. (2000). *Deroche Creek Flood HazaRoad Management Study.* Vancouver, BC.

Meyer-Peter, E., & Müller, R. (1948). Formulas for Bed-Load transport. *IAHSR 2nd meeting.* Stockholm: IAHR.

NHC (2021). Deroche Creek Geomorphological Assessment and Hydrotechnical Scoping, Final Report, preapred for Mott MacDonald Canada Ltd.

NHC. (2000). *Flood and Erosion Damage Mitigation Plan. Water level 1.*

Rapp, C., & Abbe, T. B. (2003). *A Framework for Delineating Channel Migration Zones (#03-06-027).* Ecology Publication. Washington State Department of Transportation and Washington State Department of Ecology.

Rosenau, M., & Angelo, M. (2005). *Conflicts Between Agriculture and Salmon in the Eastern Fraser Valley.* Vancouver, BC:: Pacific Fisheries Resource Conservation Council.

TAC (2004). *Guide to Bridge Hydraulics*. Second Edition. C.R. Neill (Ed.). Thomas TelfoRoad.

USACE (1991). *Hydraulic Design of Flood Control Channels* (EM 1110-2-1601). Engineer Manual. U.S. Army Corps of Engineers, Washington , D.C. 183 pp.

ATTACHMENTS

Tender Drawing Package for the Deroche Recovery Solution Project

ATTACHMENT 1

TENDER DRAWING PACKAGE FOR THE DEROCHE RECOVERY SOLUTION PROJECT

ATTACHMENT 2 – ARCHAEOLOGICAL ASSESSMENT REPORT (SUMMIT, 2023)

Innovation. Integrity.
Employee-Owned.

Appendix B

Design Drawings

KERR WOOD LEIDAL ASSOCIATES LTD.
consulting engineers

DEROCHE CREEK RECOVERY SOLUTION
PROJECT No. 2900712

ISSUED FOR CONSTRUCTION,REVISION 1, JUNE, 2025

DRAWING INDEX		
SHEET No.	SHEET DESCRIPTION	REVISION
001	TITLE SHEET AND PROJECT LOCATION	1
002	EXISTING SITE PLAN	1
003	REACH 1 WORKS - PLAN AND PROFILE VIEWS	1
004	REACH 2 WORKS - PLAN AND PROFILE VIEWS	1
005	REACH 1 - TYPICAL SECTIONS AND PROFILES	1
006	REACH 2 - TYPICAL SECTIONS AND PROFILES	1
007	SEDIMENT BASIN - STANDARD SECTIONS	1
008	LOT 8-3-3 GRADING PLAN	1
009	OFF-SETTING WORKS	1
010	OFF-SETTING WORKS - TYPICAL SECTIONS AND PROFILES	1
011	PLANTING PLAN	1



LOCATION MAP
NOT TO SCALE



SITE MAP
NOT TO SCALE

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REV.	DATE	DESCRIPTION
0	18 FEB 2025	ISSUED FOR CONSTRUCTION
1	05 JUN 2025	ISSUED FOR CONSTRUCTION

nhc northwest hydraulic consultants

SEAL:

PROFESSIONAL ENGINEER D. J. GOOLD # 28281 WITHIN COLUMBIA

2025-06-0

Permit to Practice 1000221

DEROCHE CREEK RECOVERY SOLUTION

TITLE SHEET AND PROJECT LOCATION

DESIGNED:	DJG	SHEET ID:	2900712-DER RS-001	SHEET No:
DRAFTED:	CZZ	STATUS:	ISSUED FOR CONSTRUCTION	001
CHECKED:	DJG	SCALE:	AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE:	5 JUN 2025	REV No: 1

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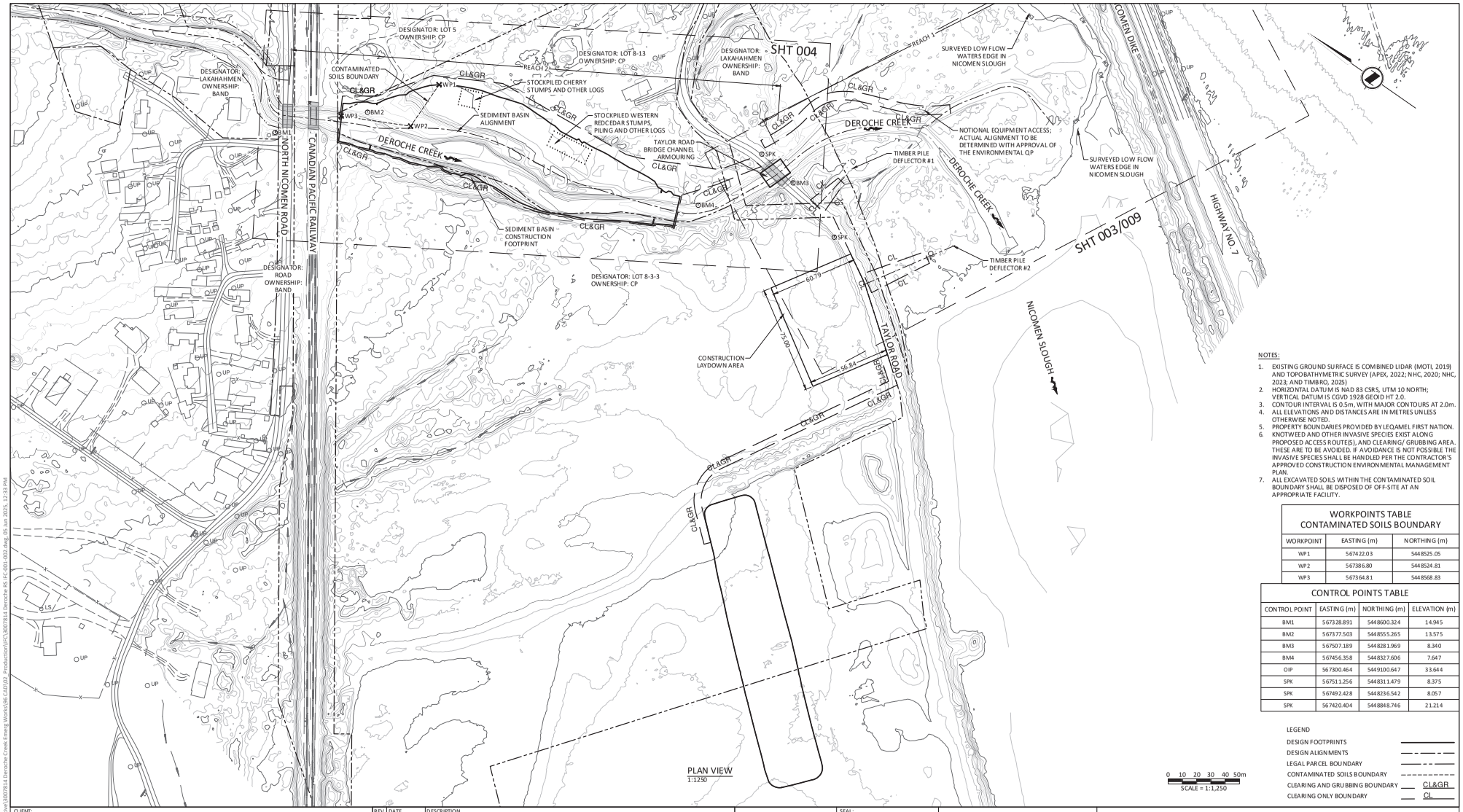

NOTES:

1. EXISTING GROUND SURFACE IS COMBINED LIDAR (MOTI, 2019) AND TOPOBATHYMETRIC SURVEY (APEX, 2022; NHC, 2020; NHC, 2023; AND TIMBRO, 2025)
2. HORIZONTAL DATUM IS NAD 83 CSRS, UTM 10 NORTH; VERTICAL DATUM IS CGVD 1928 GEOID HT 2.0.
3. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
4. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
5. PROPERTY BOUNDARIES PROVIDED BY LEQAMEL FIRST NATION.
6. KNOTWEED AND OTHER INVASIVE SPECIES EXIST ALONG PROPOSED ACCESS ROUTE(S), AND CLEARING/ GRUBBING AREA. THESE ARE TO BE AVOIDED. IF AVOIDANCE IS NOT POSSIBLE THE INVASIVE SPECIES SHALL BE HANDLED PER THE CONTRACTOR'S APPROVED CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN.
7. ALL EXCAVATED SOILS WITHIN THE CONTAMINATED SOIL BOUNDARY SHALL BE DISPOSED OF OFF-SITE AT AN APPROPRIATE FACILITY.

WORKPOINTS TABLE
CONTAMINATED SOILS BOUNDARY

WORKPOINT	EASTING (m)	NORTHING (m)
WP1	567422.03	5448525.05
WP2	567386.80	5448524.81
WP3	567364.81	5448568.83

CONTROL POINTS TABLE

CONTROL POINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
BM1	567328.891	5448600.324	14.945
BM2	567377.503	5448555.265	13.575
BM3	567507.189	5448281.969	8.340
BM4	567456.358	5448327.606	7.647
OIP	567300.464	5449100.647	33.644
SPK	567511.256	5448311.479	8.375
SPK	567492.428	5448236.542	8.057
SPK	567420.404	5448848.746	21.214

LEGEND

DESIGN FOOTPRINTS
DESIGN ALIGNMENTS
LEGAL PARCEL BOUNDARY
CONTAMINATED SOILS BOUNDARY
CLEARING AND GRUBBING BOUNDARY — CL&GR
CLEARING ONLY BOUNDARY — CL

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2025-06-09

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DEROCHE CREEK RECOVERY SOLUTION

SITE PLAN

DESIGNED: DJG	SHEET ID: 2900712-DER RS-002	SHEET No: 002
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APPROVED: DJG	DATE: 5 JUN 2025	REV No: 1

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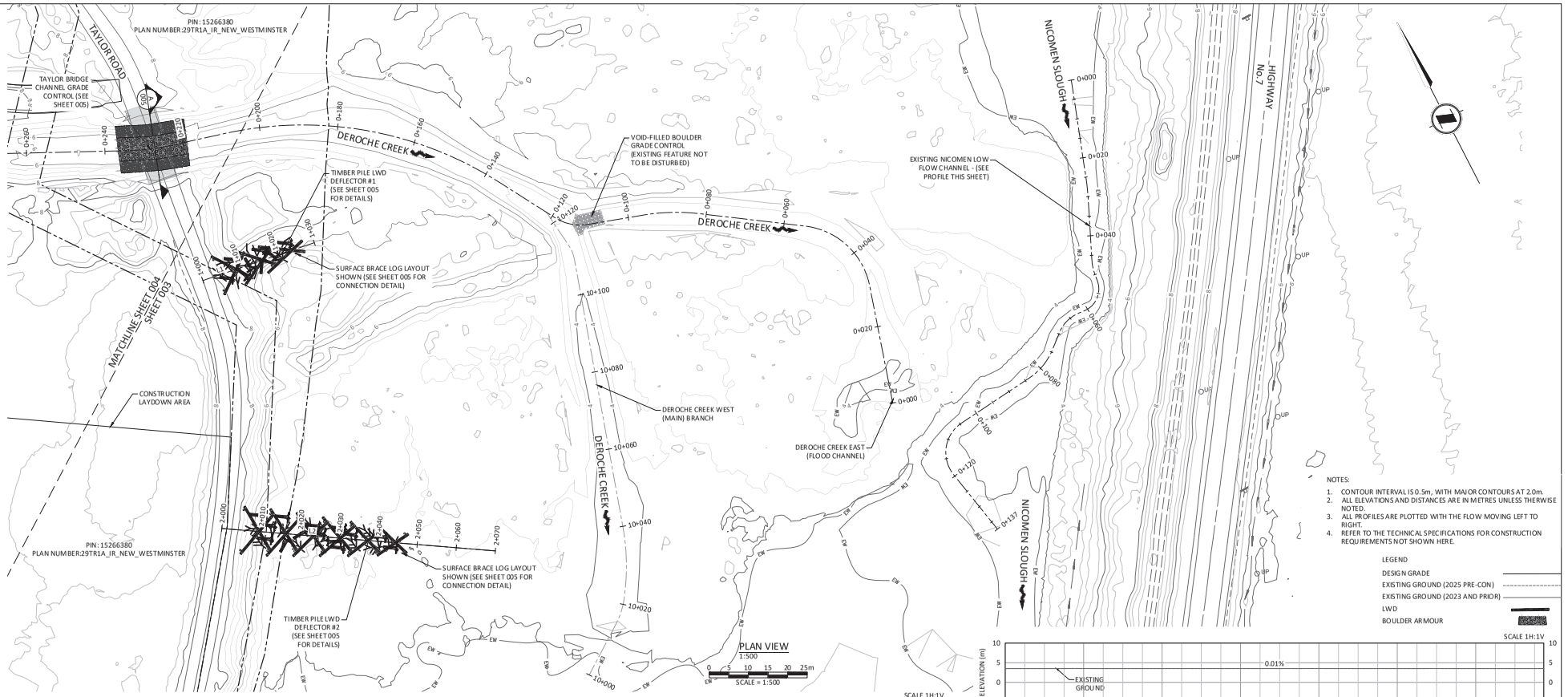
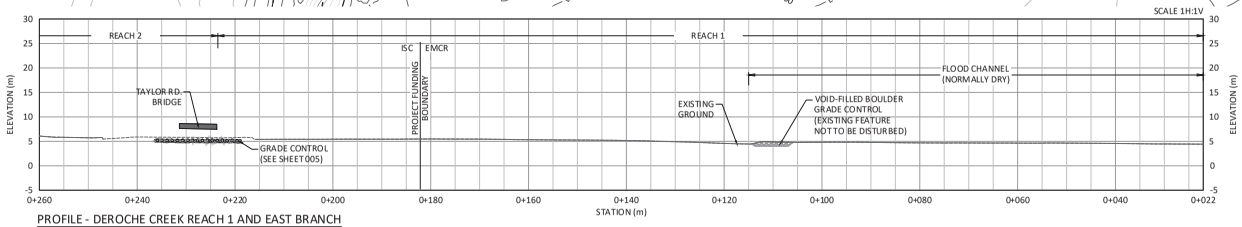


NOTES:

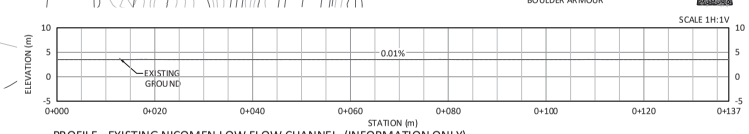
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS THERWISE NOTED.
3. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.
4. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.

LEGEND

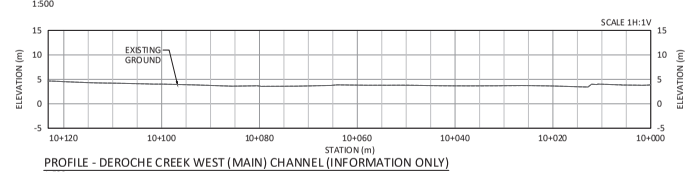
- DESIGN GRADE
- EXISTING GROUND (2025 PRE-CON)
- EXISTING GROUND (2023 AND PRIOR)
- LWD
- BOULDER ARMOUR



PROFILE - DEROCHE CREEK REACH 1 AND EAST BRANCH
1:500



PROFILE - EXISTING NICOMEN LOW FLOW CHANNEL (INFORMATION ONLY)
1:500



PROFILE - DEROCHE CREEK WEST (MAIN) CHANNEL (INFORMATION ONLY)
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DEROCHE CREEK RECOVERY SOLUTION

REACH 1 WORKS

PLAN AND PROFILE

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DRAFTED:	CZZ	STATUS:	ISSUED FOR CONSTRUCTION	003
CHECKED:	DJG	SCALE:	AS SHOWN WHEN PLOTTED D SIZE	
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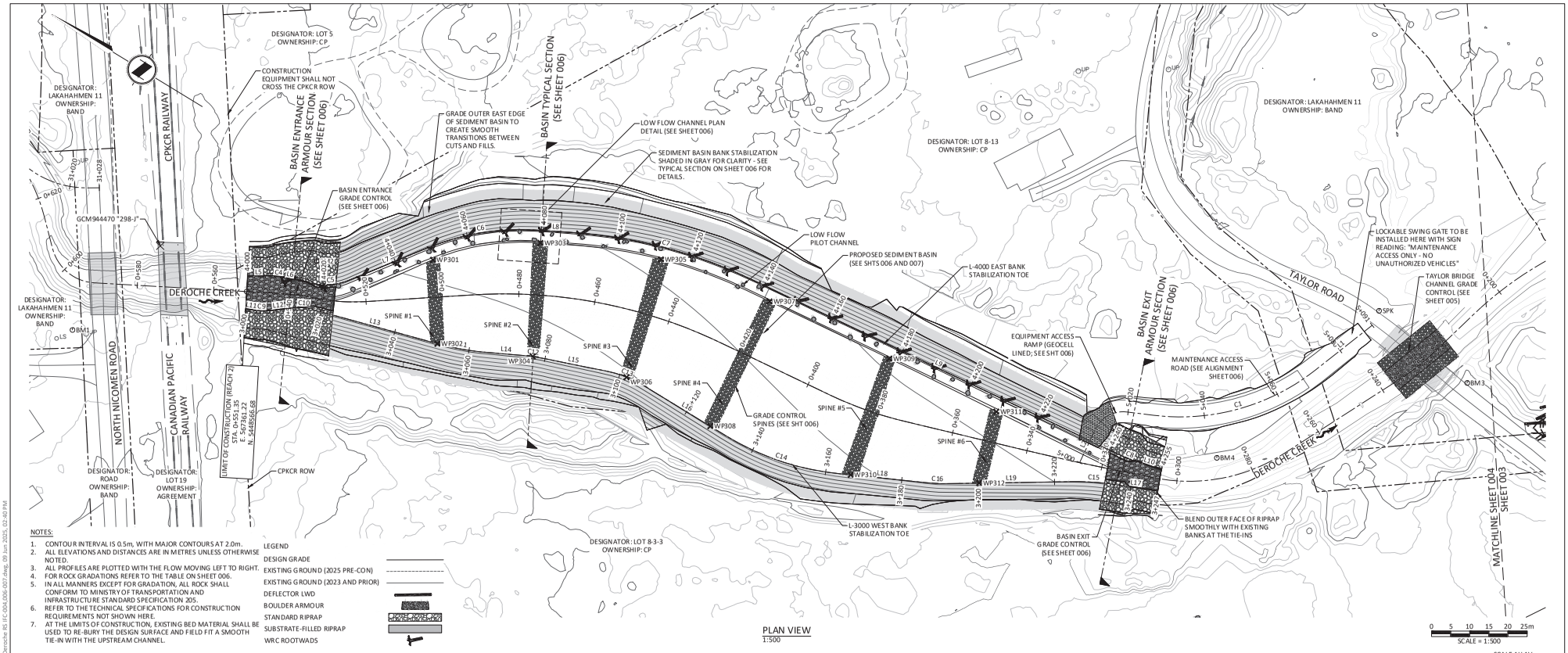


PLAN VIEW
1:500

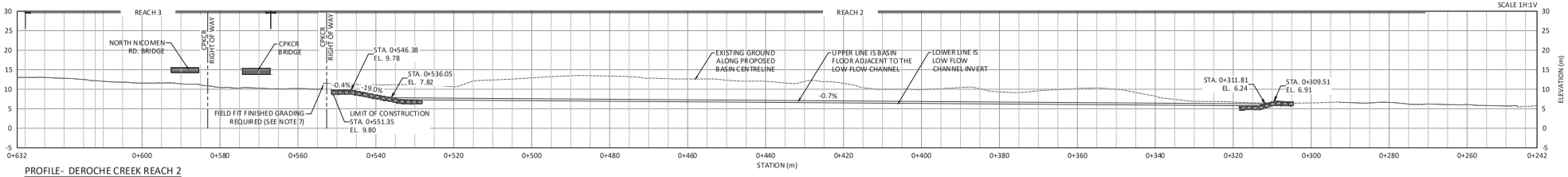
0 5 10 15 20 25m
SCALE = 1:500

NOTES:

1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
3. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.
4. FOR ROCK GRADATIONS REFER TO THE TABLE ON SHEET 006.
5. IN ALL MANNERS EXCEPT FOR GRADATION, ALL ROCK SHALL CONFORM TO MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE STANDARD SPECIFICATION 205.
6. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.
7. AT THE LIMITS OF CONSTRUCTION, EXISTING BED MATERIAL SHALL BE USED TO RE-BURY THE DESIGN SURFACE AND FIELD FIT A SMOOTH TIE-IN WITH THE UPSTREAM CHANNEL.

LEGEND

- DESIGN GRADE
- EXISTING GROUND (2025 PRE-CON)
- EXISTING GROUND (2023 AND PRIOR)
- DEFLECTOR LWD
- BOULDER ARMOUR
- STANDARD RIPRAP
- SUBSTRATE-FILLED RIPRAP
- WRC ROOTWADS



PROFILE- DEROCHE CREEK REACH 2
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BRITISH COLUMBIA

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2025-06-09
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DEROCHE CREEK RECOVERY SOLUTION
REACH 2 WORKS

PLAN AND PROFILE VIEWS

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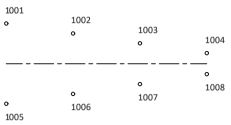

PILING PLAN - DEFLECTOR #1
1:250

PILE LAYOUT TABLE - DEFLECTOR #1		
PILE #	EASTING (m)	NORTHING (m)
1001	567505.93	5448262.56
1002	567512.54	5448260.55
1003	567519.16	5448258.55
1004	567525.77	5448256.55
1005	567504.73	5448254.45
1006	567511.63	5448254.44
1007	567518.54	5448254.43
1008	567525.45	5448254.42

TIMBER PILE DEFLECTOR #1 ALIGNMENT LAYOUT						
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L1	1+000.000	567501.20	5448259.12	098° 28' 01.01"	30.000	

WORKPOINT TABLE - TAYLOR BRIDGE ARMOURING		
PILE #	EASTING (m)	NORTHING (m)
101	567495.22	5448292.99
102	567504.69	5448288.95
103	567496.24	5448295.82
104	567505.12	5448291.93
105	567498.26	5448301.47
106	567505.97	5448297.91
107	567499.27	5448304.29
108	567506.40	5448301.04
109	567515.67	5448298.00
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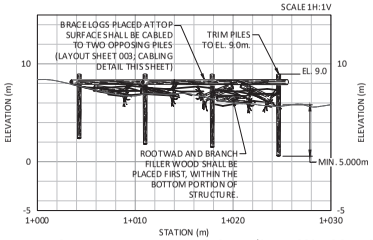

PROFILE - TIMBER PILE DEFLECTOR #1 (SHEET 003; LOOKING NORTH)
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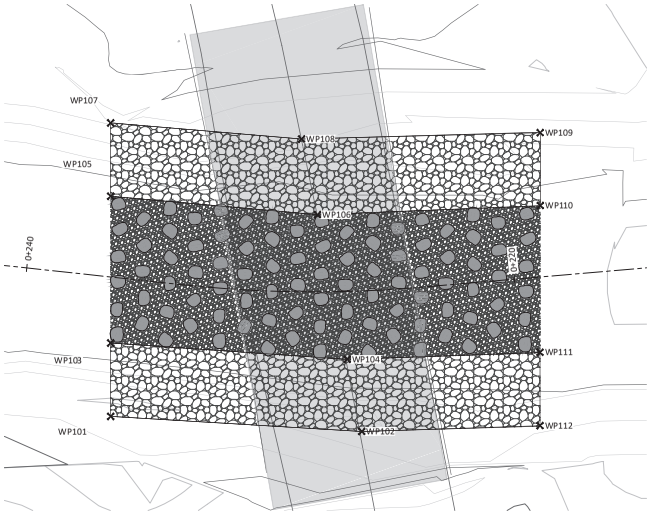


TAYLOR BRIDGE CHANNEL ARMOURING
1:150

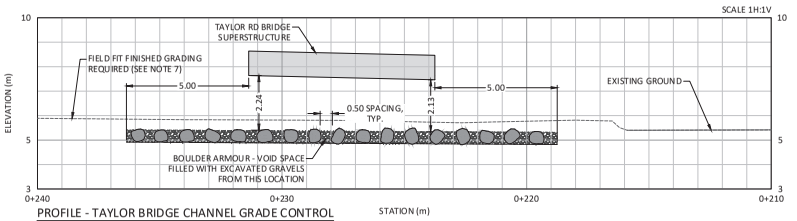


PILING PLAN - DEFLECTOR #2
1:250

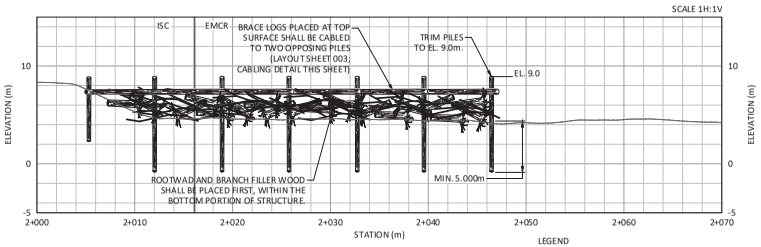
PILE LAYOUT TABLE - DEFLECTOR #2		
PILE #	EASTING (m)	NORTHING (m)
2001	567483.71	5448202.35
2002	567489.33	5448198.33
2003	567494.95	5448194.32
2004	567500.57	5448190.30
2005	567506.19	5448186.28
2006	567511.81	5448182.26
2007	567517.43	5448178.24

PILE LAYOUT TABLE - DEFLECTOR #2		
PILE #	EASTING (m)	NORTHING (m)
2008	567478.26	5448193.60
2009	567484.35	5448190.33
2010	567490.43	5448187.06
2011	567496.52	5448183.79
2012	567502.61	5448180.52
2013	567508.69	5448177.25
2014	567514.78	5448173.98

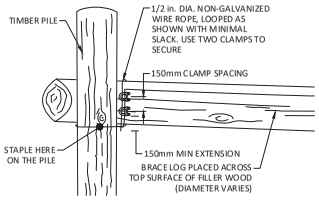
TIMBER PILE DEFLECTOR #2 ALIGNMENT LAYOUT						
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L2	2+000.000	567476.59	5448200.71	121° 53' 59.96"	70.000	



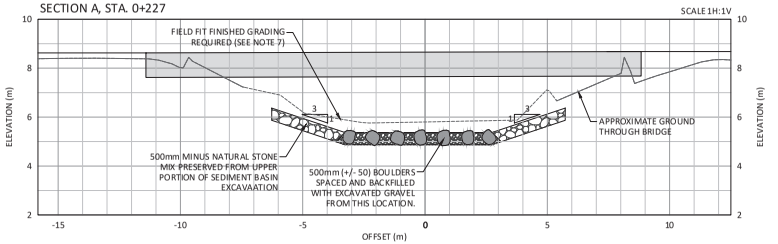
PROFILE - TAYLOR BRIDGE CHANNEL GRADE CONTROL (SHEET 003; LOOKING EAST)
1:100



PROFILE - TIMBER PILE DEFLECTOR #2 (SHEET 003; LOOKING NORTH)
1:250



BRACE LOG CABLING DETAIL
1:25



A 003 TAYLOR BRIDGE CHANNEL GRADE CONTROL (LOOKING SOUTH)
1:100

LEGEND
- DESIGN GRADE
- EXISTING GROUND (2025 PRE-CON)
- EXISTING GROUND (2023 AND PRIOR)
- LARGE WOODY DEBRIS
- TIMBER PILE
- VOID-FILLED BOULDER ARMOURING

NOTES:
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
3. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.
4. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
5. IN ALL MANNERS EXCEPT FOR GRADATION, ROCK QUALITY SHALL CONFORM TO MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE STANDARD SPECIFICATION 205.
6. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.
7. AT TAYLOR BRIDGE EXISTING BED MATERIAL SHALL BE USED TO RE-BURY THE DESIGN SURFACE AND FIELD FIT A SMOOTH TIE-IN WITH THE CHANNEL UP- AND DOWNSTREAM.

CLIENT:
BRITISH COLUMBIA — Ministry of Environment and Climate Change Strategy

REV	DATE	DESCRIPTION
0	18 FEB 2025	ISSUED FOR CONSTRUCTION
1	05 JUN 2025	ISSUED FOR CONSTRUCTION

nhc northwest hydraulic consultants

SEAL:
PROFESSIONAL ENGINEER — D. J. GOULD — # 28281 — PROVINCE OF BRITISH COLUMBIA — ENGINEERS
2025-06-09
Permit to Practice 1000021

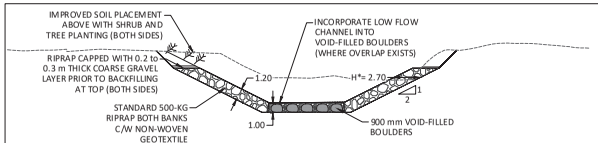
DEROCHE CREEK RECOVERY SOLUTION
REACH 1

TYPICAL SECTIONS AND PROFILE DETAILS

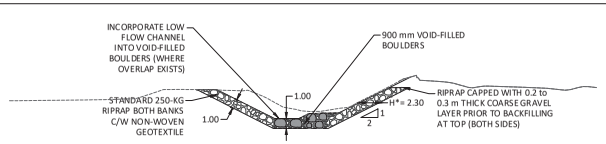
DESIGNED: DJG	SHEET ID: 2900712-DER RS-005		SHEET No: 005
DRAFTED: CZZ	STATUS: ISSUED FOR CONSTRUCTION		
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 9 JUN 2025	REV No: 1	

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

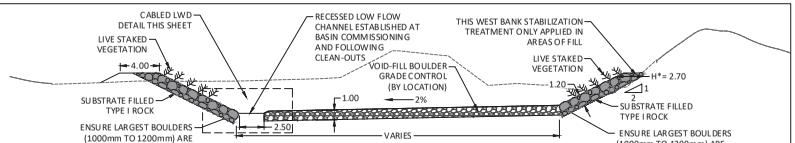
FILENAME: \\nanaimo-van\Projects\Active\2900712 Deroche Creek Emerg Works\06 CAD\02_Production\PC\2900712 Deroche RS IFC-003,005.dwg, 09 Jun 2025, 02:37 PM



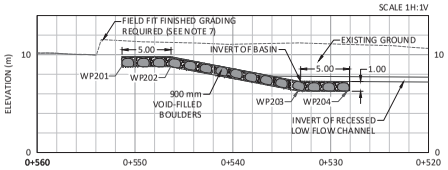
TYPICAL SECTION - BASIN ENTRANCE ARMOUR (SEE SHEET 004)
1:250



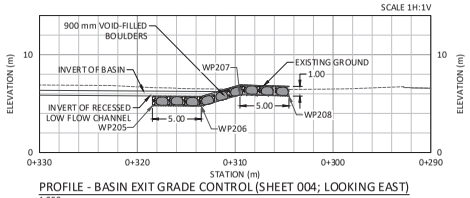
TYPICAL SECTION - BASIN EXIT ARMOUR (SEE SHEET 004)
1:250



TYPICAL SECTION - BASIN (SEE SHEET 004)
1:250



PROFILE - BASIN ENTRANCE GRADE CONTROL (SHEET 004; LOOKING EAST)
1:250



PROFILE - BASIN EXIT GRADE CONTROL (SHEET 004; LOOKING EAST)
1:250

WEST BANK STABILIZATION ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L11	3+000.000	567357.14	5448564.62	157° 30' 27.32"	2.803	
C9	3+002.803	567358.21	5448562.03	149° 56' 14.47"	2.907	11.000
L12	3+005.709	567359.66	5448559.52	142° 22' 01.61"	7.605	
C10	3+013.314	567364.30	5448553.50	153° 08' 19.07"	3.948	10.500
L13	3+017.262	567366.08	5448550.00	163° 54' 36.53"	34.242	
C11	3+051.504	567375.57	5448517.10	158° 44' 00.11"	12.649	70.000
L14	3+064.153	567380.15	5448505.32	153° 33' 23.68"	10.947	
C12	3+075.100	567385.02	5448495.52	156° 43' 38.64"	3.320	30.000
L15	3+078.420	567386.34	5448492.47	159° 53' 53.60"	17.959	
C13	3+096.379	567392.51	5448475.61	169° 55' 09.83"	10.494	30.000
L16	3+106.873	567394.33	5448465.33	179° 56' 26.06"	25.234	
C14	3+132.107	567394.36	5448440.09	167° 11' 53.43"	31.136	70.000
L18	3+163.243	567401.20	5448409.98	154° 27' 20.79"	23.184	
C16	3+186.427	567411.20	5448389.07	151° 03' 18.30"	5.935	50.000
L19	3+192.362	567414.07	5448383.87	147° 39' 15.81"	32.521	
C15	3+224.884	567431.47	5448356.40	152° 15' 55.54"	10.462	65.000
L17	3+235.346	567436.33	5448347.15	156° 52' 35.26"	11.832	

EAST BANK STABILIZATION ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L5	4+000.000	567364.60	5448568.54	148° 11' 05.50"	5.815	
C4	4+005.815	567367.66	5448563.59	154° 10' 14.71"	4.387	20.995
C5	4+017.349	567372.00	5448552.93	143° 10' 38.73"	9.399	15.858
L7	4+026.748	567377.55	5448545.52	126° 11' 53.53"	22.305	
C6	4+049.053	567395.55	5448532.34	139° 21' 17.98"	29.393	64.000
L8	4+078.446	567414.53	5448510.24	152° 30' 42.42"	9.419	
C7	4+087.864	567418.87	5448501.88	163° 16' 57.04"	48.500	129.000
L9	4+136.364	567432.74	5448455.70	174° 03' 11.66"	107.249	
C8	4+243.613	567443.85	5448349.03	170° 38' 17.75"	3.576	30.000
L10	4+247.189	567444.43	5448345.51	167° 13' 23.84"	7.393	

ENTRANCE GRADE CONTROL WORKPOINTS TABLE

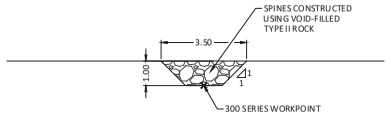
WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP201	567361.22	5448566.68	8.80
WP202	567363.57	5448562.29	8.74
WP203	567369.12	5448550.51	6.30
WP204	567371.06	5448545.87	6.26

EXIT GRADE CONTROL WORKPOINTS TABLE

WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP201	567361.22	5448566.68	8.80
WP202	567363.57	5448562.29	8.74
WP203	567369.12	5448550.51	6.30
WP204	567371.06	5448545.87	6.26

BASIN MAINTENANCE ACCESS ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L2	5+000.000	567436.58	5448357.58	083° 59' 09.03"	9.673	
C2	5+009.673	567446.20	5448358.59	119° 46' 07.66"	9.992	8.000
C1	5+026.784	567457.27	5448347.47	132° 57' 25.88"	44.956	57.000
L1	5+071.740	567489.32	5448317.62	110° 21' 45.47"	18.959	



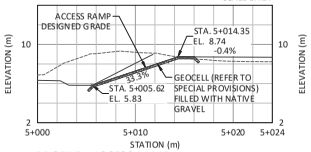
TYPICAL SECTION - GRADE CONTROL SPINE
1:100

GRADE CONTROL SPINE WORKPOINTS TABLE

WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP301	567393.69	5448529.45	6.39
WP302	567375.58	5448517.03	6.83
WP303	567412.07	5448507.78	6.12
WP304	567385.73	5448494.04	6.72
WP305	567424.84	5448478.65	5.90
WP306	567393.90	5448470.28	6.55

GRADE CONTROL SPINE WORKPOINTS TABLE

WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP307	567430.27	5448448.70	5.69
WP308	567394.39	5448444.92	6.41
WP309	567433.83	5448414.20	5.45
WP310	567402.65	5448406.96	6.09
WP311	567436.62	5448383.10	5.36
WP312	567418.34	5448377.21	5.74



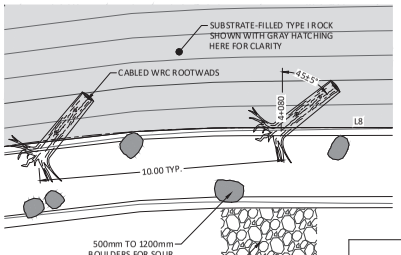
PROFILE - ACCESS RAMP (SHEET 004; LOOKING NORTH)
1:250

WEST BANK STABILIZATION OFFSET/ELEVATION TABLE

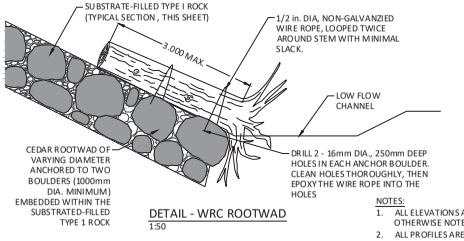
STATION	O/S TO TOE OF CUT	ELEV TOE OF CUT	O/S TO TOP OF CUT	ELEV TOP OF CUT
3+000.000	0.16	8.60	7.53	12.31
3+002.803	0.11	8.60	7.36	12.24
3+005.709	0.13	8.48	7.86	12.16
3+010.000	0.14	7.65	9.60	12.08
3+013.314	0.15	6.99	10.86	11.95
3+017.262	-0.64	6.20	10.85	11.96
3+020.000	-0.84	6.09	10.73	11.90
3+030.000	0.27	6.63	10.39	11.84
3+040.000	0.27	6.63	9.79	11.66
3+050.000	0.27	6.62	9.33	11.41
3+060.000	0.26	6.61	9.19	11.19
3+070.000	0.28	6.56	9.56	11.22
3+080.000	0.28	6.49	9.37	11.08
3+090.000	0.28	6.43	9.00	10.79
3+096.379	0.28	6.37	8.44	10.44
3+100.000	0.31	6.34	8.31	10.35
3+110.000	0.28	6.29	8.07	10.28
3+120.000	0.28	6.24	8.05	10.16
3+130.000	0.28	6.19	7.39	9.77
3+140.000	0.26	6.13	7.32	9.66
3+150.000	0.27	6.05	7.49	9.69
3+160.000	0.21	5.95	7.51	9.66
3+170.000	0.28	5.84	7.41	9.46
3+180.000	0.28	5.75	7.34	9.30
3+190.000	0.28	5.65	7.09	9.13
3+200.000	0.27	5.53	6.94	8.96
3+210.000	0.27	5.42	6.97	8.85
3+220.000	0.28	5.30	7.07	8.77
3+230.000	0.28	5.19	7.34	8.74
3+235.346	-0.91	4.77	6.98	8.72
3+240.000	0.10	5.31	6.72	8.73
3+247.178	0.11	5.77	5.96	8.70

EAST BANK STABILIZATION OFFSET/ELEVATION TABLE

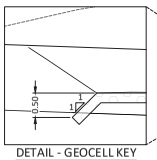
STATION	O/S TO TOE OF CUT	ELEV TOE OF CUT	O/S TO TOP OF CUT	ELEV TOP OF CUT
4+000.000	0.37	8.60	7.77	12.30
4+003.275	0.37	8.60	7.62	12.26
4+007.661	0.37	8.24	8.24	12.15
4+010.000	0.39	7.90	8.78	12.11
4+017.298	-0.41	6.40	10.54	11.97
4+020.000	-0.50	6.09	10.78	11.92
4+026.696	0.46	6.43	10.49	11.86
4+030.000	0.32	6.39	10.09	11.82
4+040.000	0.27	6.25	10.24	11.59
4+050.000	0.21	6.12	10.06	11.37
4+060.000	0.12	6.01	10.43	11.29
4+070.000	0.06	5.92	10.44	11.14
4+080.000	0.21	5.85	10.60	11.05
4+090.000	0.18	5.79	10.50	10.96
4+100.000	0.18	5.71	10.07	10.67
4+110.000	0.21	5.65	9.60	10.34
4+120.000	0.25	5.58	9.63	10.27
4+130.000	0.26	5.52	9.66	10.22
4+136.313	0.22	5.47	9.45	10.08
4+140.000	0.27	5.45	9.37	10.00
4+150.000	0.28	5.38	9.01	9.74
4+160.000	0.28	5.31	8.98	9.66
4+170.000	0.28	5.24	9.17	9.68
4+180.000	0.28	5.17	8.77	9.46
4+190.000	0.28	5.13	8.36	9.26
4+200.000	0.28	5.10	8.10	9.10
4+210.000	0.28	5.08	7.83	8.93
4+220.000	0.28	5.05	7.68	8.83
4+230.000	0.28	5.03	7.58	8.77
4+240.000	0.27	5.00	7.07	8.73
4+243.562	-0.61	4.76	7.16	8.73
4+247.138	0.19	5.16	6.93	8.73
4+250.000	0.35	5.90	5.87	8.67
4+254.531	0.34	5.77	6.17	8.69



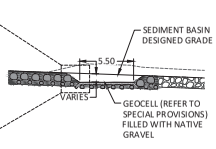
DETAIL - LOW FLOW CHANNEL PLAN
1:100



DETAIL - WRC ROOTWAD
1:50



DETAIL - GEOCELL KEY
1:50



TYPICAL SECTION - ACCESS RAMP (LOOKING WEST)
1:250

GRADATION TABLE - IMPORTED ROCK MATERIALS

	ROCK DIAMETER (mm)					
	250-KG RIPRAP	500-KG RIPRAP	TYPE I ROCK	TYPE II ROCK	900mm BOULDERS	500mm BOULDERS
D_{100}	1000	1250	1250	750	-	-
D_{85}	830	1050	1050	610	-	-
D_{50}	575	725	725	425	900 (± 100)	500 (± 50)
D_{35}	270	340	550	350	-	-
D_0	200	250	450	300	-	-

NOTES:
1. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
2. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.
3. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
4. FOR ROCK GRADATIONS REFER TO THE TABLE ON THIS SHEET.
5. IN ALL MANNERS EXCEPT FOR GRADATION, ROCK QUALITY SHALL CONFORM TO MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE STANDARD SPECIFICATION 205.
6. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.
7. AT THE LIMITS OF CONSTRUCTION, EXISTING BED MATERIAL SHALL BE USED TO RE-BURY THE DESIGN SURFACE AND FIELD FIT A SMOOTH TIE-IN WITH THE UPSTREAM CHANNEL.

LEGEND
DESIGN GRADE
EXISTING GROUND (2025 PRE-CON)
EXISTING GROUND (2023 AND PRIOR)
SUBSTRATE FILLED RIPRAP
BOULDER ARMOUR
STANDARD RIPRAP
6-INCH MINUS STREAM GRAVEL

CLIENT:
BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

REV	DATE	DESCRIPTION
0	18 FEB 2025	ISSUED FOR CONSTRUCTION
1	05 JUN 2025	ISSUED FOR CONSTRUCTION

nhc northwest hydraulic consultants

SEAL:
PROFESSIONAL ENGINEER
D. J. GOOD
29281
PROVINCE OF BRITISH COLUMBIA
2025-06-09
Permit to Practice 1000021

DEROCHE CREEK RECOVERY SOLUTION
REACH 2
TYPICAL SECTIONS AND PROFILE DETAILS

DESIGNED:	DJG	SHEET ID: 2900712-DER RS-006	SHEET No: 006
DRAFTED:	CZZ	STATUS: ISSUED FOR CONSTRUCTION	
CHECKED:	DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE: 9 JUN 2025	REV No: 1

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

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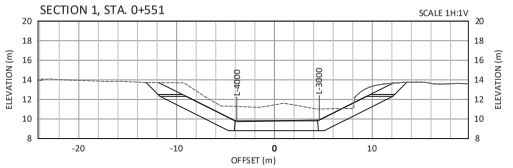
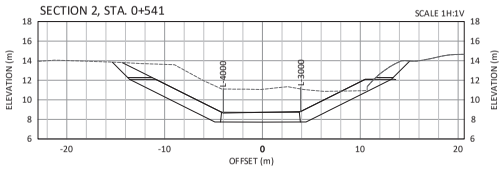
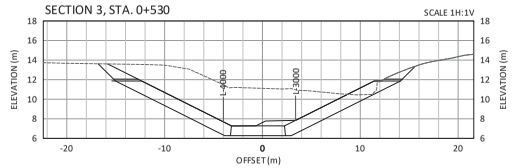
SECTION 1, STA. 0+551



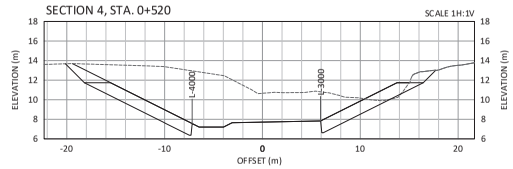
SECTION 2, STA. 0+541



SECTION 3, STA. 0+530



SECTION 4, STA. 0+520



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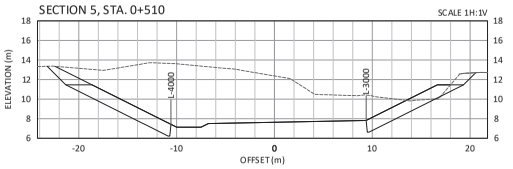

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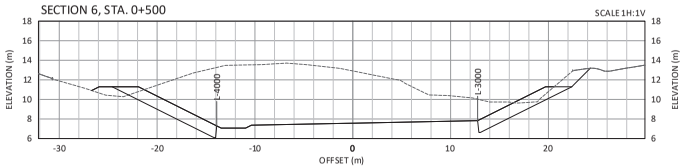
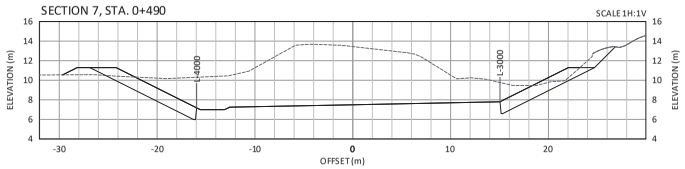


SECTION 7, STA. 0+490



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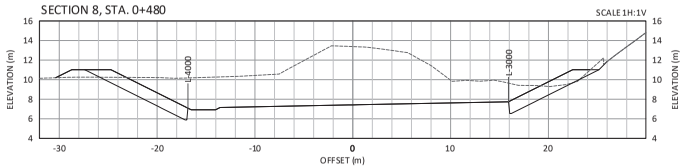

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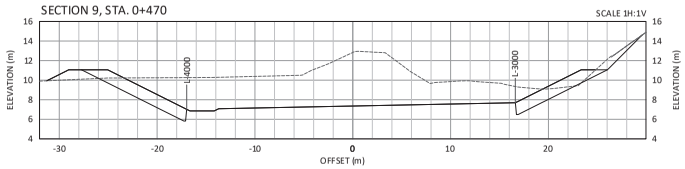
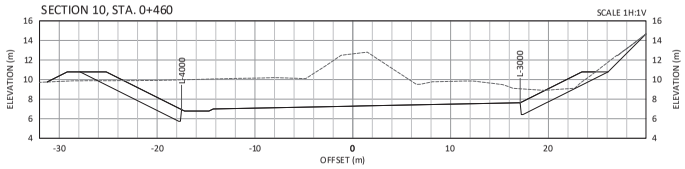
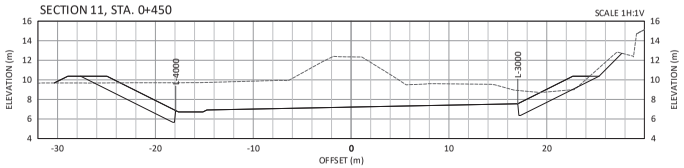


SECTION 10, STA. 0+460



SECTION 11, STA. 0+450



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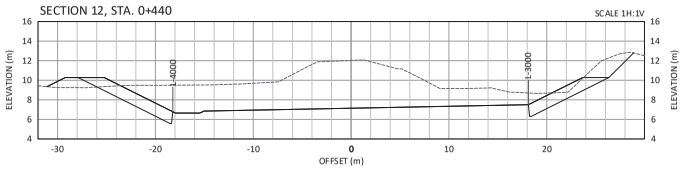
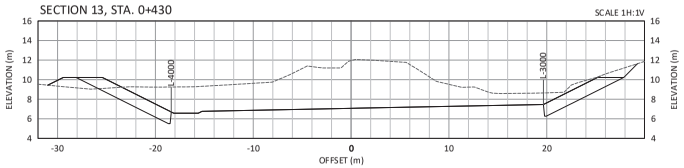
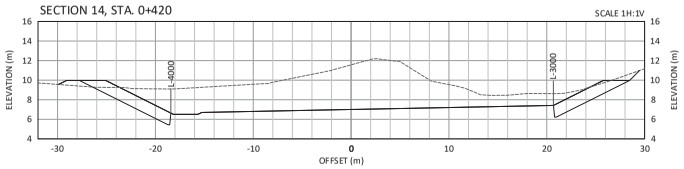


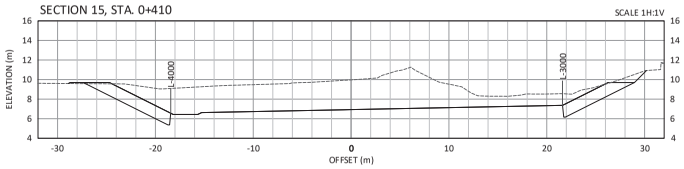
SECTION 13, STA. 0+430



SECTION 14, STA. 0+420



SECTION 15, STA. 0+410



LEGEND

DESIGN GRADE

EXISTING GROUND (2025 PRE-CON)

EXISTING GROUND (2023 AND PRIOR)

NOTES:

1. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
2. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
3. REFER TO SHEET 006 FOR L-3000 AND L-4000 ALIGNMENT TABLES, AND OFFSET/ ELEVATION TABLES

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
0	18 FEB 2025	ISSUED FOR CONSTRUCTION
1	05 JUN 2025	ISSUED FOR CONSTRUCTION

nhc northwest hydraulic consultants

SEAL:

PROFESSIONAL ENGINEER D. J. GOOLD # 28281 WATER COLUMBIA

2025-06-09

Permit to Practice 1000221

DEROCHE CREEK RECOVERY SOLUTION

SEDIMENT BASIN

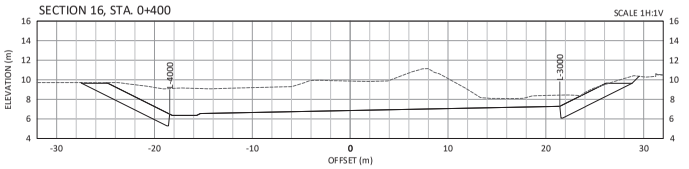
STANDARD SECTIONS

DESIGNED:	DJG	SHEET ID:	2900712-DER RS-007A	SHEET No:
DRAFTED:	CZZ	STATUS:	ISSUED FOR CONSTRUCTION	007A
CHECKED:	DJG	SCALE:	AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE:	9 JUN 2025	REV No: 1

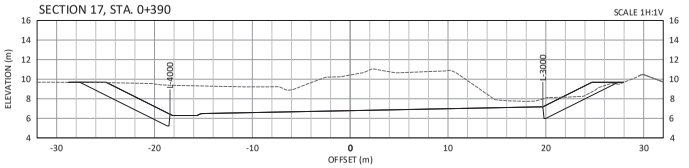
SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\mainfile-van\Projects\Active\3007814 Deroche Creek Emerg Works\96 CAD\02_Production\IFC\3007814 Deroche RS IFC-004,006-007.dwg, 09 Jun 2025, 02:40 PM

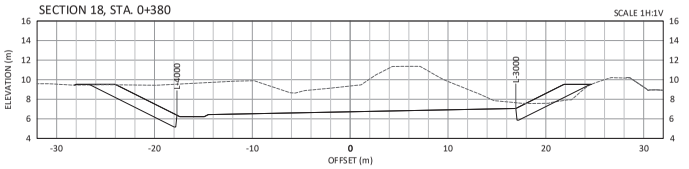
SECTION 16, STA. 0+400



SECTION 17, STA. 0+390



SECTION 18, STA. 0+380



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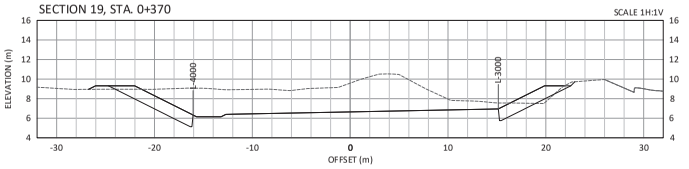
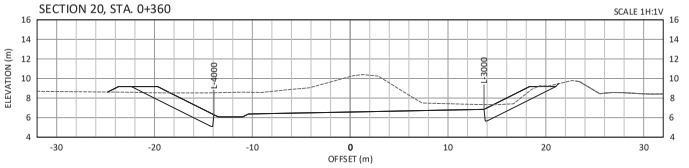
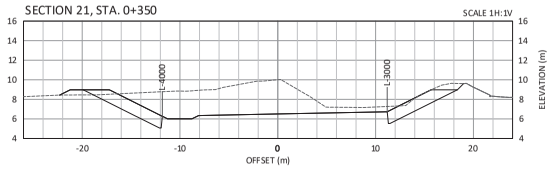


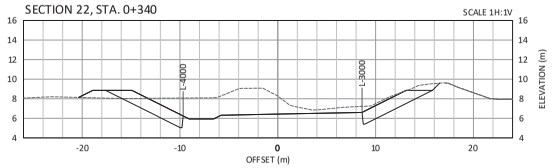
SECTION 20, STA. 0+360



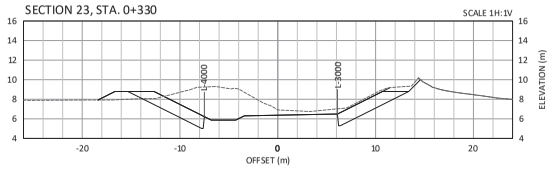
SECTION 21, STA. 0+350



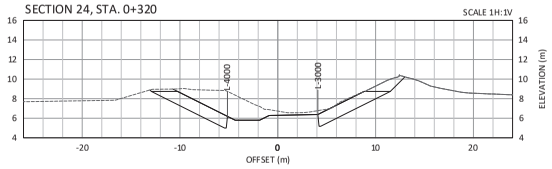
SECTION 22, STA. 0+340



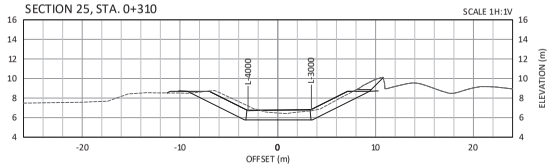
SECTION 23, STA. 0+330



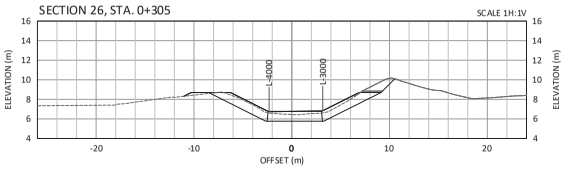
SECTION 24, STA. 0+320



SECTION 25, STA. 0+310



SECTION 26, STA. 0+305



LEGEND

DESIGN GRADE

EXISTING GROUND (2025 PRE-CON)

EXISTING GROUND (2023 AND PRIOR)

NOTES:

1. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
2. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
3. REFER TO SHEET 006 FOR L-3000 AND L-4000 ALIGNMENT TABLES, AND OFFSET/ ELEVATION TABLES

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
0	18 FEB 2025	ISSUED FOR CONSTRUCTION
1	05 JUN 2025	ISSUED FOR CONSTRUCTION

nhc northwest hydraulic consultants

SEAL:

PROFESSIONAL ENGINEER D. J. GOOLD # 28281 BRITISH COLUMBIA

2025-06-09

Permit to Practice 1000221

DEROCHE CREEK RECOVERY SOLUTION

SEDIMENT BASIN

STANDARD SECTIONS

DESIGNED:	DJG	SHEET ID:	2900712-DER RS-007B	SHEET No:
DRAFTED:	CZZ	STATUS:	ISSUED FOR CONSTRUCTION	007B
CHECKED:	DJG	SCALE:	AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE:	9 JUN 2025	REV No: 1

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\mainfile-van\Projects\Active\3007814 Deroche Creek Emerg Works\96 CAD\02_Production\IFC\3007814 Deroche RS IFC-004,006-007.dwg, 09 Jun 2025, 02:40 PM

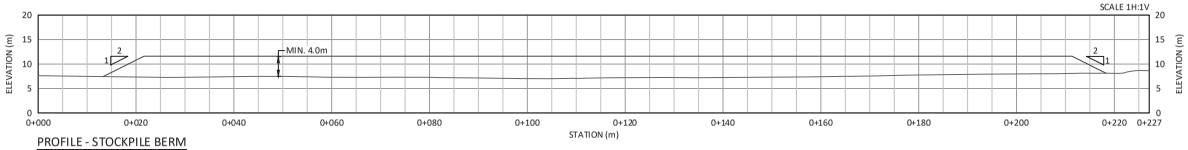


PLAN VIEW - LOT 8-3-3
1:1000

SCALE = 1:1,000



TYPICAL SECTION - STOCKPILE BERM
1:500



PROFILE - STOCKPILE BERM
1:500

NOTES:
1. EXISTING GROUND SURFACE IS LIDAR (MOTI, 2019).
2. HORIZONTAL DATUM IS NAD 83 CSRS, UTM 10 NORTH; VERTICAL DATUM IS CGVD 1928 GEOID HT 2.0.
3. REFER TO DRAWING SHEET 002 FOR CONTROL TABLE.
4. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
5. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
6. PROPERTY BOUNDARIES PROVIDED BY LEQAMEL FIRST NATION.
7. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.

LEGEND
PROPERTY BOUNDARIES
DESIGN GRADE
EXISTING GROUND (2023 AND PRIOR)

CLIENT:
BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

REV	DATE	DESCRIPTION
0	18 FEB 2025	ISSUED FOR CONSTRUCTION
1	05 JUN 2025	ISSUED FOR CONSTRUCTION

nhc northwest hydraulic consultants

SEAL:
PROFESSIONAL ENGINEER
D. J. GOULD
28281
BRITISH COLUMBIA
ENGINEERS
2025-06-05
Permit to Practice 1000021

DEROCHE CREEK RECOVERY SOLUTION
REACH 2
LOT 8-3-3 GRADING

DESIGNED: DJG	SHEET ID: 2900712-DER RS-008		SHEET No: 008
DRAFTED: CZZ	STATUS: ISSUED FOR CONSTRUCTION		
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 5 JUN 2025	REV No: 1	

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nanlfile-van\Projects\Active\2900712 Deroche Creek Emerg Works\06 CAD\02_Production\PC\2900712 Deroche RS PC-008.dwg, 05 Jun 2025, 12:53 PM



NOTES:
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
3. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.

LEGEND
DESIGN FOOTPRINTS
DESIGN ALIGNMENTS
DEFLECTOR LWD
WRC ROOTWADS

0 5 10 15 20 25m
SCALE = 1:500

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
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1	05 JUN 2025	ISSUED FOR CONSTRUCTION

nhc northwest hydraulic consultants

SEAL:

PROFESSIONAL ENGINEER D. J. GOOLD # 28281 BRITISH COLUMBIA
2025-06-09
Permit to Practice 1003021

DEROCHE CREEK RECOVERY SOLUTION
OFF-SETTING WORKS
PLAN

DESIGNED: DJG	SHEET ID: 2900712-DER RS-009	SHEET No: 009
DRAFTED: CZZ	STATUS: ISSUED FOR CONSTRUCTION	
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED: DJG	DATE: 5 JUN 2025	REV No: 1

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

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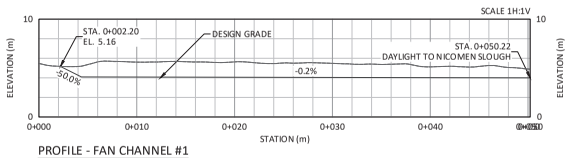
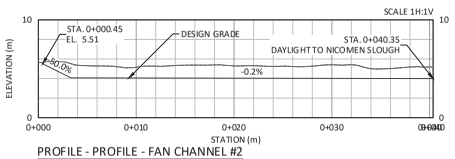
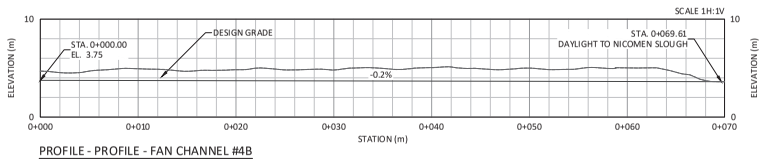


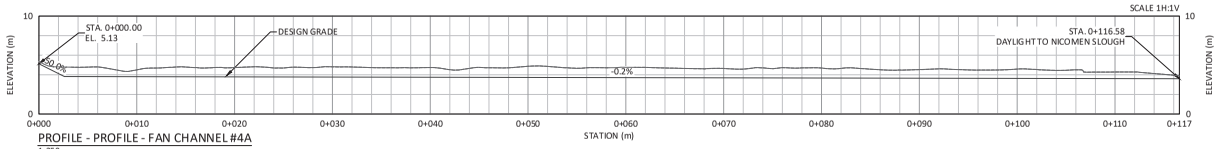
PROFILE - FAN CHANNEL #1
1:250



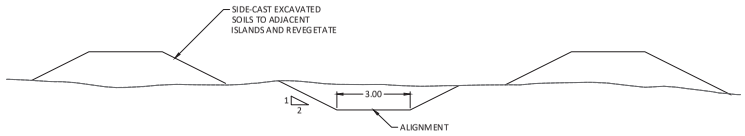
PROFILE - PROFILE - FAN CHANNEL #2
1:250



PROFILE - PROFILE - FAN CHANNEL #4B
1:250



PROFILE - PROFILE - FAN CHANNEL #4A
1:250



TYPICAL SECTION, FAN CHANNEL 1-4 (SEE SHEET 006)
1:100

FAN CHANNEL 1 ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L1	0+000.000	567581.74	5448355.64	120° 08' 23.70"	5.708	
C1	0+005.708	567586.68	5448352.77	079° 47' 38.43"	7.042	5.000
L2	0+012.750	567593.05	5448353.92	039° 26' 53.15"	2.514	
C2	0+015.264	567594.65	5448355.86	088° 01' 06.32"	15.259	9.000
L3	0+030.522	567608.14	5448356.33	136° 35' 19.49"	4.601	
C3	0+035.123	567611.30	5448352.98	090° 20' 15.26"	11.301	7.000
L4	0+046.425	567621.41	5448352.92	044° 05' 11.03"	3.796	

FAN CHANNEL 2 ALIGNMENT LAYOUT

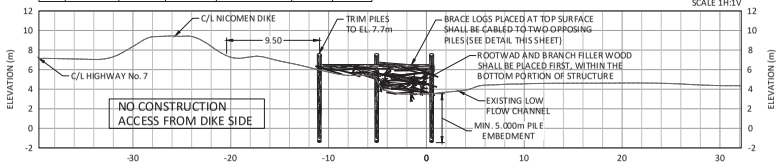
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L5	0+000.000	567597.76	5448323.44	049° 11' 11.75"	1.308	
C4	0+001.308	567598.75	5448324.29	073° 26' 20.84"	4.233	5.000
L6	0+005.541	567602.69	5448325.47	097° 41' 29.92"	4.208	
C5	0+009.749	567606.86	5448324.90	073° 06' 58.60"	6.005	7.000
L7	0+015.754	567612.43	5448326.59	048° 32' 27.27"	12.583	
C6	0+028.337	567621.86	5448334.92	065° 58' 50.42"	3.044	5.000
L8	0+031.381	567624.60	5448336.14	083° 25' 13.57"	3.757	
C7	0+035.137	567628.33	5448336.57	077° 14' 38.75"	1.725	8.000
L9	0+036.862	567630.01	5448336.95	071° 04' 03.94"	3.490	

FAN CHANNEL 4B ALIGNMENT LAYOUT

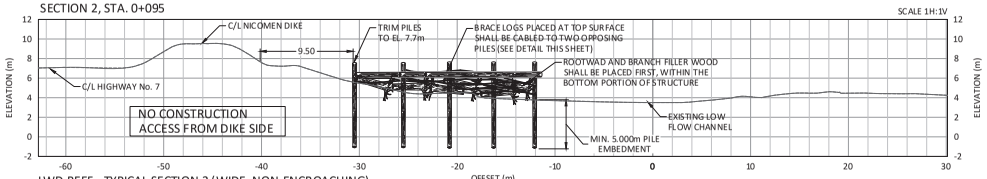
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L10	0+000.000	567529.59	5448201.74	029° 11' 52.45"	13.098	
C8	0+013.098	567535.98	5448213.17	089° 51' 38.87"	14.823	7.000
L11	0+027.920	567548.19	5448213.20	150° 31' 25.29"	13.018	
C9	0+040.939	567554.59	5448201.87	118° 18' 26.91"	8.996	8.000
L12	0+049.935	567562.10	5448197.83	086° 05' 28.53"	5.027	
C10	0+054.962	567567.12	5448198.17	116° 30' 34.99"	7.433	7.000
L13	0+062.395	567573.46	5448195.01	146° 55' 41.45"	7.545	

FAN CHANNEL 4A ALIGNMENT LAYOUT

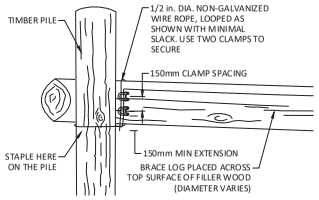
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L15	0+000.000	567497.09	5448215.67	101° 10' 45.55"	8.777	
C12	0+008.777	567505.70	5448213.96	136° 30' 31.15"	7.399	6.000
L16	0+016.176	567510.47	5448208.93	171° 50' 16.75"	3.456	
C13	0+019.632	567510.96	5448205.51	127° 43' 43.89"	9.238	6.000
L17	0+028.870	567517.57	5448200.40	083° 37' 11.03"	19.059	
C14	0+047.930	567536.51	5448202.52	148° 17' 09.33"	13.544	6.000
L18	0+061.473	567542.21	5448193.29	212° 57' 07.62"	4.159	
C15	0+065.632	567539.95	5448189.80	178° 12' 11.59"	21.833	18.000
L19	0+087.466	567540.59	5448169.29	143° 27' 15.55"	3.321	
C16	0+090.786	567542.57	5448166.62	155° 33' 49.34"	6.763	16.000
L20	0+097.550	567545.35	5448160.51	167° 40' 23.13"	2.743	
C17	0+100.292	567545.93	5448157.83	154° 18' 28.02"	4.665	10.000
L21	0+104.957	567547.94	5448153.66	140° 56' 32.91"	2.870	
C18	0+107.827	567549.75	5448151.44	146° 19' 52.20"	3.762	20.000
L22	0+111.589	567551.83	5448148.31	151° 43' 11.49"	4.995	



LWD REEF - TYPICAL SECTION 1 (NARROW, ENCROACHING ON CHANNEL)
1:250



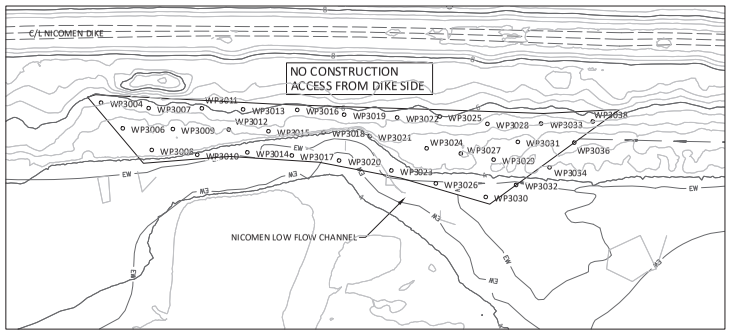
LWD REEF - TYPICAL SECTION 2 (WIDE, NON-ENCROACHING)
1:250



BRACE LOG CABLING DETAIL
1:25

LEGEND
DESIGN GRADE
EXISTING GROUND (2023 AND PRIOR)
DEFLECTOR LWD
WRC ROOTWADS

NOTES:
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
3. CROSS-SECTIONS ARE VIEWED DOWNSTREAM.
4. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.



PILING PLAN - LWD REEF
1:500

PILE LAYOUT TABLE - LWD REEF

PILE #	EASTING (m)	NORTHING (m)
3004	567736.93	5448188.08
3006	567730.10	5448187.21
3007	567730.67	5448180.54
3008	567723.15	5448184.66
3009	567724.39	5448178.72
3010	567717.27	5448177.41
3011	567724.70	5448171.44
3012	567718.06	5448169.20
3013	567719.92	5448164.50
3014	567712.09	5448168.56
3015	567713.36	5448162.59

PILE LAYOUT TABLE - LWD REEF

PILE #	EASTING (m)	NORTHING (m)
3016	567713.80	5448155.27
3017	567706.59	5448161.28
3018	567707.04	5448153.25
3019	567707.75	5448147.78
3020	567700.46	5448153.76
3021	567701.20	5448145.80
3022	567701.35	5448139.00
3023	567692.93	5448145.89
3024	567692.78	5448137.38
3025	567696.75	5448131.58
3026	567685.74	5448139.73

PILE LAYOUT TABLE - LWD REEF

PILE #	EASTING (m)	NORTHING (m)
3027	567688.07	5448132.11
3028	567690.20	5448124.25
3029	567683.37	5448127.17
3030	567677.85	5448132.68
3031	567683.71	5448121.04
3032	567676.53	5448126.14
3033	567684.27	5448115.03
3034	567675.81	5448118.45
3036	567677.29	5448111.45
3038	567678.84	5448105.92

CLIENT:
BRITISH COLUMBIA — Ministry of Environment and Climate Change Strategy

REV	DATE	DESCRIPTION
0	18 FEB 2025	ISSUED FOR CONSTRUCTION
1	05 JUN 2025	ISSUED FOR CONSTRUCTION

nhc northwest hydraulic consultants

SEAL:
PROFESSIONAL ENGINEER — D. J. GOULD — # 20281 — PROVINCE OF BRITISH COLUMBIA
2025-06-05
Permit to Practice 1000021

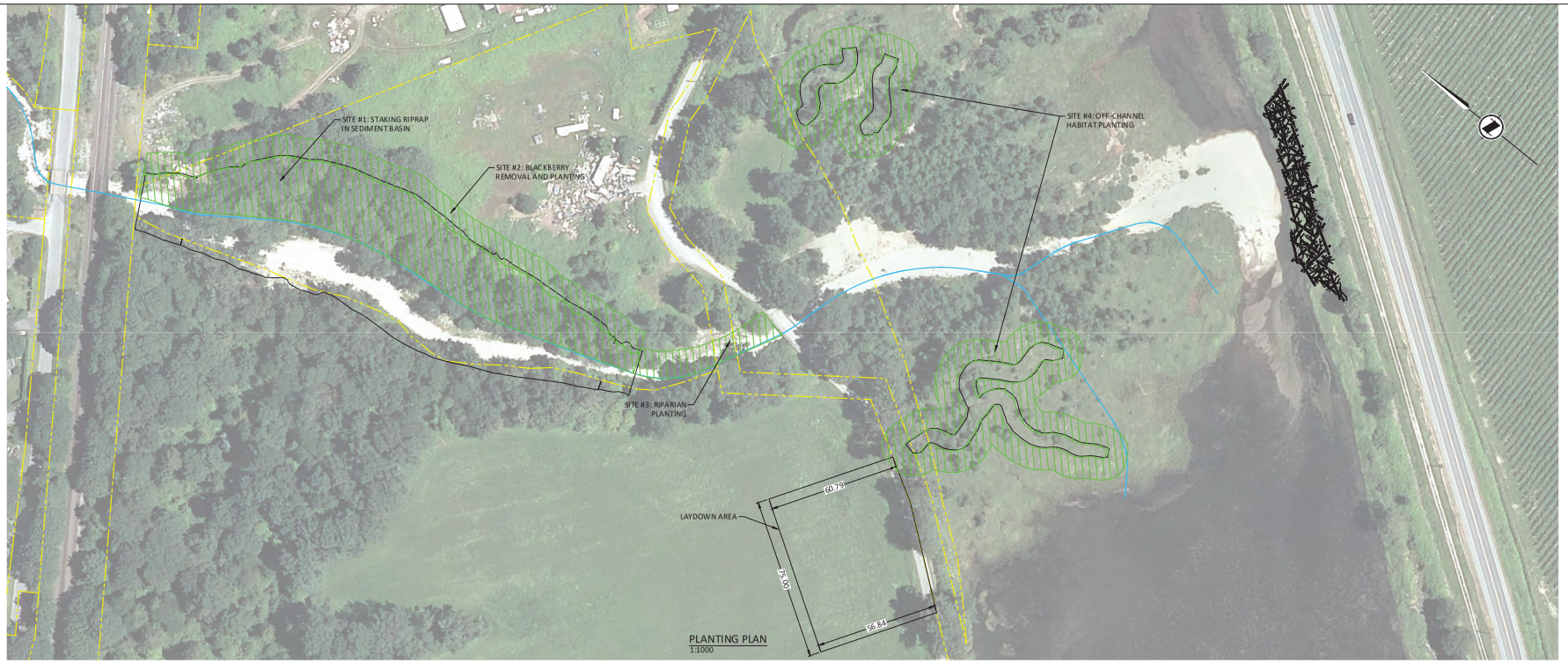
DEROCHE CREEK RECOVERY SOLUTION
OFF-SETTING WORKS

TYPICAL SECTIONS AND PROFILE

DESIGNED: DJG	SHEET ID: 2900712-DER RS-010		SHEET No: 010
DRAFTED: CZZ	STATUS: ISSUED FOR CONSTRUCTION		
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 5 JUN 2025		REV No: 1

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nanaimo-van\Projects\Active\2900712 Deroche Creek Emerg Works\06 CAD\02_Production\FC\2900712-010.dwg, 05 Jun 2025, 12:33 PM



PLANTING PLAN
1:1000

SITE PREPARATION:

1. THE PLANTING AREA SHALL BE CLEARED OF ANY INVASIVE PLANT AND PLANT PARTS, GARBAGE, OR DEBRIS PRIOR TO PLANTING.
2. INVASIVE PLANT MATERIAL SHALL BE REMOVED FROM THE SITE AND DISPOSED OF APPROPRIATELY AT A FACILITY EQUIPPED TO BURY OR BURN INVASIVE PLANT MATERIAL TO PREVENT ITS PROPAGATION.
3. MINIMAL SOIL AMENDMENTS, EARTHWORKS, AND DISTURBANCE ARE RECOMMENDED TO MINIMIZE THE LIKELIHOOD OF COLONIZATION BY INVASIVE PLANTS (i.e., HIMALAYAN BLACKBERRY).

GENERAL RIPARIAN PLANTING NOTES

1. LIVE STAKES, SHRUBS, AND TREES ARE TO BE ARRANGED IN A TRIANGULAR GRID AND SPACED ACCORDING TO THE PLANTING TABLES ON THIS DRAWING.
2. CONFORM TO PLANTING LAYOUT AS SHOWN ON THE PLANTING PLAN. PLANS MAY BE SUBJECT TO CHANGE BASED ON FIELD CONSTRAINTS AND LIMITATIONS. ALL CHANGES MUST BE APPROVED BY THE QEP.
3. CONTAINER STOCK INSTALLATION SHOULD OCCUR DURING THE FALL (SEP-OCT) TO REDUCE WATERING REQUIREMENTS AND IMPROVE SURVIVAL.
4. PLANTS MAY BE FERTILIZED WITH PELLETS OR TEA-BAG TYPE FERTILIZERS HIGH IN NITROGEN AND PHOSPHATE TO ENCOURAGE GROWTH. THIS CAN BE DONE BY PLACING FERTILIZER IN THE BASE OF THE HOLE BEFORE PLANT INSTALLATION.
5. CAREFULLY REMOVE PLANTS FROM CONTAINERS WITHOUT INJURING THE ROOT BALLS, ROOT BOUND STOCK SHOULD BE GENTLY AGITATED TO ENSURE THE ROOTS ARE PLACED IN THEIR NATURAL GROWING POSITION. GENTLY FIRM THE GROWING MEDIUM AROUND THE ROOT SYSTEM AND SETTLE THE SOIL WITH WATER AFTER PLANTING.
6. PLANTING AREAS SHALL BE SEEDED WITH FALL RYE AT A DENSITY OF 50 kg/ha.

LIVE STAKE INSTALLATION

1. LIVE STAKES SHOULD BE INSERTED SO THAT THE NATURAL ORIENTATION OF THE CUTTING IS PRESERVED. THAT IS, THE OLDER PORTION OF THE PLANT SHOULD BE INSERTED INTO THE GROUND AND THE YOUNGER PORTION SHOULD BE EXPOSED. THE BOTTOM OF THE CUTTING SHOULD BE IDENTIFIABLE BY A 45° TAPER AND THE TOP SHALL BE FLAT. LIVE STAKES SHOULD BE INSTALLED PERPENDICULAR TO THE SURFACE.
2. RATHER THAN DIGGING A HOLE FOR THE CUTTINGS, PUSH CUTTINGS INTO THE SOIL TO A DEPTH EQUAL TO APPROXIMATELY 70% OF THEIR LENGTH.
3. IF THE SOIL IS TOO FIRM TO PUSH THE CUTTING INTO THE SOIL, A PILOT HOLE CAN BE FORMED FIRST USING A MALLET AND METAL ROD OR AN AUGER. THEN THE CUTTING CAN BE PLACED INTO THE HOLE. THE HOLE DIAMETER SHALL BE SMALLER THAN THE CUTTING DIAMETER TO PREVENT AIR POCKET FORMATION.
4. AT LEAST 50 mm AND NOT MORE THAN 100 mm OF THE LIVE STAKE SHOULD BE EXPOSED.
5. AVOID DAMAGING BUDS WHEN INSERTING OR DRIVING THE CUTTING INTO THE GROUND.
6. IF THE CUTTING IS SPLIT WHILE DRIVING, TRIM THE CUTTING BELOW THE SPLIT TO PREVENT DESICCATION AND PLANT MORTALITY.
7. THERE MUST BE FIRM CONTACT BETWEEN THE CUTTING AND THE SOIL. AVOID CREATING AIR POCKETS AROUND THE CUTTING THAT CAN PREVENT ROOTS FROM DEVELOPING. TAMP THE SOIL AROUND THE CUTTING TO FILL IN ANY AIR POCKETS.
8. WATER THE CUTTING IMMEDIATELY AFTER PLANTING, AND DAILY DURING THE INSTALLATION PHASE.

WATERING

1. TO PROMOTE INITIAL ESTABLISHMENT, PLANTED MATERIAL SHALL BE WATERED IMMEDIATELY AFTER PLANTING IF NEEDED (TO BE DETERMINED BY THE QEP).

INVASIVE PLANT MANAGEMENT DURING CONSTRUCTION

1. A QEP TRAINED IN THE IDENTIFICATION OF INVASIVE PLANTS FOUND WITHIN THE LOWER MAINLAND OF BRITISH COLUMBIA WILL MONITOR PLANTING ACTIVITIES TO HELP THE CONTRACTOR PREVENT THE INTRODUCTION OF AND THE SPREAD OF INVASIVE PLANTS AT THE SITE.
2. ALL MACHINERY AND HAND TOOLS WILL BE CLEAN, RECENTLY WASHED, AND FREE OF WEED SEEDS OR PLANT MATERIAL UPON ARRIVAL TO SITE.
3. THE CONTRACTOR WILL ENSURE THAT PLANTING ACTIVITIES DO NOT INADVERTENTLY INTRODUCE INVASIVE SPECIES TO THE SITE.
4. THE CONTRACTOR WILL WORK CLOSELY WITH THE BCMOECCS TO ENSURE EARLY DETECTION AND TREATMENT OF INVASIVE SPECIES ON SITE.

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV	DATE	DESCRIPTION
0	18 FEB 2025	ISSUED FOR CONSTRUCTION
1	05 JUN 2025	ISSUED FOR CONSTRUCTION

SEAL:

COLLEGE OF APPLIED BIOLOGISTS
Janice Kwo
June 9, 2025
RPBio 3279 CAB

DEROCHE CREEK RECOVERY SOLUTION

PLANTING PLAN

DESIGNED:	JK	SHEET ID: 2900712-DER RS-011	SHEET No: 011
DRAFTED:	TR	STATUS: ISSUED FOR CONSTRUCTION	
CHECKED:	JK	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	PL	DATE: 5 JUN 2025	REV No: 1

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nanlfile-van\Projects\Active\2900712 Deroche Creek Emerg Works\06 CAD\02_Production\PC\2900712-DER-011.dwg, 05 Jun 2025, 11:04 AM

KERR WOOD LEIDAL
consulting engineers

Okanagan
202 – 3334 30th Avenue
Vernon, BC V1T 2C8
T 250 503 0841

Supplemental Instruction #04

DATE:	August 6, 2025
OWNER:	Leq'a:mel First Nation
PROJECT NAME:	Deroche Creek Recovery Solution – Construction Works
CONTRACT NO.:	2900712
SUPPLEMENTAL INSTRUCTION NO.:	#01
CONTRACTORS RFI NO.:	NA
TO:	Tyson West, Project Coordinator - Timbro Contracting Ltd.

A few discrepances were noted on IFC Drawing 005 and 006.

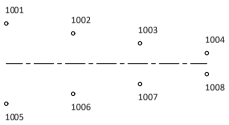
Find attached copies of replacement drawings R2. A sealed set was previously sent. Please only use the sealed set.

Yours truly,

KERR WOOD LEIDAL ASSOCIATES LTD.

Brett Barker, Owners Representative

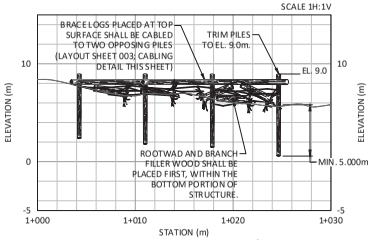
Encl.



PILING PLAN - DEFLECTOR #1
1:250

PILE LAYOUT TABLE - DEFLECTOR #1		
PILE #	EASTING (m)	NORTHING (m)
1001	567505.93	5448262.56
1002	567512.54	5448260.55
1003	567519.16	5448258.55
1004	567525.77	5448256.55
1005	567504.73	5448254.45
1006	567511.63	5448254.44
1007	567518.54	5448254.43
1008	567525.45	5448254.42

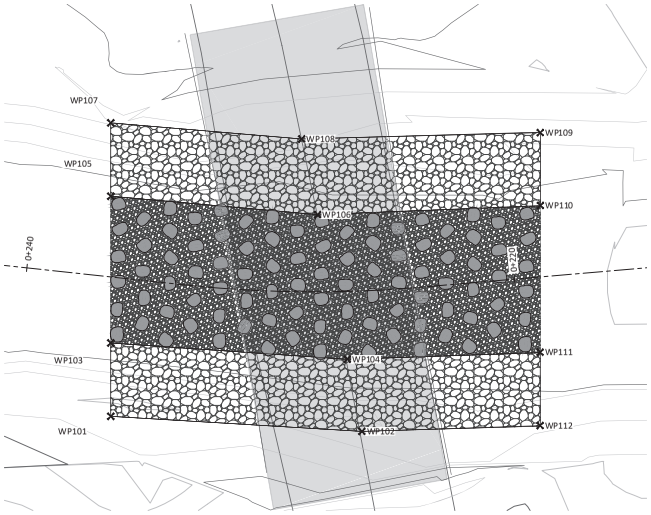
TIMBER PILE DEFLECTOR #1 ALIGNMENT LAYOUT						
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L1	1+000.000	567501.20	5448259.12	098° 28' 01.01"	30.000	



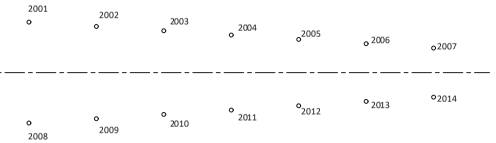
PROFILE - TIMBER PILE DEFLECTOR #1 (SHEET 003; LOOKING NORTH)
1:250

2

WORKPOINT TABLE - TAYLOR BRIDGE ARMOURING			
WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP101	567495.22	5448292.99	5.92
WP102	567504.69	5448288.95	5.86
WP103	567496.24	5448295.82	4.92
WP104	567505.12	5448291.93	4.87
WP105	567498.26	5448301.47	4.92
WP106	567505.97	5448297.91	4.87
WP107	567499.27	5448304.29	5.92
WP108	567506.40	5448301.04	5.88
WP109	567515.67	5448298.00	5.82
WP110	567514.67	5448295.19	4.82
WP111	567512.64	5448289.54	4.82
WP112	567511.63	5448286.72	5.81



TAYLOR BRIDGE CHANNEL ARMOURING
1:150

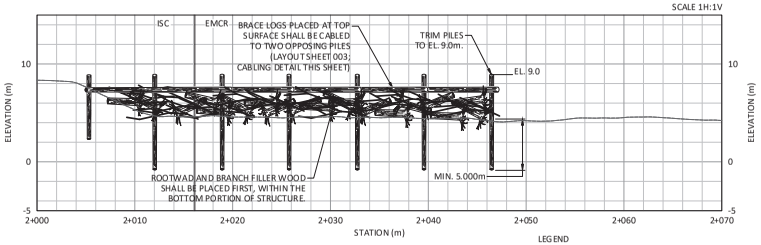


PILING PLAN - DEFLECTOR #2
1:250

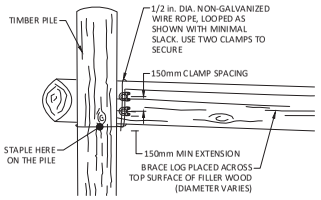
PILE LAYOUT TABLE - DEFLECTOR #2		
PILE #	EASTING (m)	NORTHING (m)
2001	567483.71	5448202.35
2002	567489.33	5448198.33
2003	567494.95	5448194.32
2004	567500.57	5448190.30
2005	567506.19	5448186.28
2006	567511.81	5448182.26
2007	567517.43	5448178.24

PILE LAYOUT TABLE - DEFLECTOR #2		
PILE #	EASTING (m)	NORTHING (m)
2008	567478.26	5448193.60
2009	567484.35	5448190.33
2010	567490.43	5448187.06
2011	567496.52	5448183.79
2012	567502.61	5448180.52
2013	567508.69	5448177.25
2014	567514.78	5448173.98

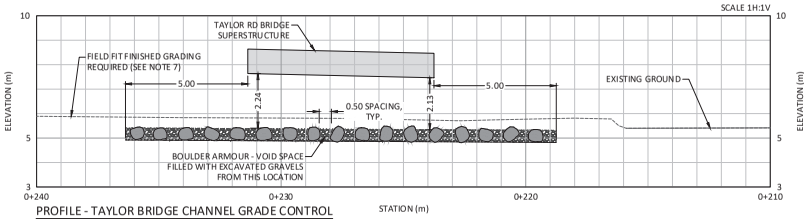
TIMBER PILE DEFLECTOR #2 ALIGNMENT LAYOUT						
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L2	2+000.000	567476.59	5448200.71	121° 53' 59.96"	70.000	



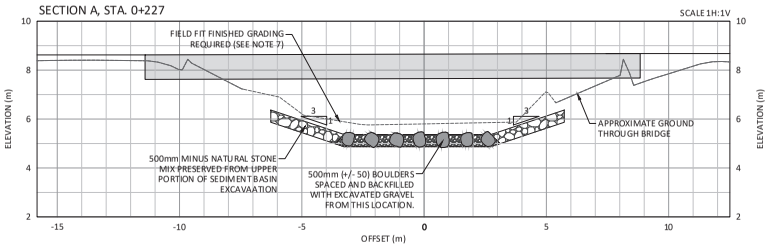
PROFILE - TIMBER PILE DEFLECTOR #2 (SHEET 003; LOOKING NORTH)
1:250



BRACE LOG CABLING DETAIL
1:25



PROFILE - TAYLOR BRIDGE CHANNEL GRADE CONTROL (SHEET 003; LOOKING EAST)
1:100



A / 003 TAYLOR BRIDGE CHANNEL GRADE CONTROL (LOOKING SOUTH)
1:100

LEGEND
- DESIGN GRADE
- EXISTING GROUND (2025 PRE-CON)
- EXISTING GROUND (2023 AND PRIOR)
- LARGE WOODY DEBRIS
- TIMBER PILE
- VOID-FILLED BOULDER ARMOURING

NOTES:
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
3. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.
4. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
5. IN ALL MANNERS EXCEPT FOR GRADATION, ROCK QUALITY SHALL CONFORM TO MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE STANDARD SPECIFICATION 205.
6. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.
7. AT TAYLOR BRIDGE EXISTING BED MATERIAL SHALL BE USED TO RE-BURY THE DESIGN SURFACE AND FIELD FIT A SMOOTH TIE-IN WITH THE CHANNEL UP- AND DOWNSTREAM.

CLIENT:
BRITISH COLUMBIA — Ministry of Environment and Climate Change Strategy

REV	DATE	DESCRIPTION
0	18 FEB 2025	ISSUED FOR CONSTRUCTION
1	05 JUN 2025	ISSUED FOR CONSTRUCTION
2	31 JUL 2025	ISSUED FOR CONSTRUCTION - WORKPOINT TABLE REVISED

nhc northwest hydraulic consultants

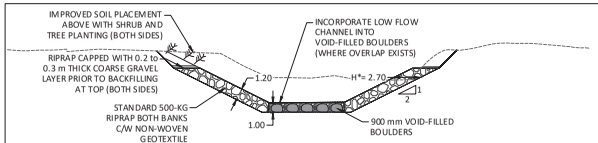
SEAL:
D. J. GOULD # 28091 PROFESSIONAL ENGINEER — 2025-08-01
Permit to Practice 1003931

DEROCHE CREEK RECOVERY SOLUTION
REACH 1
TYPICAL SECTIONS AND PROFILE DETAILS

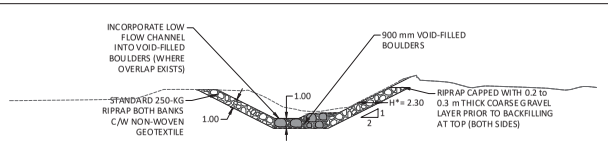
DESIGNED: DJG	SHEET ID: 2900712-DER RS-005	SHEET No: 005
DRAFTED: CZZ	STATUS: ISSUED FOR CONSTRUCTION	
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED: DJG	DATE: 31 JUL 2025	REV No: 2

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

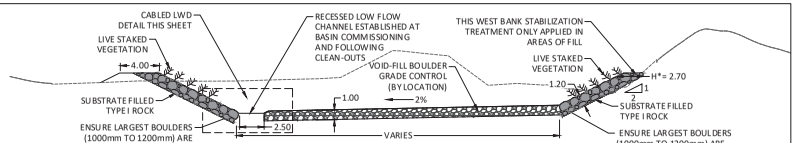
FILENAME: \\nanaimo-van\Projects\Active\2900712 Deroche Creek Energy Works\06 CAD\02_Production\PC\2900712 Deroche RS PC-003_005.dwg, 31 Jul 2025, 02:09 PM



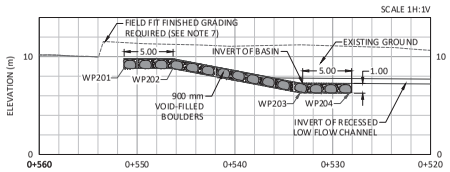
TYPICAL SECTION - BASIN ENTRANCE ARMOUR (SEE SHEET 004)
1:250



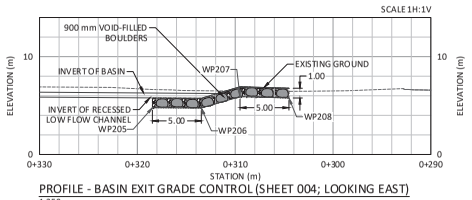
TYPICAL SECTION - BASIN EXIT ARMOUR (SEE SHEET 004)
1:250



TYPICAL SECTION - BASIN (SEE SHEET 004)
1:250



PROFILE - BASIN ENTRANCE GRADE CONTROL (SHEET 004; LOOKING EAST)
1:250



PROFILE - BASIN EXIT GRADE CONTROL (SHEET 004; LOOKING EAST)
1:250

WEST BANK STABILIZATION ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L11	3+000.000	567357.14	5448564.62	157° 30' 27.32"	2.803	
C9	3+002.803	567358.21	5448562.03	149° 56' 14.47"	2.907	11.000
L12	3+005.709	567359.66	5448559.52	142° 22' 01.61"	7.605	
C10	3+013.314	567364.30	5448553.50	153° 08' 19.07"	3.948	10.500
L13	3+017.262	567366.08	5448550.00	163° 54' 36.53"	34.242	
C11	3+051.504	567375.57	5448517.10	158° 44' 00.11"	12.649	70.000
L14	3+064.153	567380.15	5448505.32	153° 33' 23.68"	10.947	
C12	3+075.100	567385.02	5448495.52	156° 43' 38.64"	3.320	30.000
L15	3+078.420	567386.34	5448492.47	159° 53' 53.60"	17.959	
C13	3+096.379	567392.51	5448475.61	169° 55' 09.83"	10.494	30.000
L16	3+106.873	567394.33	5448465.33	179° 56' 26.06"	25.234	
C14	3+132.107	567394.36	5448440.09	167° 11' 53.43"	31.136	70.000
L18	3+163.243	567401.20	5448409.98	154° 27' 20.79"	23.184	
C16	3+186.427	567411.20	5448389.07	151° 03' 18.30"	5.935	50.000
L19	3+192.362	567414.07	5448383.87	147° 39' 15.81"	32.521	
C15	3+224.884	567431.47	5448356.40	152° 15' 55.54"	10.462	65.000
L17	3+235.346	567436.33	5448347.15	156° 52' 35.26"	11.832	

EAST BANK STABILIZATION ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L5	4+000.000	567364.60	5448568.54	148° 11' 05.50"	5.815	
C4	4+005.815	567367.66	5448563.59	154° 10' 14.71"	4.387	20.995
C5	4+017.349	567372.00	5448552.93	143° 10' 38.73"	9.399	15.858
L7	4+026.748	567377.55	5448545.52	126° 11' 53.53"	22.305	
C6	4+049.053	567395.55	5448532.34	139° 21' 17.98"	29.393	64.000
L8	4+078.446	567414.53	5448510.24	152° 30' 42.42"	9.419	
C7	4+087.864	567418.87	5448501.88	163° 16' 57.04"	48.500	129.000
L9	4+136.364	567432.74	5448455.70	174° 03' 11.66"	107.249	
C8	4+243.613	567443.85	5448349.03	170° 38' 17.75"	3.576	30.000
L10	4+247.189	567444.43	5448345.51	167° 13' 23.84"	7.393	

ENTRANCE GRADE CONTROL WORKPOINTS TABLE

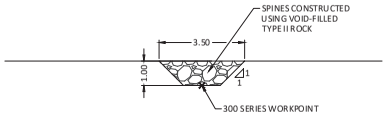
WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP201	567361.22	5448566.68	8.80
WP202	567363.57	5448562.29	8.74
WP203	567369.12	5448550.51	6.30
WP204	567371.06	5448545.87	6.26

EXIT GRADE CONTROL WORKPOINTS TABLE

WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP205	567439.09	5448350.55	4.78
WP206	567440.80	5448345.86	4.75
WP207	567442.17	5448342.15	5.91
WP208	567443.91	5448337.47	5.77

BASIN MAINTENANCE ACCESS ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L2	5+000.000	567436.58	5448357.58	083° 59' 09.03"	9.673	
C2	5+009.673	567446.20	5448358.59	119° 46' 07.66"	9.992	8.000
C1	5+026.784	567457.27	5448347.47	132° 57' 25.88"	44.956	57.000
L1	5+071.740	567489.32	5448317.62	110° 21' 45.47"	18.959	



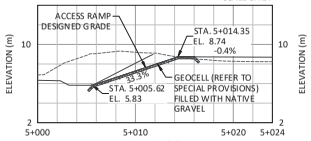
TYPICAL SECTION - GRADE CONTROL SPINE
1:100

GRADE CONTROL SPINE WORKPOINTS TABLE

WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP301	567393.69	5448529.45	6.39
WP302	567375.58	5448517.03	6.83
WP303	567412.07	5448507.78	6.12
WP304	567385.73	5448494.04	6.72
WP305	567424.84	5448478.65	5.90
WP306	567393.90	5448470.28	6.55

GRADE CONTROL SPINE WORKPOINTS TABLE

WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP307	567430.27	5448448.70	5.69
WP308	567394.39	5448444.92	6.41
WP309	567433.83	5448414.20	5.45
WP310	567402.65	5448406.96	6.09
WP311	567436.62	5448383.10	5.36
WP312	567418.34	5448377.21	5.74



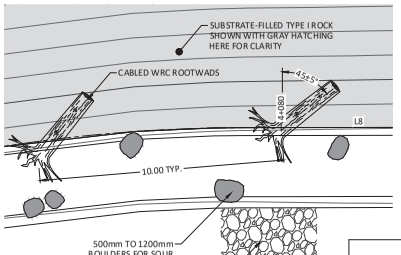
PROFILE - ACCESS RAMP (SHEET 004; LOOKING NORTH)
1:250

WEST BANK STABILIZATION OFFSET/ELEVATION TABLE

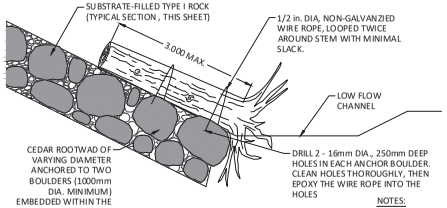
STATION	O/S TO TOE OF CUT	ELEV TOE OF CUT	O/S TO TOP OF CUT	ELEV TOP OF CUT
3+000.000	0.16	8.60	7.53	12.31
3+002.803	0.11	8.60	7.36	12.24
3+005.709	0.13	8.48	7.86	12.16
3+010.000	0.14	7.65	9.60	12.08
3+013.314	0.15	6.99	10.86	11.95
3+017.262	-0.64	6.20	10.85	11.96
3+020.000	-0.84	6.09	10.73	11.90
3+030.000	0.27	6.63	10.39	11.84
3+040.000	0.27	6.63	9.79	11.66
3+050.000	0.27	6.62	9.33	11.41
3+060.000	0.26	6.61	9.19	11.19
3+070.000	0.28	6.56	9.56	11.22
3+080.000	0.28	6.49	9.37	11.08
3+090.000	0.28	6.43	9.00	10.79
3+096.379	0.28	6.37	8.44	10.44
3+100.000	0.31	6.34	8.31	10.35
3+110.000	0.28	6.29	8.07	10.28
3+120.000	0.28	6.24	8.05	10.16
3+130.000	0.28	6.19	7.39	9.77
3+140.000	0.26	6.13	7.32	9.66
3+150.000	0.27	6.05	7.49	9.69
3+160.000	0.21	5.95	7.51	9.66
3+170.000	0.28	5.84	7.41	9.46
3+180.000	0.28	5.75	7.34	9.30
3+190.000	0.28	5.65	7.09	9.13
3+200.000	0.27	5.53	6.94	8.96
3+210.000	0.27	5.42	6.97	8.85
3+220.000	0.28	5.30	7.07	8.77
3+230.000	0.28	5.19	7.34	8.74
3+235.346	-0.91	4.77	6.98	8.72
3+240.000	0.10	5.31	6.72	8.73
3+247.178	0.11	5.77	5.96	8.70

EAST BANK STABILIZATION OFFSET/ELEVATION TABLE

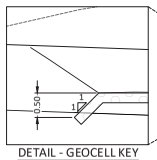
STATION	O/S TO TOE OF CUT	ELEV TOE OF CUT	O/S TO TOP OF CUT	ELEV TOP OF CUT
4+000.000	0.37	8.60	7.77	12.30
4+003.275	0.37	8.60	7.62	12.26
4+007.661	0.37	8.24	8.24	12.15
4+010.000	0.39	7.90	8.78	12.11
4+017.298	-0.41	6.40	10.54	11.97
4+020.000	-0.50	6.09	10.78	11.92
4+026.696	0.46	6.43	10.49	11.86
4+030.000	0.32	6.39	10.09	11.82
4+040.000	0.27	6.25	10.24	11.59
4+050.000	0.21	6.12	10.06	11.37
4+060.000	0.12	6.01	10.43	11.29
4+070.000	0.06	5.92	10.44	11.14
4+080.000	0.21	5.85	10.60	11.05
4+090.000	0.18	5.79	10.50	10.96
4+100.000	0.18	5.71	10.07	10.67
4+110.000	0.21	5.65	9.60	10.34
4+120.000	0.25	5.58	9.63	10.27
4+130.000	0.26	5.52	9.66	10.22
4+136.313	0.22	5.47	9.45	10.08
4+140.000	0.27	5.45	9.37	10.00
4+150.000	0.28	5.38	9.01	9.74
4+160.000	0.28	5.31	8.98	9.66
4+170.000	0.28	5.24	9.17	9.68
4+180.000	0.28	5.17	8.77	9.46
4+190.000	0.28	5.13	8.36	9.26
4+200.000	0.28	5.10	8.10	9.10
4+210.000	0.28	5.08	7.83	8.93
4+220.000	0.28	5.05	7.68	8.83
4+230.000	0.28	5.03	7.58	8.77
4+240.000	0.27	5.00	7.07	8.73
4+243.562	-0.61	4.76	7.16	8.73
4+247.138	0.19	5.16	6.93	8.73
4+250.000	0.35	5.90	5.87	8.67
4+254.531	0.34	5.77	6.17	8.69



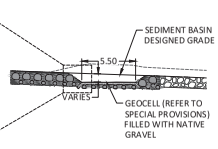
DETAIL - LOW FLOW CHANNEL PLAN
1:100



DETAIL - WRC ROOTWAD
1:50



DETAIL - GEOCELL KEY
1:50



TYPICAL SECTION - ACCESS RAMP (LOOKING WEST)
1:250

GRADATION TABLE - IMPORTED ROCK MATERIALS

	ROCK DIAMETER (mm)					
	250-KG RIPRAP	500-KG RIPRAP	TYPE I ROCK	TYPE II ROCK	900mm BOULDERS	500mm BOULDERS
D_{100}	1000	1250	1250	750	-	-
D_{85}	830	1050	1050	610	-	-
D_{50}	575	725	725	425	900 (± 100)	500 (± 50)
D_{15}	270	340	550	350	-	-
D_0	200	250	450	300	-	-

NOTES:
1. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
2. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.
3. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
4. FOR ROCK GRADATIONS REFER TO THE TABLE ON THIS SHEET.
5. IN ALL MANNERS EXCEPT FOR GRADATION, ROCK QUALITY SHALL CONFORM TO MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE STANDARD SPECIFICATION 205.
6. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.
7. AT THE LIMITS OF CONSTRUCTION, EXISTING BED MATERIAL SHALL BE USED TO RE-BURY THE DESIGN SURFACE AND FIELD FIT A SMOOTH TIE-IN WITH THE UPSTREAM CHANNEL.

LEGEND
- DESIGN GRADE
- EXISTING GROUND (2025 PRE-CON)
- EXISTING GROUND (2023 AND PRIOR)
- SUBSTRATE FILLED RIPRAP
- BOULDER ARMOUR
- STANDARD RIPRAP
- 6-INCH MINUS STREAM GRAVEL

CLIENT:
BRITISH COLUMBIA — Ministry of Environment and Climate Change Strategy

REV	DATE	DESCRIPTION
0	18 FEB 2025	ISSUED FOR CONSTRUCTION
1	05 JUN 2025	ISSUED FOR CONSTRUCTION
2	31 JUL 2025	ISSUED FOR CONSTRUCTION - WORKPOINT TABLE REVISED

nhc northwest hydraulic consultants

SEAL: D. J. GOULD # 28261 PROFESSIONAL ENGINEER — 2025-08-01 — Permit to Practice 1000201

DEROCHE CREEK RECOVERY SOLUTION
REACH 2
TYPICAL SECTIONS AND PROFILE DETAILS

DESIGNED:	DJG	SHEET ID: 2900712-DER RS-006	SHEET No: 006
DRAFTED:	CZZ	STATUS: ISSUED FOR CONSTRUCTION	
CHECKED:	DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE: 31 JUL 2025	REV No: 2

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nanaimo-van\Projects\Active\2900712\4 Deroche Creek Energy Works\06 CAD\02_Production\IFC\2900712-Deroche RS IFC-004,006-007 Aing, 31 Jul 2025, 02:15 PM

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Appendix C

Offsetting Plan

KERR WOOD LEIDAL ASSOCIATES LTD.
consulting engineers

KERR WOOD LEIDAL
consulting engineers

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Deroche Creek Sediment Long-Term Solution Project

Environmental Assessment and Offsetting Plan

Final Report
May 29, 2024
KWL Project No. 2838.300

Prepared for:
BC Ministry of Environment and Climate Change Strategy

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Report Submission

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1. Introduction

The Deroche Creek Sediment Long-Term Removal Project (the Project) will address sediment accumulation and erosion concerns in the lower 1 km of Deroche Creek upstream of Nicomen Slough. Accumulated material has the potential to create channel erosion, road flooding, and infrastructure damage in the Leq'a:mel First Nation community located within Lakahahmen IR 11 and the neighbouring properties near Deroche in the Fraser Valley Regional District (FVRD). Emergency sediment removal was conducted in November 2022 to remove sediments introduced by the 2021 Atmospheric River Event (ARE). The following Project aims to provide a long-term solution to the ongoing sedimentation in lower Deroche Creek to mitigate future impacts on infrastructure and salmon habitat.

This Environmental Assessment and Offsetting Plan provides details on the existing conditions present at the site, the proposed construction activities, identifies potential impacts to aquatic and riparian habitat, presents mitigation and offsetting measures, and a monitoring plan. This report is intended to support a *Fisheries Act* Authorization application to Fisheries and Oceans Canada (DFO).

1.1 Project Background

In November 2021, multiple atmospheric rivers passed through British Columbia causing widespread flooding across the Fraser Valley and other parts of the province. As part of the flood recovery initiatives by Environment and Climate Change Strategy (ENV), emergency sediment removal was conducted in Deroche Creek in 2022. Roles within the project are:

- ENV is the project proponent.
- Leq'a:mel First Nation (LFN) is a project partner.
- Northwest Hydraulic Consultants (NHC) is the Engineer-of-Record.
- Kerr Wood Leidal Associates Ltd. (KWL) is a subconsultant to the to provide environmental services during design, permitting support, contract administration, construction management, and construction environmental monitoring.

1.2 Regulatory Context and Requirements

All Project construction related works must be completed in compliance with applicable legislation, guidelines, and commitments outlined in Table 1-1.

Based on the current scope of the proposed works, the following environmental legislation does not apply to the Project:

- Federal *Impact Assessment Act* [S.C. 2019, c. 28, s. 1]: The Project does not meet the criteria for a designated project described in the Schedule describing physical activities in the Regulations Designating Physical Activities (SOR/2012-147).
- Provincial *Environmental Assessment Act* [SBC 2018, c. 51]*:* This Project does not meet the criteria for a reviewable project described in the Reviewable Projects Regulation (BC Reg. 243/2019).
- Provincial *Heritage Conservation Act*: As the project is located on federal reserve land, Heritage Inspection or Alteration Permits are not required.

Table 1-1: Environmental Legislation and Regulations Applicable to the Project

Legislation	Agency	Area of Regulation	Permits/Actions Required
Federal			
Fisheries Act [R.S.C., 1985, c. F-14]	Fisheries and Oceans Canada	Protection of fish and fish habitat.	• Submit a request for review to the Fish and Fish Habitat Protection Program to identify potential risks to the conservation and protection of fish and fish habitat. • If the death of fish, or harmful alteration, disruption or destruction of fish habitat will likely result from the Project, Authorization will be required.
Migratory Birds Convention Act [SC 1994, c. 22]	Environment and Climate Change Canada	Prohibiting injury, molestations, and destruction of migratory birds and their nests.	• As tree clearing will occur outside the nesting window for migratory birds of March 1–August 31, breeding bird surveys will not be required.
Species at Risk Act [SC 2002, c. 29]	Fisheries and Oceans Canada (aquatic species); Environment and Climate Change Canada (terrestrial species)	Protection of species designated on Schedule 1 of the Act and their critical habitat.	• No known SARA listed species or habitats are present at the site. • No permitting under SARA is anticipated.
Provincial			
Water Sustainability Act [SBC 2014, c. 15]	Ministry of Water, Land and Resource Stewardship	Regulates activities being carried out in and about a stream.	• Submit a Section 11 Change Approval for works in and about a stream for sediment removal. • Ensure all works adhere to the conditions of the Change Approval.
Wildlife Act [RSBC 1996, c. 488, S. 34]		Regulates works that impact wildlife species in BC.	• Permitting for salvage of amphibians and small mammals in riparian areas
Weed Control Act [RSBC 1996, c. 487]		Requires all land occupiers to control the spread of provincial and/or regional noxious weeds on their land.	• Ensure proper identification and management of invasive plants throughout Project works.
Integrated Pest Management Act [RSBC 2003, c. 58]	Ministry of Environment & Climate Change Strategy	Regulates pesticide use and treatment of noxious weeds in BC.	• Ensure pesticide permit is obtained, if required, for treatment of noxious weeds.
Leq'a:mel First Nation			
Environmental Assessment Law (2018)	Leq'a:mel First Nation	Identifies environmental effects from projects and promotes collaboration between Leq'a:mel and other levels of government.	• Obtain an environmental assessment approval for the Project or a written letter confirming an environmental assessment is not required.
Environmental Protection Law (2018)	Leq'a:mel First Nation	Projects on Leq'a:mel Lands.	• Ensure Project activities comply with the law
Soil Transport, Deposit, and Removal Law (2020)	Leq'a:mel First Nation	Soil management and transportation and protection of Leq'á:mel Lands from contamination.	• Apply for a permit to transport, remove, or deposit soil.
Leq'a:mel Archaeological Permit	Leq'a:mel First Nation	Protection and management archaeological sites.	• Apply for a permit for site investigation and, if required, alteration.

2. Project Description

2.1 Project Location and Details

Table 2-1: Project Location Description

Site ID	**S-CR-30**
Site Description	Deroche Creek at Lakahahmen IR 11
Location	UTM Zone 10U 567551E 5448285N
Local Government Agency	LFN, Fraser Valley Regional District
Waterbody	Deroche Creek, Nicomen Slough

Deroche Creek flows through Lakahahmen IR 11 where it enters Nicomen Slough, a historical side channel of the Fraser River that has had its inflow from the river regulated by diking and the "Bell Dam" since the 1930s.

Lakahahmen IR 11 is located on and adjacent to the Deroche Creek alluvial fan, approximately 22 km east of the City of Mission, BC. The project location is the mainstem of Deroche Creek, starting to the west of the intersection of North Deroche Road and Cooper Road, running southeast to Taylor Road, and ending at the downstream edge of the alluvial fan within Nicomen Slough (Figure 2-1).

The assessment area was separated into the following assessment reaches:

- Reach 1 – Downstream of Taylor Road, including the alluvial fan.
- Reach 2a – Taylor Road to limit of Fall 2022 sediment removal.
- Reach 2b – Limit of Fall 2022 sediment removal to North Nicomen Road.
- Reach 3 – North Nicomen Road to Leq'á:mel First Nation Cemetery.

Continued sediment deposition on the alluvial fan poses potential threats such as channel avulsion, bank erosion, and negative impacts to fish passage. Initial emergency sediment removal works have been completed, but further long-term solutions are required to mitigate future risks.

2.2 Description of Proposed Works

The immediate proposed Project includes the following works:

1. Construction of a sediment basin with a low-flow channel in Reach 2 to increase area available for sediment deposition and reduce infilling of the lower channel and fan, which has the potential to impede the migration of fish during low flows and smother spawning habitat downstream.
2. Installation of bed armouring at Ministry of Transportation & Infrastructure's Taylor Road Bridge in Reach 2, downstream of the proposed sediment basin, to prevent degradation due the reduction in sediment supply.
3. Construction of two timber deflectors on the Deroche Creek alluvial fan perpendicular to the Taylor Road to prevent high flows from eroding the embankment of Taylor Road.

The construction stage, activity, and description of activity for construction works are described in Table 2-2 to Table 2-5. Engineering drawings of proposed works can be found in Appendix B.

Table 2-2: Proposed Construction Methods for Sediment Basin

Stage	Activity	Description of Activity
Site Preparation	Clearing and Grubbing	Remove vegetation for access path from Taylor Road to the downstream extent of the sediment basin. Remove vegetation on east bank of Deroche Creek within the basin footprint.
	Site Isolation	The work site will be isolated from flow and dewatered so that work can be conducted in the dry. Flow will be pumped around the site or through a bypass channel. Exclusion fencing of construction area to prevent fish access; salvage of all fish, amphibians, and mammals from enclosed site.
Construction	Basin Construction	Excavation and grading of sediment basin. The west bank of Deroche Creek will act as the west wall of the sediment basin, therefore no excavation is proposed west of Deroche Creek. A low flow channel will be established along the left bank to convey base surface flows once they return to the creek. All construction below the normal high-water mark will occur in the dry and/or fully isolated from creek flows.
	Hauling and Disposal	Excavated material will be hauled by truck and either used on-site for construction of other project components or disposed of on reserve at a location approved by LFN. Machine access will occur from Taylor Road.
	Instream Complexing	Large woody debris (sourced from clearing) and habitat boulders will be placed in the low flow channel to add habitat complexity for salmonids.
	Bank Stabilization	Banks of the sediment basin will be stabilized using riprap filled with appropriate growing substrate for vegetation above the normal high-water mark.
	Surface Restoration	Refinish roads and seed exposed soils disturbed from the works.
Site Restoration	Site Restoration and Enhancement	The banks of the sediment basin will be planted with native riparian plant species and live stakes.

Table 2-3: Proposed Construction Methods for Taylor Bridge Grade Control

Stage	Activity	Description of Activity
Site Preparation	Site Isolation	The work site will be isolated from flow and dewatered so that work can be conducted in the dry. Flow will be pumped around the site.
	Clearing and Grubbing	Remove riparian vegetation along the machine access path from Taylor Road.
Construction	Excavation	Excavate sediment to subgrade, place boulders in a checkerboard pattern, and fill voids between boulders using excavated sediment.
	Hauling and Disposal	Excavated material will be hauled by truck and either used on-site for construction of other Project Elements or disposed of at a location approved by LFN.
	Surface Restoration	Refinish roads and seed and exposed soils disturbed from the works.
Site Restoration	Site Restoration and Enhancement	Replant cleared area with native riparian plant species.

Table 2-4: Proposed Construction Methods for Timber Deflectors

Stage	Activity	Description of Activity
Site Preparation	Clearing and Grubbing	Remove vegetation along access path and within the berm footprints from Taylor Road.
Construction	Installation of Wood Piles	Drive timber piles (sourced from sediment basin clearing) into the Deroche Creek fan approximately 4 m below grade.
	Installation of Timbers and Woody Debris	Timber and woody debris from cleared trees will be placed between the timber piles to form the timber deflectors.
	Surface Restoration	Refinish roads, driveways, and other surfaces disturbed due to the works.
Site Restoration	Site Restoration and Enhancement	Disturbed areas will be replanted with native shrubs and trees.

2.3 Construction Schedule

The construction schedule is outlined in Table 2-5 below.

Table 2-5: Proposed Construction Schedule

Stage	Activity	Start	End
Permitting	DFO Request for Review	September 2023	October 2023
	Water Sustainability Act Change Approval	September 2023	February 2024
	Fisheries Act Authorization	December 2023	February 2024
	DFO Scientific Fish Collection Permit	December 2023	December 2023
	Provincial Fish and Wildlife Salvage Permits	December 2023	December 2023
Procurement	Tree clearing tender	January 2024	February 2024
	Main construction tender	January 2024	April 2024
Construction	Tree clearing[1]	February 2024	February 2024
	Out of stream construction	May 2024	September 2024
	Instream construction	August 1, 2024	September 15, 2024

[1]If *Fisheries Act* Authorization has not been received, tree clearing will only occur outside of the riparian area.

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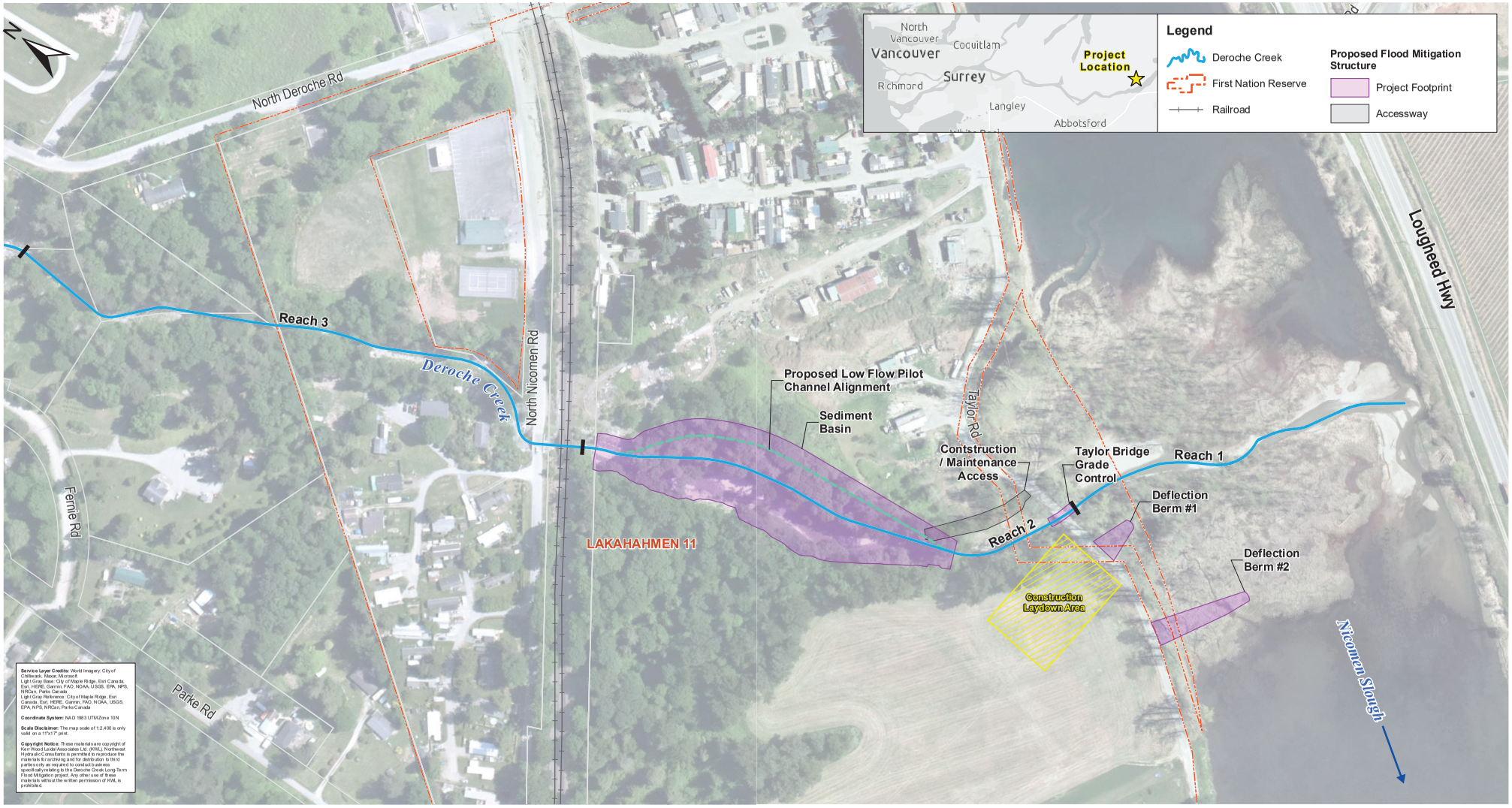

Project No. 2838.003
Date December 2023
Scale 1:2,400
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Project Location

Figure 2-1

3. Description of Fish and Aquatic Habitat

3.1 Methods

An assessment of existing conditions in and around Deroche Creek and the Nicomen Slough were conducted using desktop and field reviews. The desktop review included the following sources:

- BC HabitatWizard 50K Freshwater Atlas and Stream Reports.
- BC Fish Information Data Query (FIDQ).
- BC Conservation Data Centre (BC CDC) Species and Ecosystems Explorer Database.
- BC CDC iMap.
- BC Ecological Reports Catalogue (EcoCat).

On March 9, 2023, KWL biologists Andrew Baylis (RPBio) and Janice Kwo (RPBio) conducted an environmental assessment of the site with the following objectives:

- To characterize the existing environmental conditions, features, and values present at the site.
- To provide context for the potential ecological impacts of the proposed works.

KWL assessed the creek using methodology based on the Level 1 Fish Habitat Assessment Procedures[1] to assess the creek and its surrounding riparian area and took note of any additional observations. Section 3 includes a summary of the information collected during this environmental assessment. Photographs of the site are available in Appendix A.

3.2 Environmental Assessment Area

The Environmental Assessment Area is composed of the 850 m section of Deroche Creek from the Leq'á:mel First Nation Cemetery to the toe of the alluvial fan and the entirety of its surrounding riparian area (i.e., the entire footprint of the Project). Machine access for the sediment basin and timber deflectors will occur from Taylor Road. Machine access for bank stabilization works will occur from North Nicomen Road.

3.3 Fish Communities

There were no observations of fish in Deroche Creek or Nicomen Slough during the site visit in March. In the fall of 2022 and 2023, spawning chum and coho were observed in the lower reaches of Deroche Creek (below the CP Rail bridge)[2]. Rearing salmon fry have also been observed in Deroche Creek. A summary of fish species observed in Deroche Creek is summarized in Table 3-1. The assessed area does not contain critical habitat for any aquatic species protected under Schedule 1 of Canada's *Species at Risk Act*.

[1] Johnston, N.T. and Slaney, P.A. 1996. Fish Habitat Assessment Procedures. British Columbia Ministry of Environment, Lands and Parks, and British Columbia Ministry of Forests, Watershed Restoration Program, Technical Circular No. 8. Victoria, BC
[2] Rick McKamey (Leq'á:mel First Nation), personal communication. March 9, 2023.

Table 3-1 Summary of Fish Species Observed in Deroche Creek

Common Name	Scientific Name
Chum Salmon	*Onchorhychus keta*
Coho Salmon	*Oncorhynchus kisutch*
Cutthroat Trout	*Oncorhynchus clarkii*
Sculpin	*Cottoidea sp.*
Threespine Stickleback	*Gasterosteus aculeatus*

3.4 Description of Aquatic Habitat

Physical Aquatic Habitat Characteristics

Reaches 1 and 2a are located within the footprint of the Emergency Sediment Removal project which occurred in Fall 2022. Sediment deposition, minor bank erosion, and intermittent flows were observed in these areas. Flows went subsurface approximately 15 meters above Taylor Road and resurfaced approximately 50 meters downstream of Taylor Road. Sediment deposition was also observed at the southeast edge of the alluvial fan, which is causing the flow path of Nicomen Slough to undercut the embankment of Highway 7.

The main channel of Deroche Creek was more defined in Reaches 2b and 3 with no intermittency. The morphology ranged from shallow riffle-glide sequences in Reach 2b to riffle-cascade sequences in Reach 3. There were many disturbance indicators and flood signs throughout these reaches including cut eroding banks, uprooted vegetation, large sediment deposits, and little to no pool area.

Suitable spawning substrate and flow for chum and coho were observed in all three reaches of the assessment area. However, based on site visit observations, Deroche Creek is an unstable system, and the frequent movement and deposition of sediment poses a high risk of sedimentation of any viable spawning sites. Please refer to Appendix A for site photos.

Physical Water Quality

In-situ water quality observations were recorded during the March 9, 2023 field visit to provide a snapshot of relative water quality conditions in the Project area (Table 3-2). All measurements fell within a suitable range for aquatic life in freshwater systems in British Columbia.

Table 3-2: In-situ Water Quality Analysis Results from August 22, 2022

Reach	pH[3]	Temperature (°C)[4]	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Specific Conductance (µS/cm)[5]
1	8.5	6.8	68.3	8.58	37.2
2a	8.3	7.2	99.5	11.91	38.7
2b	8.2	4.7	98.9	12.70	41.7
3	8.1	5.7	97.6	12.24	42.9

[3] Unrestricted change permitted within a pH range of 6.5–9 (B.C. Ministry of Environment and Climate Change Strategy).
[4] Temperatures as high as 22–24°C are considered life-threatening for salmon species. (B.C. Ministry of Environment and Climate Change Strategy).
[5] No provincial guideline for aquatic life exists for ambient measurements of specific conductivity; however, low measurements (<200 µS/cm) are considered to indicate relatively pristine conditions in freshwater systems (Environment and Climate Change Canada).

3.5 Description of Riparian Vegetation

Existing Conditions

The riparian vegetation within the assessed area of Deroche Creek consists disturbed young deciduous forest and mixed forest. Upstream of Taylor Road, the riparian community transitions into a mixed forest with larger cottonwood and western redcedar (*Thuja plicata*) with an understory that consists of invasive species. Invasive species observed through this reach include Himalayan blackberry (*Rubus armeniacus*), English ivy (*Hedera helix*), Japanese knotweed (*Fallopia japonica*), and Scotch broom (*Cytisus scoparius*).

Riparian vegetation on the alluvial fan consists of small black cottonwoods (*Populus tricocarpa*), red alders (*Alnus rubra*), and willow (*Salix* sp.) with an understory consisting predominantly of invasive reed canary grass (*Phalaris arundinacea*). Vegetation is limited on the alluvial fan due to continual inputs of sediment from Deroche Creek. Canopy cover in this area is low compared to the rest of Deroche Creek.

Please refer to Appendix A for site photos.

4. Description of Effects of Fish and Fish Habitat

The Project works are anticipated to results in temporary and permanent effects on fisheries and aquatic resources. Impacts are expected to affect all fish and life stages present in Deroche Creek. All potential impacts to fisheries and aquatic resources that may result from the Project are outlined in Table 4-1.

Table 4-1: Potential Impacts to Fisheries and Aquatic Habitat

Activity	Type of Potential Impact	Potential Impact	Probability of Impact	Magnitude of Impact	Extent of Impact
Temporary Impacts					
Use of Industrial Equipment	Changes to contaminant concentrations	Introduction of deleterious substances into Deroche Creek and Nicomen Slough could negatively impact fish health.	Low	Medium	Deroche Creek & Nicomen Slough
Use of Industrial Equipment	Changes in sediment concentration	Increased turbidity from instream works could negatively impact fish health.	Medium	Low	Deroche Creek & Nicomen Slough
Permanent Impacts					
Sediment Basin – Placement of Material/ Structure	Changes to habitat structure and cover	The existing alignment of Deroche Creek will be redirected into a new low flow channel along the east bank of the sediment basin.	High	High	2,700 m^2
	Changes in sediment concentration	The sediment basin will reduce the amount of sediment being transported downstream and decrease the likelihood of smothering redds further downstream.	High	High	Deroche Creek & Nicomen Slough
Timber Deflectors Footprint – Placement of Material	Changes to habitat structure and cover	Timber piles, timbers, and woody debris will be placed permanently on the Deroche Creek fan, below the high-water mark of Nicomen Slough to deflect creek flows away from the Taylor Road embankment but will also have the added benefit of increasing habitat complexity and cover during high flows and/or water levels.	Low	Low	~1,000 m^2
Taylor Road Grade Control – Placement of Material	Changes to habitat structure and cover	Boulder armoring will be placed in Deroche Creek under the Taylor Road Bridge, which alters the type of habitat available in that area.	High	Low	110 m^2

Activity	Type of Potential Impact	Potential Impact	Probability of Impact	Magnitude of Impact	Extent of Impact
Use of Industrial Equipment	Potential mortality to fish/eggs/ova from equipment	There is potential for injury or mortality of fish during construction.	Low	High	Project Footprint

Table 4-2: Potential Impacts to Riparian Vegetation

Activity	Type of Potential Impact	Potential Impact	Probability of Impact	Magnitude of Impact	Extent of Impact
Temporary Impacts					
Clearing of Riparian Vegetation	Loss of riparian vegetation	Removal of vegetation (native and invasive) in the following areas: • Construction laydown area • Machine access and footprint for timber deflectors	High	Medium	4,000
Clearing of Riparian Vegetation	Introduction of invasive plants	Introduction of additional invasive plant species	Medium	Low	Project Footprint
Permanent Impacts					
Clearing of Riparian Vegetation	Loss of riparian vegetation	Riparian vegetation will be permanently removed in the following areas: • Access road to the sediment basin • Sediment basin footprint east of Deroche Creek	High	Medium	7,400

5. Description of Measures and Standards to Avoid or Mitigate Death of Fish or Harmful Alteration, Disruption or Destruction of Fish Habitat

5.1 Avoidance Measures

Impacts to fish and fish habitat from the timber deflectors will be avoided by eliminating the use of fill and rip rap in the design. Berms will be constructed with wood pilings and woody debris to provide habitat complexity for salmonids when during high flow in addition to protecting the Taylor Road embankment from erosion. Wood materials used to build the proposed pile and timber deflectors will be sourced on site from the sediment basin footprint.

The sediment basin has been designed to avoid disturbance and vegetation clearing on the right bank. The extent of the sediment basin on the left bank will be field-fit to avoid clearing large trees.

5.2 Mitigation Measures

The following guidance documents were used to develop mitigation measures for this project:

- *Requirements and Best Management Practices for Making Changes In and About a Stream in British Columbia*. Version 2022.01. Government of British Columbia, 2022.
- *Measures to Protect Fish and Fish Habitat*, Fisheries and Oceans Canada, 2019.
- *A Field Guide to Fuel Handling, Transportation and Storage*, Ministry of Water, Land and Air Protection, 3rd Edition, 2002.
- *B.C. Approved Water Quality Guidelines*, Ministry of Environment and Climate Change Strategy Updated 2018.
- *Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia*, Ministry of Water, Land and Air Protection, 2004.
- *Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia*, Ministry of Environment and Climate Change Strategy, 2014.
- *Land Development Guidelines for the Protection of Aquatic Habitat, Fisheries and Oceans, 2nd Edition, 1993.*
- *New Migratory Birds Regulations,* Environment and Climate Change Canada, 2022.

Environmental Monitoring

Environmental monitoring will be conducted to ensure appropriate measures are being taken to protect the environment. The Environmental Monitor (EM) must be an appropriate Qualified Environmental Professional (QEP). The EM will regularly inspect the work site for compliance with the environmental requirements of the Project. Observations will be recorded and reported to the Consultant and the Contractor. The EM must be familiar with the regulatory requirements of the Project and has the responsibility to report all non-compliance events and stop work if necessary. The EM will be on-site at the project start-up and during any sensitive activity.

Use of Reduced Risk Instream Work Window

Instream works will be completed in the reduced risk instream work window for the area (August 1–September 15). At this time, water levels in Deroche Creek and the Nicomen Slough and expected to be low, with the potential for the lower reach of Deroche Creek to be dry or intermittently dry. Conducting works at this time should reduce duration of instream works and the potential for fish to be present in the work area. Proposed works are expected to last through the entire work window (until September 15), with a potential to extend beyond if necessary (e.g., weather delays). Any extension will be done with the direction of the QEP for the project and in consultation with regulatory agencies.

Instream works will occur in the dry. In the event that the creek is not dry during construction, fish isolation fencing will be installed around the construction area and the area will be salvaged using minnow traps, seine netting, and dip netting. Dewatering of the work site will occur under the supervision of the QEP. All pump intakes will be equipped with fish screens (mesh width < 2.54 mm) to prevent entrainment and impingement of fish, in accordance with the DFO Interim Code of Practice for End-of-pipe fish protection screens for small water intakes in freshwater[6]. Generally, harm to fish during dewatering can occur due to stranding. To mitigate this risk, dewatering will be done slowly under the supervision of the QEP.

Fish Salvage

Isolation will be the primary mitigation measure for fish, and salvages should be conducted after the confirmation of fish presence in the isolated work area is confirmed, and where it is safe and practicable. Isolation measures are to remain in place for the duration of the project. A QEP must be on site during in-water works. See CEMP for more information on measures to avoid harming fish and fish habitat.

Amphibian and Reptiles Salvage

Amphibian and reptile salvage surveys are to be conducted according to the BMPs for Amphibian and Reptile Salvages in BC and the *Interim Hygiene Protocols for Amphibian Field Staff and Researchers*. Salvages will consist of both time-constraint (TCS) and systematic searches (i.e., visual encounter surveys) and dip-netting during any potential dewatering activities. Salvages will be completed under the direction of the QEP.

Breeding Bird Nest Surveys

Between March 1 and August 31, a QEP with experience in breeding bird nest surveys should be retained to carry out breeding bird nest surveys within the Project Footprint. These surveys are intended to identify nesting birds and apply mitigative measures to prevent contravention of the federal *Migratory Birds Convention Act* and the associated *Migratory Birds Regulation*.

Breeding bird nest surveys are to be conducted in a manner consistent with the following methodology:

1. Prior to any construction-related activity within undisturbed habitat, the surveyor(s) are to walk the entire area where works are proposed to identify birds exhibiting nesting behaviours and to locate nests within and adjacent to the right-of-way, this includes:
    - observing visual and audible behavioural cues; and
    - inspecting suitable nesting habitats, including ground, shrubs, wetland perimeters, and trees for nests.

[6] DFO, 2020. DFO 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. Accessed December 15, 2023.

2. A minimum of two surveys on separate days are to be conducted to identify any potential nests.
3. Surveys are to be conducted at a minimum intensity of 1 ha per hour.
4. Should an active nest be identified during nest surveys, a “no-work” radial buffer appropriate to the species and as determined by the QEP is to be established around the nest as described below. No work is to be conducted within the buffer until the nest has fledged.
5. Surveyors are to record the following information for identified nests:
    - Species
    - Geographic coordinates
    - Distance to the applicable project components.
    - Date and time of day.
    - Representative photos
    - Site description (i.e., tree or shrub species, height of nest, type of nest, direction cavity faces)
    - Stage of nesting (i.e., construction stage; eggs, including number; hatchlings; almost fledged)

Erosion and Sediment Control

- Stockpiles of excavated soil will be covered with polyethylene sheeting or alternative to prevent erosion, to be determined in consultation between the QEP and contractor.
- Silt fencing will be installed at the limit of disturbed areas to prevent sediment (as applicable).
- All construction materials, garbage, and erosion and sediment control materials will be removed from the site after the Project is complete.
- Water used in any concrete works (mixing, washing, curing, runoff, grout, etc.) will be managed to prevent entry into storm drains and watercourses.

Spill Prevention and Management

- All fueling of vehicles and equipment will be done off-site or onsite in a designated fueling area over a spill containment tray at least 30 m from any storm drain and watercourses.
- All equipment washing (i.e., concrete truck washout) must be done off-site or onsite in a designated area at least 30 m from storm drains and watercourses in a manner that will prevent wash from reaching any waterway.
- Generators, pumps, and other stationary equipment will be placed on spill trays. Where possible, generators will be located at least 30 m from any waterway.
- All machinery will be clean, in good working condition and free of excess oil and grease. Equipment will be inspected daily and documented.
- Containers will be labelled according to the Transportation of Dangerous Good Act and Workplace Hazardous Materials Information Systems (WHMIS) regulations.
- Oil waste, filters, absorbent pads, and cartridges will be collected and disposed of off-site at an appropriate facility in accordance with federal, provincial, and municipal regulatory requirements.
- A spill kit will be on each site, and staff trained in their use. Spill kits will contain appropriate materials for each site including spill booms capable of spanning creek widths where applicable.

- Any spill of a listed substance according to the *Spill Reporting Regulation* will be immediately reported to the Provincial Emergency Program 24-hour phone line at 1-800-663-3456. Leq'a:mel First Nation, the BC Ministry of Environment and Climate Change Strategy, FVRD, and all project team members will be notified of the spill.

Site Restoration and Replanting

- Areas, where aquatic and riparian vegetation is disturbed or removed, will be replanted with native plant species as required, including construction laydown areas and machine access routes. The banks of the sediment basin will be staked with native species.

5.3 Summary of Residual Impacts to Fish and Fish Habitat

The death of fish is not anticipated after avoidance and mitigation measures are put in place. However, there is the potential for temporary impact while the work is ongoing. These impacts to fish habitat will be mitigated by following procedures outlined in the CEMP.

After mitigation measures are implemented, it is expected the following residual impacts will result from the proposed project works and activities are likely to result in serious harm to fish:

- The alteration of approximately 230 m of channel comprising **2,700 m^2** of aquatic habitat in Deroche Creek through the sediment basin footprint.
- The alteration of **110 m^2** of aquatic habitat in Deroche Creek as a result of the Taylor Road bridge grade control structure.
- The destruction of approximately **7,400 m^2** of riparian vegetation within the footprint of the sediment basin including the loss of 229 trees[7] greater than 20 cm diameter at breast height (DBH).

The proposed timber deflectors are not anticipated to have any harmful residual effects and have been designed to function as rearing habitat during high creek flows from Deroche Creek and/or water levels in Nicomen Slough.

[7] Total trees cleared, including area outside of the 30 m riparian buffer of Deroche Creek.

6. Offsetting Plan

The offsetting plan is required to offset the impacts to aquatic and riparian fish habitat associated with the proposed project. Avoidance of impact is not possible as repairs are necessary to address sediment accumulation in Deroche Creek to mitigate future impacts on infrastructure and salmon habitat. The offsetting plan is being implemented in-kind and in addition to mitigation measures that are in place to minimize impacts to fish and fish habitat during and after construction. The objectives of the offsetting plan are aimed to achieve a residual positive net gain in fish habitat value, where the geographic extent, duration, timing, and intensity of residual effects are described in the following sections.

The offsetting objectives and measures have been determined in collaboration with LFN.

6.1 Offsetting Measures

The offsetting plan for the Project consists of the habitat-related measures of the hybrid design approaches as well as the installation of a number of specific habitat complexing features.

The proposed offsetting measures are as follows:

1. Construction of four rearing habitat channels within the northeast and southeast portions of the Deroche Creek alluvial fan (**1,325 m^2**).
2. Installation of a large woody debris reef along the Highway 7 embankment to improve habitat complexity, limit further erosion, and encourage natural channel migration away from the south bank of Nicomen Slough (**1,200 m^2**).
3. Installation of habitat complexing features, including installation of large woody debris (LWD) in the sediment basin low flow channel (**700 m^2**).
4. Enhancement of existing riparian habitat along Deroche Creek through invasive species removal and planting of native trees and shrubs (**9,800 m^2**).

Rearing Channel Creation in Deroche Fan

The Deroche Creek alluvial fan provides relatively simple and uniform juvenile salmonid rearing habitat during low flow conditions (outside of Fraser freshet). Low sloping topography and placid conditions contribute to shallow water with an abundance of fine sediments, invasive reed canary grass, and aquatic macrophytes. Rearing habitat, in the form of relatively narrow incised “finger” channel are proposed to be constructed in the south-east region of the fan. Channels 2–3 m wide and at least 1 m deep, with steep sides will create an abundance of edge habitat and most likely act as point source outlets for groundwater. This will be beneficial for water temperature moderation in summer and winter and may create some chum spawning potential. LWD and brush will be added to the channel for habitat complexing. Excavated gravels will be used to form mounds with an elevation conducive to shrub growth and planted with native species. These will contribute to riparian diversity and, when inundated during freshet, provide excellent wetted habitat. An example of a constructed rearing channel in shown in Figure 6-1.

Engineering design drawings are available in Appendix B.



Figure 6-1: Example of Constructed Rearing Channel

Large Woody Debris Reef

The large woody debris reef will be constructed in a similar manner to the timber deflectors. Timber piles, sourced from trees within the sediment basin footprint, will be driven into the ground at a maximum depth of 3 m. Woody debris of a variety of sizes, including pieces with rootwads and brush material will be interlocked between piles to provide instream cover for salmonids. Figure 6-2 shows a sketch of the proposed design.

Engineering design drawings are available in Appendix B.

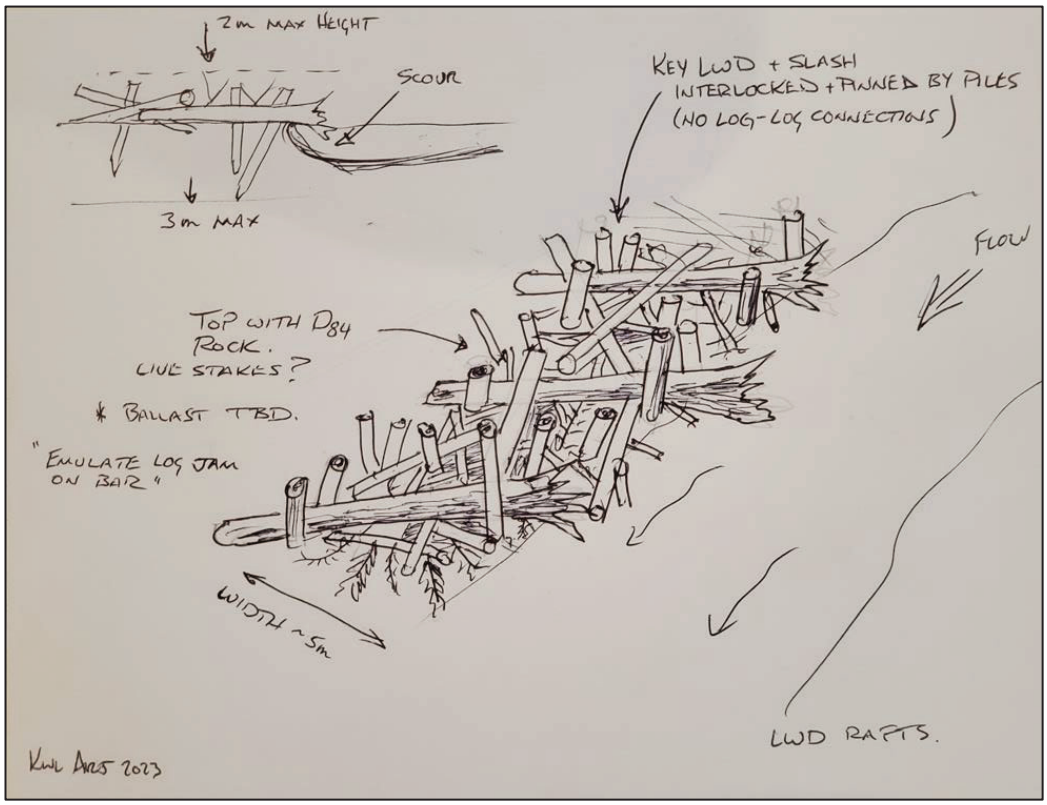

Figure 6-2: Diagram of Proposed Large Woody Debris Reef along the Highway 7 Embankment

Sediment Basin Low Flow Channel

The reach of Deroche Creek that flows through the sediment basin footprint is predominately a fast-moving channel with cobble substrate. This area has limited spawning habitat value due to the lack of appropriate spawning gravel and limited rearing habitat value due to the lack of instream cover and fast flowing water.

The banks of the sediment basin will be lined with substrate filled riprap and the area will be staked with willow. A low flow channel will be created along the base of the left bank of the basin. Embedded boulders with anchored large woody debris will be placed along this reach of the channel to create channel complexity and cover habitat for salmonids. Soil will be placed at the top of banks on either side of the basin and this area will be planted with native shrubs and trees.

This basin is specifically designed to maintain the low flow channel through scour. Traditional sediment basins typically consist of an over-excavated pool that provides short-term habitat value through depth but is deficient in structural cover. As the pool fills with sediment, low flows braid out into extremely shallow channels with no cover, structure, or complexity. The basin is dredged and the whole process starts over. In contrast, the Deroche basin behaves more like a natural channel that accretes a mid-channel bar. Such bars typically skew the low flow channel to either side, often increasing erosion on channel margins and sometimes creating undercut banks. The addition of low weirs is intended to favour this channel skew to the left side of the basin where complexing elements are placed. This may improve the habitat and fish passage as flow decline and, ideally, may create spawning locations not subject to burial over the winter.

Vegetated riprap provides greater riparian and aquatic ecological value than traditional riprap. Riparian vegetation also shades waterways from typical summer temperatures, providing nutrients as leaf litter or bug drop, and preventing the establishment of invasive species. Riparian vegetation, hydric soils and leaf litter may act as a sponge, soaking up stormwater during high flow events and allowing water to be slowly released back into the stream. The increase in organic matter and reduction in soil compaction associated with riparian vegetation also allows for greater water infiltration and drainage. The roots of the riparian vegetation, once established, can then provide enhanced riprap resiliency while also reducing surface runoff through uptake and transpiration (Natural Edge, 2020).

Implementation monitoring and effectiveness monitoring protocols are in place to ensure the native shrubs, plugs, and seeds successfully establish and create functional riparian habitat over the following five (5) years post construction.

Engineering design drawings are available in Appendix B.

Invasive Species Removal and Riparian Planting

Invasive species such as English ivy and Himalayan blackberry are prevalent in the riparian area of Deroche Creek. Several areas along Deroche Creek have been identified as suitable areas for invasive species removal and native planting (Figure 6-3). The planting sites are as follows:

Site 1: Willow staking and planting riprap along the east wall of the low flow channel in the sediment basin to provide shade.

Site 2: English ivy removal and riparian planting of native shrubs along the west bank of the sediment basin.

Site 3: Himalayan blackberry removal and riparian planting of native trees and shrubs east of sediment basin.

Site 4: Himalayan blackberry removal and riparian planting of native trees and shrubs on northeast side of Taylor Road bridge.

Site 5: Riparian planting of native trees and shrubs along the created rearing habitat channels areas on the Deroche Creek alluvial fan.



Photo 6-1: Proposed location of the LWD reef.



Photo 6-2: Proposed English Ivy removal and riparian planting area (Site 2).



Photo 6-3: Proposed blackberry removal and planting area east of sediment basin (Site 3).



Photo 6-4: Proposed blackberry removal and planting area (Site 4).



Photo 6-5: Proposed location of rearing habitat channel between timber deflectors.



Photo 6-6: Proposed location of three rearing habitat channels on the north side of the alluvial fan.

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Northwest Hydraulic Consultants
Deroche Creek Long-Term Flood Mitigation

KERR WOOD LEIDAL consulting engineers



Project No.	2838.003
Date	May 2024
Scale	1:2,000

0 12.5 25 50 Metres

Planting Areas

Figure 6-3

6.2 Habitat Balance

This section outlines the habitat balances for the amount impacted fish habitat and the amount of offsetting habitat created or enhanced. The project will achieve a net ecological gain in fish habitat by creating **665 m^2** of aquatic habitat and restoring **6,009 m^2** of riparian habitat. Table 6-1 summarizes the residual impacts to fish habitat and proposed aquatic offsetting measures. Table 6-2 summarizes residual impacts to riparian habitat and proposed riparian offsetting measures.

Table 6-1: Summary of Residual Aquatic Habitat Impacts and Proposed Offsetting Areas

Proposed Works	Habitat Description	Area (m^2)
Residual Impacts – Aquatic Habitat		
Deroche Creek – Sediment Basin	• Low channel complexity with limited instream cover and a predominately cobble substrate. • Limited habitat for rearing or spawning salmon.	2,700
Deroche Creek – Taylor Road Bridge Grade Control	• Low gradient channel with a cobble and gravel substrate. • Seasonally dry. • Limited instream cover. • Potential spawning area, however, area prone to sediment deposition (potential smothering of redds).	110
	Total Aquatic Area Impacted	**-2,810 m^2**
Proposed Offsetting – Aquatic Habitat		
Creation of Rearing Habitat Channels in Deroche Fan	• Off-channel rearing habitat with large woody debris.	1,325
Nicomen Slough – LWD Reef	• Rearing habitat or staging area for spawning adults.	1,200
Creation of Low Flow Channel in Sediment Basin	• Migratory corridor with habitat complexing.	950
	Total Aquatic Offsetting	**+3,475 m^2**
	Net Aquatic Habitat	**+665 m^2**

Table 6-2: Summary of Residual Riparian Habitat Impacts and Proposed Offsetting Areas

Proposed Works	Habitat Description	Area (m^2)
Residual Impacts – Riparian Habitat		
Loss of Riparian Habitat from Sediment Basin (229 Trees)	• Large cottonwood, cedars, and bigleaf maple with limited understory. Due to a berm along the east bank of Deroche Creek, the riparian area has limited influence on the creek.	7,400
	Total Riparian Area Impacted	**-7,400 m^2**
Proposed Offsetting – Riparian Habitat		
Site 1: Staking and Planting Riprap in Sediment Basin	• Rip rap along the sediment basin will be filled with growing medium and planted and staked.	3,740
Site 2: Himalayan Blackberry Removal and Planting East of Sediment Basin	• Himalayan blackberry will be removed from the area and native shrubs and trees will be planted.	2,588
Site 3: Riparian Planting on NE Side of Taylor Road Bridge	• Himalayan blackberry will be removed from the area and native shrubs and trees will be planted.	414
Site 4: Riparian Planting of Rearing Habitat Channels	• Native shrubs and trees will be planted along the margins of the created rearing habitat channels on the Deroche Creek alluvial fan.	6,667
	Total Riparian Offsetting	**13,409 m^2**
	Net Riparian Habitat	**+6,009 m^2**

6.3 Habitat Credits

No habitat credits will be used for this project. Residual impacts from the project will be offset by the measures outlined in the previous sections.

7. Description of Monitoring Measures to Assess Effectiveness of Measures and Standards Described

This section describes monitoring required during and after construction of the measures to mitigate habitat impacts to fish from the Project. Construction monitoring will occur during construction. Implementation monitoring will occur immediately following construction. Effectiveness monitoring will occur over a five (5)-year period after construction for aquatic habitat components and over a ten (10)-year period after construction for riparian habitat components.

7.1 Monitoring Approach

The monitoring approach proposed is based on the advice and guidance found in the following documents:

- *Policy for Applying Measures to Offset Adverse Effects on Fish and Fish Habitat Under the Fisheries Act, Fisheries and Oceans Canada, 2019*.
- *Requirements and Best Management Practices for Making Changes In and About A Stream in British Columbia, Ministry of Forests, Lands, Natural Resource Operations, and Rural Development, 2022*.
- *Standards and Best Practices for Instream Works, Ministry of Water, Land, and Air Protection, 2004*.
- *Guidelines for In-Stream and Off-Channel Routine Effectiveness Evaluation, Ministry of Water, Land, and Air Protection, 2003*.
- *Monitoring and Assessment of Fish Habitat Compensation and Stewardship Projects: Study Design, methodology, and Example Case Studies, Mike Pearson (et al.), 2005*.
- *Assessing the effectiveness of habitat offset activities in Canada: Monitoring design and metrics.* Smokorowski et al. 2015.

7.2 Construction Monitoring for Mitigation Measures

This stage of monitoring will occur during construction and is intended to ensure that the project is being carried out in compliance with all applicable legislation and permits and in adherence to the environmental guidance for the project.

Construction Environmental Management Plan for Project Works

A Construction Environmental Monitoring Plan (CEMP) has been developed for the construction of project works and will be supplemented by requirements and recommendations listed in regulatory permits. The CEMP will:

- Set out the requirements and measures that will be adopted to avoid, minimize, and mitigate the potential impacts to fish and fish habitat as a result of the Project.
- Be implemented by the Contractor throughout the project and applies to the construction phase.
- Provide overarching guidance for how environmental considerations will be implemented and monitored during the construction phase of the project.

The CEMP will be a living document and will be updated throughout the construction phase of the Project as planning for work is finalized and as findings from the monitoring program warrant changes in environmental management.

Construction Environmental Monitoring

Construction monitoring will be carried out by a QEP or a team working under the direction of a QEP. The responsibilities of the Environmental Monitor (EM) will be:

- To monitor and provide recommendations to ensure compliance with all applicable permits (i.e., *Fisheries Act* Authorization and *Water Sustainability Act* Change Approval), best management practices, and the Construction Environmental Management Plan.
- To provide additional recommendations to avoid and mitigate impacts to fish and fish habitat to the greatest extent possible.
- To provide recommendations for field fit components of the design and ensure the design is executed as approved.

Reporting

The EM will prepare daily environmental monitoring reports detailing the activities conducted, issues of non-compliance with the CEMPs and mitigation measures implemented to address deficiencies, as well as a representative photo log.

Upon completion of construction, the EM will prepare a brief memo summarizing key incidents; the daily reports will be included in the appendix of the CEMP. The memo will be submitted to DFO and WLRS within 60 days of completion of construction.

7.3 Implementation Monitoring

This stage of monitoring will occur immediately after completion of the works and ensure the works were carried out as planned. Implementation monitoring will evaluate the project works and the five primary offsetting components through a series of monitoring questions detailed below.

Monitoring Objectives

The purpose of implementation monitoring is to ensure project and offsetting works are functioning as designed. The objectives of the project will be used to identify metrics of success for the proposed works. The objectives include:

- Maintaining fish passage in the low flow channel in the sediment basin.
- Creating rearing habitat for juvenile salmonids (LWD reef and rearing habitat channels).
- Increased riparian plant biodiversity and density at the restoration planting sites.

These components will be used to frame metrics of success for the implementation monitoring, as described below.

Monitoring Protocol

Implementation monitoring will be conducted by appropriate QEP or team of QEPs. Generally, it is expected that monitoring will be completed by (or under supervision of) a Registered Professional Biologist (RPBio).

Implementation monitoring will evaluate the project and offsetting components through examining the following questions:

- **Sediment Basin**
  - Does the low-flow channel meet the intent of the design as per the engineering drawing package?
  - Do the materials match the design drawings and function as intended?
  - Are the habitat boulders and large woody debris installed as per the engineering drawings? Will they function as intended?
  - Are stakes in the rip rap installed at the correct elevation and at the correct depth?
- **Taylor Road Bridge Grade Control Structure**
  - Is the grade control structure passable to fish?
- **Timber Deflectors**
  - Do the materials used match the design drawings?
  - Will the structures function as fish habitat during high flows in Nicomen Slough?
- **Alluvial Fan Rearing Channels**
  - Does channel construction match the engineering design drawings?
  - Is the large woody debris installed as per the engineering drawings? Will they function as intended?
- **Large Woody Debris Reef**
  - Do the materials used match the design drawings?
  - Does the debris reef appear to be functioning as bank protections?
  - Does the debris reef appear to be functioning as fish habitat?
- **Riparian Planting**
  - Does the planting match the planting plan? Appropriate number of plants, type of plant (i.e., live stakes versus potted plants), size and condition of planted stock, species, and spacing?
  - Is there sufficient coverage of seed mix in areas with exposed soil?
  - Have plants been installed in the appropriate location and in an appropriate manner to facilitate establishment (i.e., planting depth, stem vertical, no air pockets around root ball)?
  - Is there a watering plan in place with adequate frequency for site moisture conditions?
  - Has all the garbage and any other unnecessary debris been removed from the planting areas?

Any deficiencies identified on site by the QEP during the implementation monitoring will be communicated to the contractor and via email. A follow-up implementation monitoring site visit by the QEP(s) will be conducted to ensure all deficiencies have been addressed.

7.4 Effectiveness Monitoring

This stage of monitoring will occur annually over a multi-year period post-construction and is intended to assess whether the proposed offsetting works are achieving their expected outcomes as per the offsetting plan.

Study Design

Effectiveness monitoring study design will follow a Before, After, Control, Impact (BACI) experimental design. Aquatic habitat effectiveness monitoring will be conducted for five years following construction and riparian monitoring will occur for ten years following construction. This will allow sufficient time to ensure the vegetation has become established, and that all Project components are functioning as intended. Monitoring will occur twice a year, once in late summer (July/August) when plants are leafed out and water levels are lowest, and once in the late fall during Coho and Chum spawning season. This will facilitate accurate assessment of plant growth and survival, assessment of low-flow stream conditions, assessment of high-flow stream conditions, and fish usage. The monitoring and reporting schedule is outlined in Table 7-1. Monitoring goals and methodologies are described in the sections below. Monitoring metrics and locations are summarized in Figure 7-1.

Table 7-1: Effectiveness Monitoring and Reporting Schedule

	Year 1	Year 2	Year 3	Year 5	Year 7	Year 10
Aquatic Habitat Monitoring	S/F	S/F	S/F	S/F	-	-
Riparian Restoration Monitoring	S	S	S	S	S	S
S = Summer, F= Fall						

Offsetting Goals

The purpose of effectiveness monitoring is to ensure project and offsetting works are functioning as designed. The goals of the project will be used to identify metrics of success for the proposed works. The goals include:

- **Goal 1 –** Maintain fish passage in the low flow channel in the sediment basin.
- **Goal 2 –** Improve rearing habitat for juvenile salmonids.
  - **Objective –** Create rearing habitat channels in the Deroche Creek alluvial fan.
  - **Objective** – Create rearing habitat in the low-flow channel with the installation of LWD.
  - **Objective –** Enhance rearing habitat in Nicomen Slough through the addition of the LWD reef.
  - **Objective –** Enhance rearing habitat in Nicomen Slough through installation of the timber deflectors.
- **Goal 3 –** Increase riparian plant biodiversity and density at the restoration planting sites.

These offsetting goals have been used to inform monitoring metrics and methodologies. These are discussed in the section below.

Goal 1: Maintain Fish Passage through the Sediment Basin

Monitoring Question: Are Coho and Chum salmon able to pass through the sediment basin at low flows?

Fish passage will be assessed both qualitatively and quantitatively. The monitor will walk the length of the low-flow channel and will note and measure areas where the channel is dry or there are barriers to fish passage. One transects will be established in the low-flow channel to measure water depth and water velocity. These values will be compared to habitat suitability indices for all life stages of Chum and Coho salmon to assess fish passage.

Goal 2: Creation and Enhancement of Rearing Habitat

Monitoring Question: Are the alluvial fan rearing channels and low-flow channel providing moderate to high quality habitat for rearing salmonids?

Rearing habitat will be assessed using a modified Fish Habitat Assessment Protocol (Johnston and Slaney, 1996). This will include collection of data such as physical stream measurements (wetted width, mean depth, and maximum pool depth), assessments of available instream cover (LWD, deep pools, boulders, in stream vegetation, etc.), and canopy cover. Suitability surveys will be conducted in the low-flow channel in the sediment basin and in the rearing habitat channels in the alluvial fan.

In-situ water quality measurements will be collected in Deroche Creek and in Nicomen Slough. Measurements will include pH, temperature, turbidity, and dissolved oxygen. Values will be compared to provincial Approved or Working Water Quality Guidelines for the Protection of Aquatic Life.

Monitoring Question: Are juvenile salmon utilizing the alluvial fan channels?

Abundance of juvenile salmonids (catch per unit effort) will be conducted in the alluvial fan channels. This data will be compared with abundance data collected in the reference alluvial fan channel on the north side of the fan. However, the reference channel is groundwater fed, so there is a potential that data will not be directly comparable. Data collected at this reference site data will be more of a general indicator of population trends through the five years of effectiveness monitoring. Presence of juvenile salmon in the channels and results from the rearing habitat suitability survey will determine if rearing habitat creation has been successful.

Monitoring Question: Is fish abundance higher in the areas where large wood has been placed in Nicomen Slough?

Abundance of juvenile salmonids (catch per unit effort) will be assessed in the low-flow channel, and in Nicomen Slough (at the LWD Reef and the south deflection berm) using minnow traps. Fish abundance data in Nicomen Slouch will be compared to baseline data and a reference site with no woody debris on the bank of Nicomen Slough near Deroche Creek.

In the low-flow channel, monitoring data will be compared to baseline data collected prior to the start of works.

At the LWD reef, the project will aim to increase the juvenile abundance from baseline conditions. Several published papers were reviewed to determine a suitable target increase. Impacts of LWD installation ranged from no effect on juvenile salmon[8] to resulting in 7.9 times increase in juvenile salmon

[8] Walls, Caroline J., "The Effectiveness of Large Woody Debris Placement at Improving Freshwater Rearing Habitat and Enhancing Juvenile Salmon (Oncorhynchus spp.) Production" (2020). WWU Graduate School Collection. 937. https://cedar.wwu.edu/wwuet/937

abundance[9]. A study conducted in Washington and Oregon, LWD increased juvenile coho density by 1.8 to 3.2 times over reference reaches[10]. Based on this study, the metric of success for the LWD reef will be increasing the density of salmon by 2 times over baseline conditions.

Monitoring Question: Are the installed habitat structures structurally stable?

Large woody debris and habitat boulders in the low flow channel will be assessed for structural stability. The LWD reef area and deflection berms will also be assessed for stability and to ensure they are providing habitat. Structural stability will be based on qualitative observations based on the criteria outlined in Table 7-2.

Table 7-2: Criteria for Monitoring Stability of Large Woody Debris

Score	Description
4	LWD and habitat boulders (low-flow channel only) in excellent condition; all components are solid with no evidence of breakage or wear.
3	LWD and habitat boulders (low-flow channel only) in sufficient condition; normal wear and tear with limited localized damage.
2	LWD and habitat boulders (low-flow channel only) in poor condition; evidence of LWD decay or movement.
1	LWD and habitat boulders (low-flow channel only) in very poor condition; LWD collapsed. LWD collapsed, boulders crumbled, cables rusted and failed. Structure will not last another high flow season.

Goal 3: Improve Riparian Planting Areas

Riparian monitoring will occur in the summer when plants are leafed out. Circular plots with an area of 10 m^2 will be placed randomly throughout the planting areas. The functionality and success of the planted areas will be determined based on the following metrics.

Monitoring Question: Is the planted stock surviving and healthy?

Assessment of the success of plantings based on the proportion of plant survivorship and plant health. Planted shrubs should have a survival rate of 80% and planted trees should have a survival rate of 100%. Plant health will be assessed qualitatively by observing evidence of yellowing, grazing (i.e., uniform height reduction, widespread absence of leaf tips, waterfowl observed grazing on site), and/or other physical damage (e.g., smothering by logs or garbage).

Replacement planting, when deemed necessary, should be tracked to ensure appropriate adjustments to plant numbers and species for future years of monitoring of plant stock health and survivorship.

Quantitative assessment of the mean percent cover of invasive plants in each plant plot. Reed canary grass, Japanese knotweed, and Himalayan blackberry have been identified as invasive plants of note.

[9] C. J. Cederholm, R. E. Bilby, P. A. Bisson, T. W. Bumstead, B. R. Fransen, W. J. Scarlett, J. W. Ward. 1997. Response of Juvenile Coho Salmon and Steelhead to Placement of Large Woody Debris in a Coastal Washington Stream. North American Journal of Fisheries Management. 17(4). 947-963. https://doi.org/10.1577/1548-8675(1997)017<0947:ROJCSA>2.3.CO;2
[10] P. Roni and T. Quinn. 2001. Density and size of juvenile salmonids in response to placement of large woody debris in western Oregon and Washington streams. Canadian Journal of Fisheries and Aquatic Sciences. 58(2). https://doi.org/10.1139/f00-246

Path: P:\2800-2899\2838-003\430-GIS\Pro Projects\2838003_Figures\2838003_Figures.aprx\2838003_Fig7-1_EffectivenessMonitoringPlan | Date Saved: 2024-05-15 10:28 AM | Author: rtaylor

Northwest Hydraulic Consultants
Deroche Creek Long-Term Flood Mitigation

KERR WOOD LEIDAL consulting engineers



Project No. 2838.003
Date May 2024
Scale 1:2,000
0 12.5 25 50 Metres

Effectiveness Monitoring Plan

Figure 7-1

7.5 Routine Maintenance and Adaptive Management

Routine maintenance is likely to be needed in the years following construction to ensure native vegetation are well established and functioning as intended. Maintenance activities may include:

- Watering of planted stock, especially in the first growing season.
- Replacement planting.
- Invasive plant management (especially in the first few growing seasons).
- Removal of trash.

Further assessment and maintenance may be needed depending on the results of the effectiveness monitoring assessment. All components that receive a score of 2 or lower (based on the assessment in **Error! Reference source not found.**) will require maintenance to bring the component up to target c onditions. However, if multiple components receive a score of 2 or lower, a site diagnostic may be warranted. A site diagnostic can be used to determine the potential underlying causes of poor performance of the restoration prescription and recommend potential solutions.

An adaptive management approach will be used to propose solutions to address the failed components based on greater understanding of localized conditions gained from the site diagnostic. In the case that a novel stressor is identified and/or considerable changes are needed to address an issue on site, additional monitoring frequency and duration may be recommended to ensure the site meets expectations and objectives of the approved design.

Reporting

Implementation Monitoring Report

An implementation monitoring report will be prepared and submitted to DFO and WLRS within 60 days of completion of construction and/or once all deficiencies have been addressed. The report will include:

- An executive summary.
- An as-built survey.
- Detailed documentation of the field fit implementation of planting, habitat complexing structures, and other relevant components.
- An outline of any deficiencies on site and how they were addressed to ensure the works meet the approved design.
- A representative photo log using standardized viewpoints and bearings (where applicable).

Effectiveness Monitoring Reports

A monitoring memo will be prepared following the last site visit of each monitoring year. The memo will include:

- An executive summary.
- An overview of general site conditions.
- Data summary and analysis.
- An overall assessment of site conditions relative to the project objectives and intended function.
- A representative photo log using standardized viewpoints and bearings (where applicable).
- An overview of maintenance needed with revised monitoring schedule, if deemed necessary.
- Findings of the site diagnostic and adaptive management recommendations, if deemed necessary.

The monitoring memo will be submitted to DFO and WLRS within 60 days of the last site visit of each monitoring year.

8. Contingency Measures

8.1 Construction Contingency Measures

If the avoidance and mitigation measures outlined are found, over the course of the monitoring, to be insufficient to prevent harmful impacts to fish and fish habitat, the following contingency measures will be implemented:

- The Environmental Monitor will require works to stop until a suitable strategy to address the issues is implemented by the contractor.
- Works may be completed during different conditions or with different construction techniques if issues are identified by the Environmental Monitor.

8.2 Offsetting Contingency Measures

Effectiveness monitoring will be conducted to assess the success of the offsetting plan. In the event that the offsetting plan does not meet the criteria outlined, the following contingency measures will be implemented:

- Identify which criteria the offsetting plan has not successfully met.
- Determine the cause of the cause of the deficiency.
- Determine how to resolve the cause of the deficiency (e.g. altering the design, addition of new plants, identifying additional maintenance needs).
- Implement and monitor the contingency measures.

In the unlikely event that these contingency steps are unsuccessful in remedying the deficiencies, alternate sites in the region will be identified for additional restoration.

Report Submission

Prepared by:

KERR WOOD LEIDAL ASSOCIATES LTD.



Janice Kwo, M.Sc., RPBio
Project Biologist

Reviewed by:



Patrick Lilley, M.Sc., RPBio, BC-CESCL
Senior Biologist

Statement of Limitations

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Revision History

Revision #	Date	Status	Revision	Author
0	May 28, 2024	Final		JVK

Appendix A

Site Photos

Appendix A – Site Photos



Photo A-1: Deroche Creek flowing through the alluvial fan and entering the Nicomen Slough. November 15, 2023.



Photo A-2: Location of proposed timber deflectors on the Deroche Creek alluvial fan. March 9, 2023.



Photo A-3: Looking upstream at the Taylor Road Bridge and location of proposed grade control structure. Deroche Creek was dry in the section during the site visit in March 2023.



Photo A-4: Location of the proposed Taylor Road grade control structure.



Photo A-5: Reach 2a of Deroche Creek, looking upstream at the location of the proposed sediment basin.



Photo A-6: Upstream end of the proposed sediment basin on Deroche Creek, looking downstream.



Photo A-7: Riparian area on east bank of Deroche Creek within the sediment basin footprint.



Photo A-8: Riparian area on east bank of Deroche Creek within the sediment basin footprint. Berm along the east bank visible in background.

Appendix B

Engineering Drawings

KERR WOOD LEIDAL ASSOCIATES LTD.
consulting engineers

DEROCHE CREEK RECOVERY SOLUTION

ISSUED FOR TENDER, APRIL, 2024

DRAWING INDEX		
SHEET No.	SHEET DESCRIPTION	REVISION
001	TITLE SHEET AND PROJECT LOCATION	
002	EXISTING SITE PLAN	
003	REACH 1 WORKS - PLAN AND PROFILE VIEWS	
004	REACH 2 WORKS - PLAN AND PROFILE VIEWS	
005	REACH 1 - TYPICAL SECTIONS AND PROFILES	
006	REACH 2 - TYPICAL SECTIONS AND PROFILES	
007	SEDIMENT BASIN - STANDARD SECTIONS	
008	LOT 8-3-3 GRADING PLAN	
009	OFF-SETTING WORKS	
010	OFF-SETTING WORKS - TYPICAL SECTIONS AND PROFILES	
011	PLANTING PLAN	



LOCATION MAP
NOT TO SCALE



SITE MAP
NOT TO SCALE

CLIENT:

Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION

nhc northwest hydraulic consultants

SEAL:

2024-05-04

PERMIT TO PRACTICE
NORTHWEST HYDRAULIC CONSULTANTS LTD.
PERMIT NUMBER: 1003221
The Association of Professional Engineers and Geoscientists of British Columbia

DEROCHE CREEK RECOVERY SOLUTION

TITLE SHEET AND PROJECT LOCATION

DESIGNED: DJG	SHEET ID: 3007814-RS-001	SHEET No:	
DRAFTED: CZZ	STATUS: ISSUED FOR TENDER	001	
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 30 APR 2024	REV No:	

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

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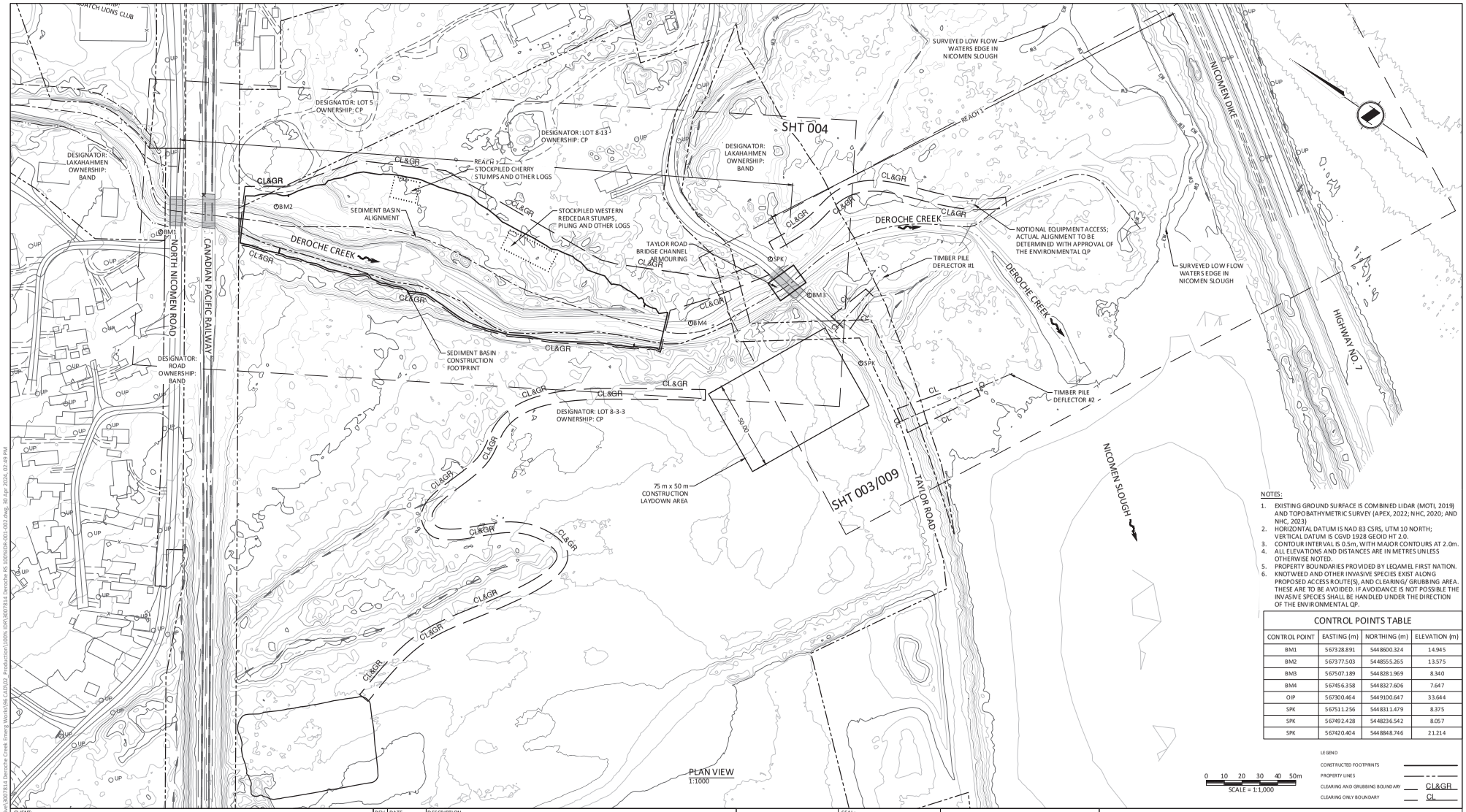

NOTES:

1. EXISTING GROUND SURFACE IS COMBINED LIDAR (MOTI, 2019) AND TOPOBATHYMETRIC SURVEY (APEX, 2022; NHC, 2020; AND NHC, 2023)
2. HORIZONTAL DATUM IS NAD 83 CSRS, UTM 10 NORTH; VERTICAL DATUM IS CGVD 1928 GEOID HT 2.0.
3. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
4. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
5. PROPERTY BOUNDARIES PROVIDED BY LEQAMEL FIRST NATION.
6. KNOTWEED AND OTHER INVASIVE SPECIES EXIST ALONG PROPOSED ACCESS ROUTE(S), AND CLEARING/ GRUBBING AREA. THESE ARE TO BE AVOIDED. IF AVOIDANCE IS NOT POSSIBLE THE INVASIVE SPECIES SHALL BE HANDLED UNDER THE DIRECTION OF THE ENVIRONMENTAL QP.

CONTROL POINTS TABLE

CONTROL POINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
BM1	567328.891	5448600.324	14.945
BM2	567377.503	5448555.265	13.575
BM3	567507.189	5448281.969	8.340
BM4	567456.358	5448327.606	7.647
OIP	567300.464	5449100.647	33.644
SPK	567511.256	5448311.479	8.375
SPK	567492.428	5448236.542	8.057
SPK	567420.404	5448848.746	21.214

LEGEND

CONSTRUCTED FOOTPRINTS
PROPERTY LINES
CLEARING AND GRUBBING BOUNDARY — CL&GR
CLEARING ONLY BOUNDARY — CL

CLIENT: Ministry of Environment and Climate Change Strategy, British Columbia

REV.	DATE	DESCRIPTION

nhc northwest hydraulic consultants

SEAL: D. J. GOULD # 29261 PROFESSIONAL ENGINEERS — 2024-05-04

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DEROCHE CREEK RECOVERY SOLUTION

SITE PLAN

DESIGNED: DJG	SHEET ID: 3007814-RS-002		SHEET No: 002
DRAFTED: CZZ	STATUS: ISSUED FOR TENDER		
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 30 APR 2024		REV No:

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

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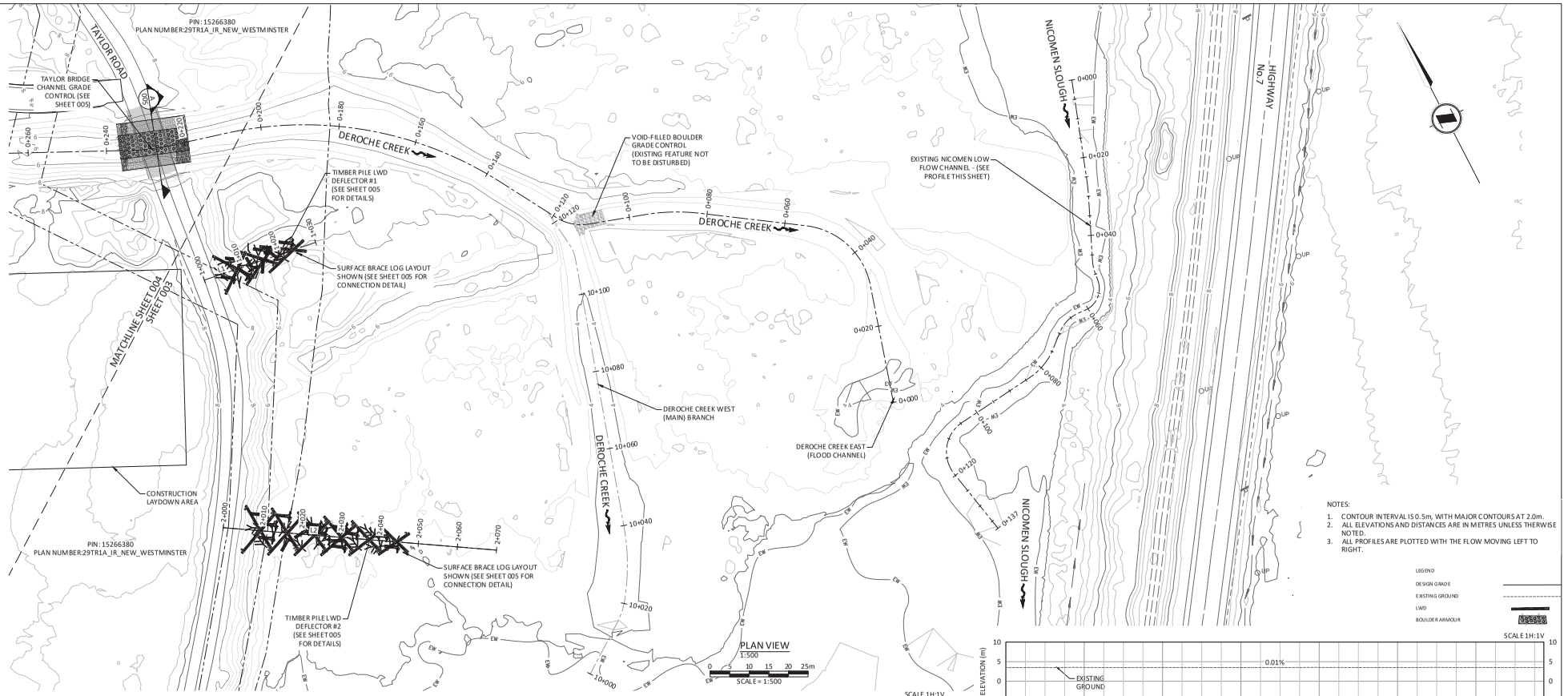
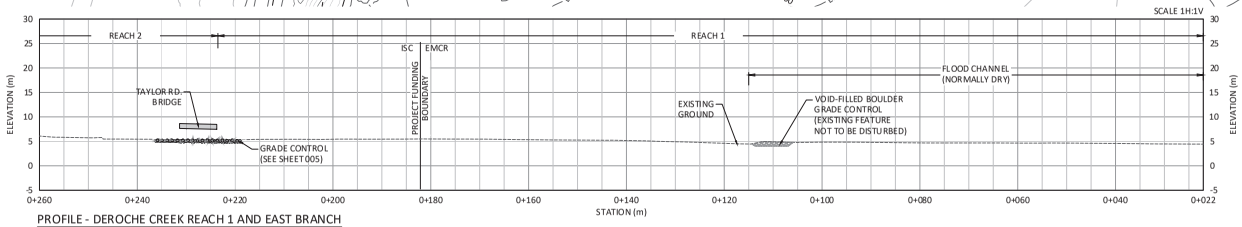
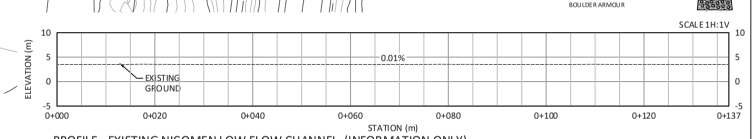


NOTES:

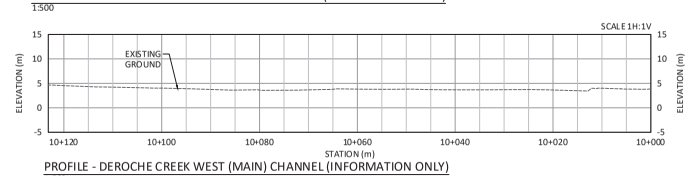
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS THERWISE NOTED.
3. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.



PROFILE - DEROCHE CREEK REACH 1 AND EAST BRANCH
1:500



PROFILE - EXISTING NICOMEN LOW FLOW CHANNEL (INFORMATION ONLY)
1:500



PROFILE - DEROCHE CREEK WEST (MAIN) CHANNEL (INFORMATION ONLY)
1:500

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION

nhc northwest hydraulic consultants

SEAL:

PROFESSIONAL ENGINEER D. J. GOOLD # 28261 BRITISH COLUMBIA
2024-05-04

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The Association of Professional Engineers and Geoscientists of British Columbia

DEROCHE CREEK RECOVERY SOLUTION
REACH 1 WORKS
PLAN AND PROFILE

DESIGNED:	DJG	SHEET ID:	3007814-RS-003	SHEET No:
DRAFTED:	CZZ	STATUS:	100% IDR	003
CHECKED:	DJG	SCALE:	AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE:	30 APR 2024	REV No:

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

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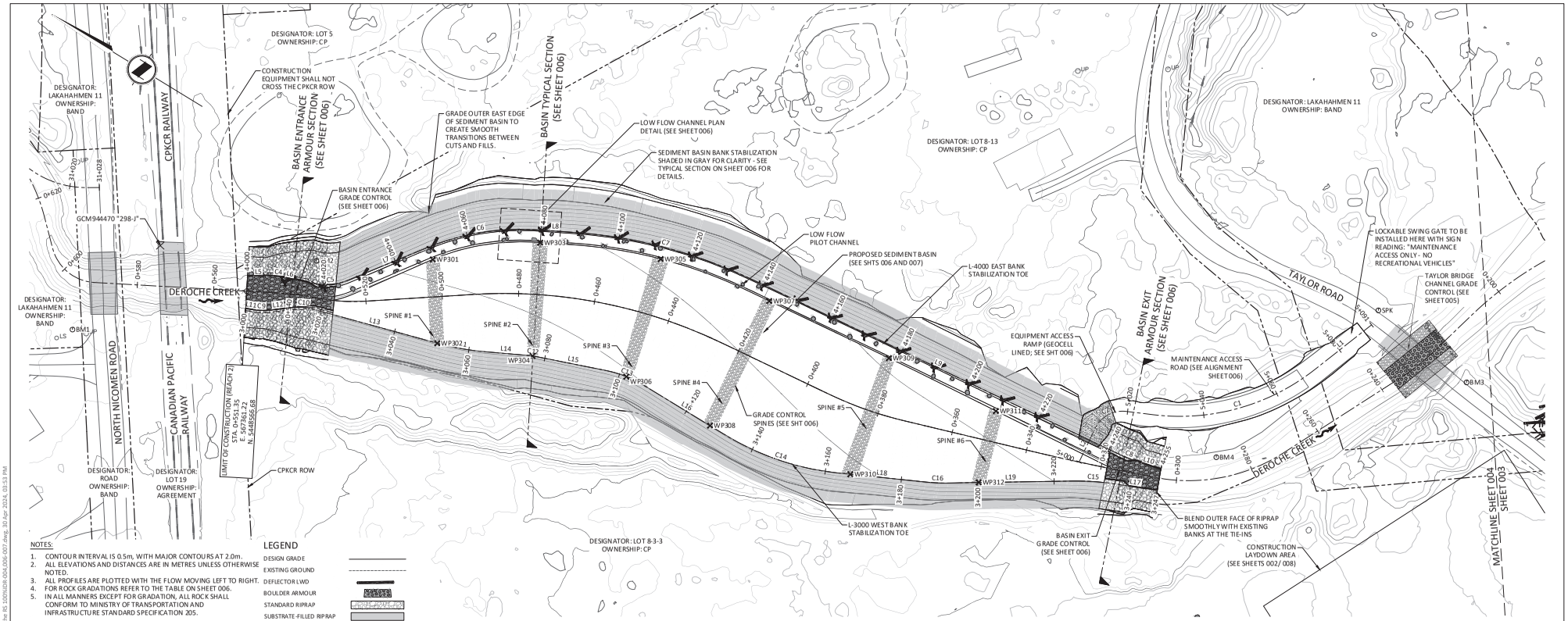


NOTES:

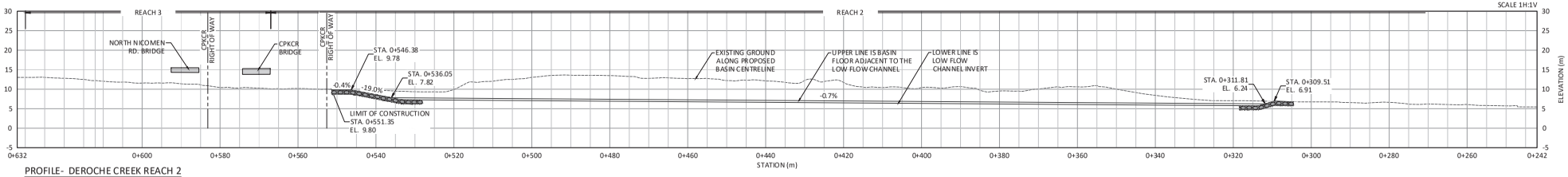
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
3. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.
4. FOR ROCK GRADATIONS REFER TO THE TABLE ON SHEET 006.
5. IN ALL MANNERS EXCEPT FOR GRADATION, ALL ROCK SHALL CONFORM TO MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE STANDARD SPECIFICATION 205.

LEGEND

- DESIGN GRADE
- EXISTING GROUND
- DEFLECTOR LWD
- BOULDER ARMOUR
- STANDARD RIPRAP
- SUBSTRATE-FILLED RIPRAP
- WRC ROOTWADS

PLAN VIEW
1:500

0 5 10 15 20 25m
SCALE = 1:500



PROFILE- DEROCHE CREEK REACH 2
1:500

CLIENT:

Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION

nhc northwest hydraulic consultants

SEAL:

D. J. GOULD # 29261 PROFESSIONAL ENGINEER — 2024-05-04

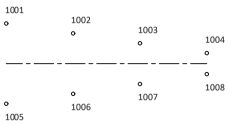
PERMIT TO PRACTICE
NORTHWEST HYDRAULIC CONSULTANTS LTD.
PERMIT NUMBER: 1003221
The Association of Professional Engineers and Geoscientists of British Columbia

DEROCHE CREEK RECOVERY SOLUTION
REACH 2 WORKS
PLAN AND PROFILE VIEWS

DESIGNED: DJG	SHEET ID: 3007814-RS-004		SHEET No: 004
DRAFTED: CZZ	STATUS: ISSUED FOR TENDER		
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 30 APR 2024		REV No:

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nwinfile-van\Projects\Active\3007814 Deroche Creek Emerg Works\06 CAD\02_Production\100% IDR\3007814 Deroche RS 100%IDR-004,006-007.dwg, 30 Apr 2024, 03:53 PM

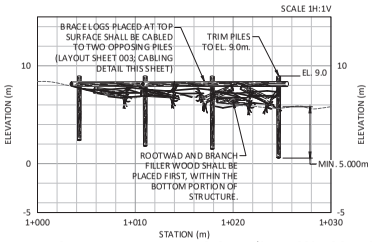


PILING PLAN - DEFLECTOR #1
1:250

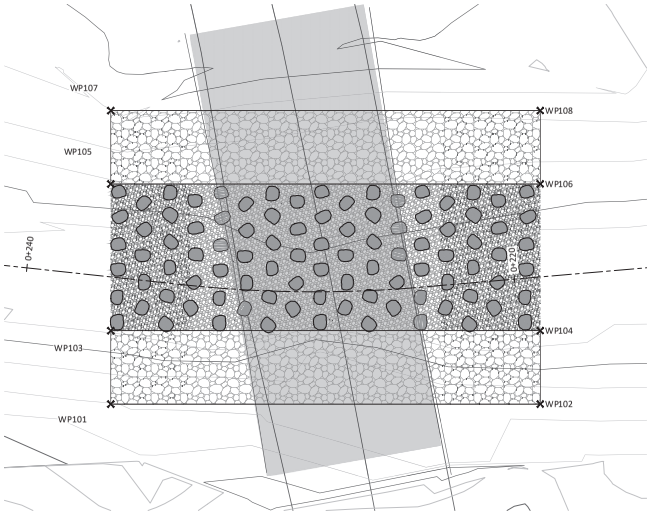
PILE LAYOUT TABLE - DEFLECTOR #1		
PILE #	EASTING (m)	NORTHING (m)
1001	567505.93	5448262.56
1002	567512.54	5448260.55
1003	567519.16	5448258.55
1004	567525.77	5448256.55
1005	567504.73	5448254.45
1006	567511.63	5448254.44
1007	567518.54	5448254.43
1008	567525.45	5448254.42

TIMBER PILE DEFLECTOR #1 ALIGNMENT LAYOUT						
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L1	1+000.000	567501.20	5448259.12	098° 28' 01.01"	30.000	

WORKPOINT TABLE - TAYLOR BRIDGE ARMOURING		
PILE #	EASTING (m)	NORTHING (m)
101	567495.39	5448293.46
102	567511.93	5448287.55
103	567496.40	5448296.29
104	567512.94	5448290.37
105	567498.43	5448301.94
106	567514.96	5448296.02
107	567499.44	5448304.76
108	567515.97	5448298.84



PROFILE - TIMBER PILE DEFLECTOR #1 (SHEET 003; LOOKING NORTH)
1:250



TAYLOR BRIDGE CHANNEL ARMOURING
1:150

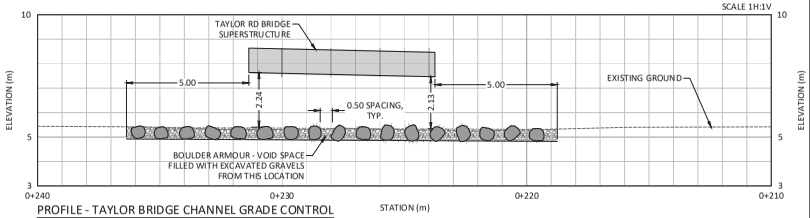


PILING PLAN - DEFLECTOR #2
1:250

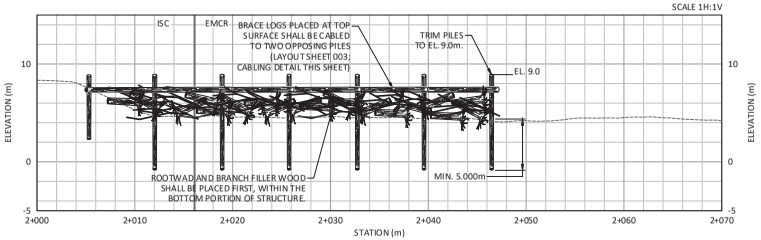
PILE LAYOUT TABLE - DEFLECTOR #2		
PILE #	EASTING (m)	NORTHING (m)
2001	567483.71	5448202.35
2002	567489.33	5448198.33
2003	567494.95	5448194.32
2004	567500.57	5448190.30
2005	567506.19	5448186.28
2006	567511.81	5448182.26
2007	567517.43	5448178.24

PILE LAYOUT TABLE - DEFLECTOR #2		
PILE #	EASTING (m)	NORTHING (m)
2008	567478.26	5448193.60
2009	567484.35	5448190.33
2010	567490.43	5448187.06
2011	567496.52	5448183.79
2012	567502.61	5448180.52
2013	567508.69	5448177.25
2014	567514.78	5448173.98

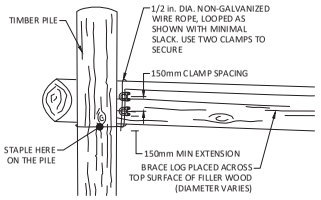
TIMBER PILE DEFLECTOR #2 ALIGNMENT LAYOUT						
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L2	2+000.000	567476.59	5448200.71	121° 53' 59.96"	70.000	



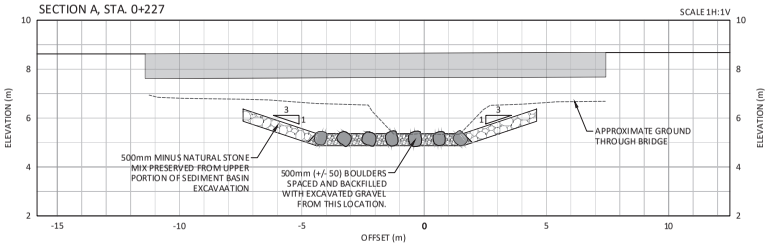
PROFILE - TAYLOR BRIDGE CHANNEL GRADE CONTROL (SHEET 003; LOOKING EAST)
1:100



PROFILE - TIMBER PILE DEFLECTOR #2 (SHEET 003; LOOKING NORTH)
1:250



BRACE LOG CABLING DETAIL
1:25



A / 003 TAYLOR BRIDGE CHANNEL GRADE CONTROL (LOOKING SOUTH)
1:100

LEGEND
DESIGN GRADE
EXISTING (2023) GROUND
LARGE WOODY DEBRIS
TIMBER PILE
VOID-FILLED BOULDER ARMOURING

NOTES:
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
3. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.
4. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
5. IN ALL MANNERS EXCEPT FOR GRADATION, ROCK QUALITY SHALL CONFORM TO MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE STANDARD SPECIFICATION 205.

CLIENT:
BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION

nhc northwest hydraulic consultants

SEAL:
PROFESSIONAL ENGINEER D. J. GOULD # 28261 PROVINCE OF BRITISH COLUMBIA
2024-05-04

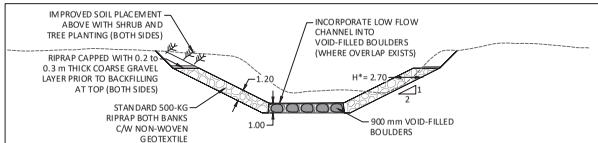
PERMIT TO PRACTICE
NORTHWEST HYDRAULIC CONSULTANTS LTD.
PERMIT NUMBER: 1003221
The Association of Professional Engineers and Geoscientists of British Columbia

DEROCHE CREEK RECOVERY SOLUTION
REACH 1
TYPICAL SECTIONS AND PROFILE DETAILS

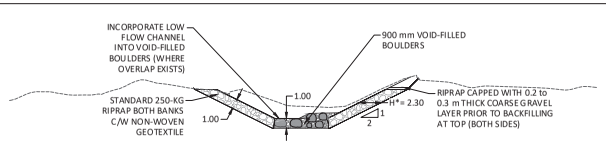
DESIGNED:	DJG	SHEET ID: 3007814-RS-005	SHEET No: 005
DRAFTED:	CZZ	STATUS: 100% IDR	
CHECKED:	DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE: 30 APR 2024	REV No:

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

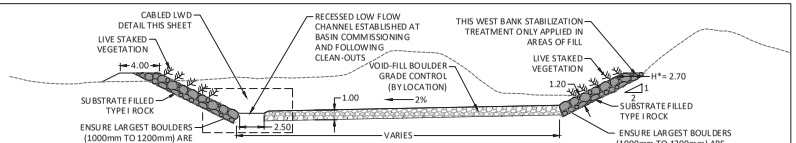
FILENAME: \\nwhfile-svr\Projects\Active\3007814 Deroche Creek Emerg Works\06 CAD\02_Production\100% IDR\3007814 Deroche RS 100%IDR-003.005.dwg, 30 Apr 2024, 03:14 PM



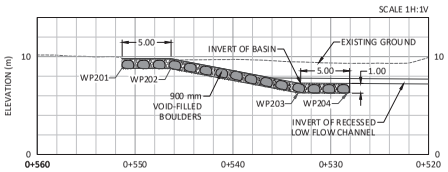
TYPICAL SECTION - BASIN ENTRANCE ARMOUR (SEE SHEET 004)
1:250



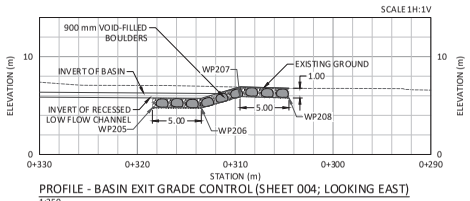
TYPICAL SECTION - BASIN EXIT ARMOUR (SEE SHEET 004)
1:250



TYPICAL SECTION - BASIN (SEE SHEET 004)
1:250



PROFILE - BASIN ENTRANCE GRADE CONTROL (SHEET 004; LOOKING EAST)
1:250



PROFILE - BASIN EXIT GRADE CONTROL (SHEET 004; LOOKING EAST)
1:250

WEST BANK STABILIZATION ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L11	3+000.000	567357.14	5448564.62	157° 30' 27.32"	2.803	
C9	3+002.803	567358.21	5448562.03	149° 56' 14.47"	2.907	11.000
L12	3+005.709	567359.66	5448559.52	142° 22' 01.61"	7.605	
C10	3+013.314	567364.30	5448553.50	153° 08' 19.07"	3.948	10.500
L13	3+017.262	567366.08	5448550.00	163° 54' 36.53"	34.242	
C11	3+051.504	567375.57	5448517.10	158° 44' 00.11"	12.649	70.000
L14	3+064.153	567380.15	5448505.32	153° 33' 23.68"	10.947	
C12	3+075.100	567385.02	5448495.52	156° 43' 38.64"	3.320	30.000
L15	3+078.420	567386.34	5448492.47	159° 53' 53.60"	17.959	
C13	3+096.379	567392.51	5448475.61	169° 55' 09.83"	10.494	30.000
L16	3+106.873	567394.33	5448465.33	179° 56' 26.06"	25.234	
C14	3+132.107	567394.36	5448440.09	167° 11' 53.43"	31.136	70.000
L18	3+163.243	567401.20	5448409.98	154° 27' 20.79"	23.184	
C16	3+186.427	567411.20	5448389.07	151° 03' 18.30"	5.935	50.000
L19	3+192.362	567414.07	5448383.87	147° 39' 15.81"	32.521	
C15	3+224.884	567431.47	5448356.40	152° 15' 55.54"	10.462	65.000
L17	3+235.346	567436.33	5448347.15	156° 52' 35.26"	11.832	

EAST BANK STABILIZATION ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L5	4+000.000	567364.60	5448568.54	148° 11' 05.50"	5.815	
C4	4+005.815	567367.66	5448563.59	154° 10' 14.71"	4.387	20.995
C5	4+017.349	567372.00	5448552.93	143° 10' 38.73"	9.399	15.858
L7	4+026.748	567377.55	5448545.52	126° 11' 53.53"	22.305	
C6	4+049.053	567395.55	5448532.34	139° 21' 17.98"	29.393	64.000
L8	4+078.446	567414.53	5448510.24	152° 30' 42.42"	9.419	
C7	4+087.864	567418.87	5448501.88	163° 16' 57.04"	48.500	129.000
L9	4+136.364	567432.74	5448455.70	174° 03' 11.66"	107.249	
C8	4+243.613	567443.85	5448349.03	170° 38' 17.75"	3.576	30.000
L10	4+247.189	567444.43	5448345.51	167° 13' 23.84"	7.393	

ENTRANCE GRADE CONTROL WORKPOINTS TABLE

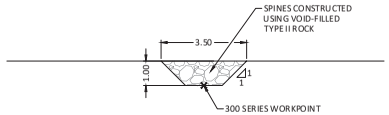
WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP201	567361.22	5448566.68	8.80
WP202	567363.57	5448562.29	8.74
WP203	567369.12	5448550.51	6.30
WP204	567371.06	5448545.87	6.26

EXIT GRADE CONTROL WORKPOINTS TABLE

WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP201	567361.22	5448566.68	8.80
WP202	567363.57	5448562.29	8.74
WP203	567369.12	5448550.51	6.30
WP204	567371.06	5448545.87	6.26

BASIN MAINTENANCE ACCESS ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L2	5+000.000	567436.58	5448357.58	083° 59' 09.03"	9.673	
C2	5+009.673	567446.20	5448358.59	119° 46' 07.66"	9.992	8.000
C1	5+026.784	567457.27	5448347.47	132° 57' 25.88"	44.956	57.000
L1	5+071.740	567489.32	5448317.62	110° 21' 45.47"	18.959	



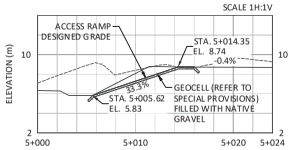
TYPICAL SECTION - GRADE CONTROL SPINE
1:100

GRADE CONTROL SPINE WORKPOINTS TABLE

WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP301	567393.69	5448529.45	6.39
WP302	567375.58	5448517.03	6.83
WP303	567412.07	5448507.78	6.12
WP304	567385.73	5448494.04	6.72
WP305	567424.84	5448478.65	5.90
WP306	567393.90	5448470.28	6.55

GRADE CONTROL SPINE WORKPOINTS TABLE

WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP307	567430.27	5448448.70	5.69
WP308	567394.39	5448444.92	6.41
WP309	567433.83	5448414.20	5.45
WP310	567402.65	5448406.96	6.09
WP311	567436.62	5448383.10	5.36
WP312	567418.34	5448377.21	5.74



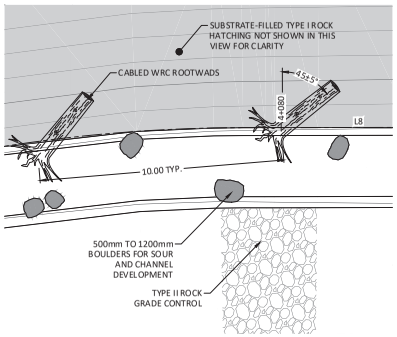
PROFILE - ACCESS RAMP (SHEET 004; LOOKING NORTH)
1:250

WEST BANK STABILIZATION OFFSET/ELEVATION TABLE

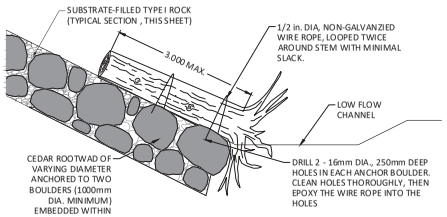
STATION	O/S TO TOE OF CUT	ELEV TOE OF CUT	O/S TO TOP OF CUT	ELEV TOP OF CUT
3+000.000	0.16	8.60	7.53	12.31
3+002.803	0.11	8.60	7.36	12.24
3+005.709	0.13	8.48	7.86	12.16
3+010.000	0.14	7.65	9.60	12.08
3+013.314	0.15	6.99	10.86	11.95
3+017.262	-0.64	6.20	10.85	11.96
3+020.000	-0.84	6.09	10.73	11.90
3+030.000	0.27	6.63	10.39	11.84
3+040.000	0.27	6.63	9.79	11.66
3+050.000	0.27	6.62	9.33	11.41
3+060.000	0.26	6.61	9.19	11.19
3+070.000	0.28	6.56	9.56	11.22
3+080.000	0.28	6.49	9.37	11.08
3+090.000	0.28	6.43	9.00	10.79
3+096.379	0.28	6.37	8.44	10.44
3+100.000	0.31	6.34	8.31	10.35
3+110.000	0.28	6.29	8.07	10.28
3+120.000	0.28	6.24	8.05	10.16
3+130.000	0.28	6.19	7.39	9.77
3+140.000	0.26	6.13	7.32	9.66
3+150.000	0.27	6.05	7.49	9.69
3+160.000	0.21	5.95	7.51	9.66
3+170.000	0.28	5.84	7.41	9.46
3+180.000	0.28	5.75	7.34	9.30
3+190.000	0.28	5.65	7.09	9.13
3+200.000	0.27	5.53	6.94	8.96
3+210.000	0.27	5.42	6.97	8.85
3+220.000	0.28	5.30	7.07	8.77
3+230.000	0.28	5.19	7.34	8.74
3+235.346	-0.91	4.77	6.98	8.72
3+240.000	0.10	5.31	6.72	8.73
3+247.178	0.11	5.77	5.96	8.70

EAST BANK STABILIZATION OFFSET/ELEVATION TABLE

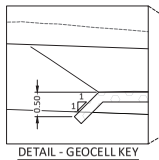
STATION	O/S TO TOE OF CUT	ELEV TOE OF CUT	O/S TO TOP OF CUT	ELEV TOP OF CUT
4+000.000	0.37	8.60	7.77	12.30
4+003.275	0.37	8.60	7.62	12.26
4+007.661	0.37	8.24	8.24	12.15
4+010.000	0.39	7.90	8.78	12.11
4+017.298	-0.41	6.40	10.54	11.97
4+020.000	-0.50	6.09	10.78	11.92
4+026.696	0.46	6.43	10.49	11.86
4+030.000	0.32	6.39	10.09	11.82
4+040.000	0.27	6.25	10.24	11.59
4+050.000	0.21	6.12	10.06	11.37
4+060.000	0.12	6.01	10.43	11.29
4+070.000	0.06	5.92	10.44	11.14
4+080.000	0.21	5.85	10.60	11.05
4+090.000	0.18	5.79	10.50	10.96
4+100.000	0.18	5.71	10.07	10.67
4+110.000	0.21	5.65	9.60	10.34
4+120.000	0.25	5.58	9.63	10.27
4+130.000	0.26	5.52	9.66	10.22
4+136.313	0.22	5.47	9.45	10.08
4+140.000	0.27	5.45	9.37	10.00
4+150.000	0.28	5.38	9.01	9.74
4+160.000	0.28	5.31	8.98	9.66
4+170.000	0.28	5.24	9.17	9.68
4+180.000	0.28	5.17	8.77	9.46
4+190.000	0.28	5.13	8.36	9.26
4+200.000	0.28	5.10	8.10	9.10
4+210.000	0.28	5.08	7.83	8.93
4+220.000	0.28	5.05	7.68	8.83
4+230.000	0.28	5.03	7.58	8.77
4+240.000	0.27	5.00	7.07	8.73
4+243.562	-0.61	4.76	7.16	8.73
4+247.138	0.19	5.16	6.93	8.73
4+250.000	0.35	5.90	5.87	8.67
4+254.531	0.34	5.77	6.17	8.69



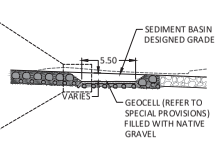
DETAIL - LOW FLOW CHANNEL PLAN
1:100



DETAIL - WRC ROOTWAD
1:50



DETAIL - GEOCELL KEY
1:50



TYPICAL SECTION - ACCESS RAMP (LOOKING WEST)
1:250

GRADATION TABLE

	ROCK DIAMETER (mm)					
	250-KG RIPRAP	500-KG RIPRAP	TYPE I ROCK	TYPE II ROCK	900mm BOULDERS	500mm BOULDERS
D_{100}	1000	1250	1250	750	-	-
D_{85}	830	1050	1050	610	-	-
D_{50}	575	725	725	425	900 (± 100)	500 (± 50)
D_{15}	270	340	550	350	-	-
D_{0}	200	250	450	300	-	-

NOTES:
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
3. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.
4. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
5. FOR ROCK GRADATIONS REFER TO THE TABLE ON THIS SHEET.
6. IN ALL MANNERS EXCEPT FOR GRADATION, ROCK QUALITY SHALL CONFORM TO MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE STANDARD SPECIFICATION 205.

LEGEND
DESIGN GRADE
EXISTING (2023) GROUND
SUBSTRATE FILLED RIPRAP
BOULDER ARMOUR
STANDARD RIPRAP
6-INCH MINUS STREAM GRAVEL

CLIENT:
BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION

nhc northwest hydraulic consultants

SEAL:
PROFESSIONAL ENGINEER D. J. GOULD # 28261 PROVINCE OF BRITISH COLUMBIA
2024-05-04

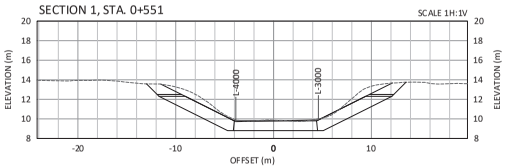
PERMIT TO PRACTICE
NORTHWEST HYDRAULIC CONSULTANTS LTD.
PERMIT NUMBER: 1003221
The Association of Professional Engineers and Geoscientists of British Columbia

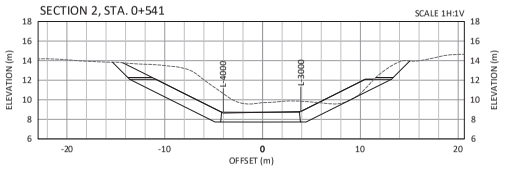
DEROCHE CREEK RECOVERY SOLUTION
REACH 2
TYPICAL SECTIONS AND PROFILE DETAILS

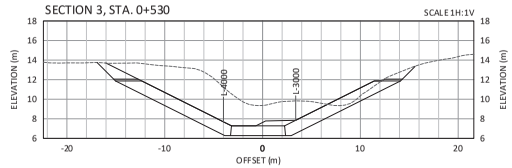
DESIGNED:	DJG	SHEET ID: 3007814-RS-006	SHEET No: 006
DRAFTED:	CZZ	STATUS: ISSUED FOR TENDER	
CHECKED:	DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE: 30 APR 2024	REV No:

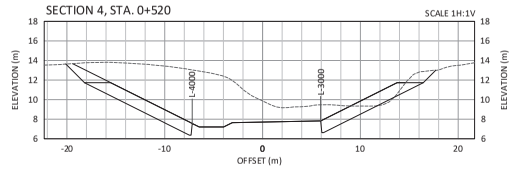
SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

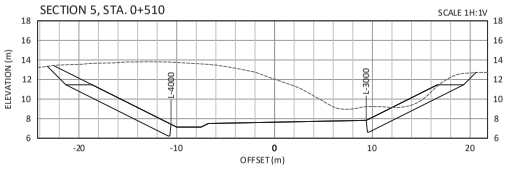
FILENAME: \\nwhfile-van\Projects\Active\3007814 Deroche Creek Energ Works\06 CAD\02_Production\100% ISFI\3007814 Deroche RS 100%ISFI-006.006-007.dwg, 30 Apr 2024, 03:53 PM

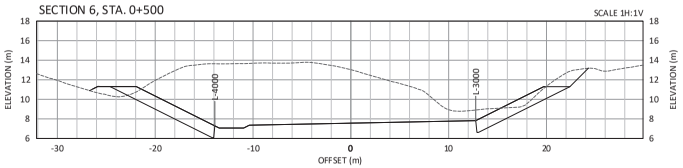


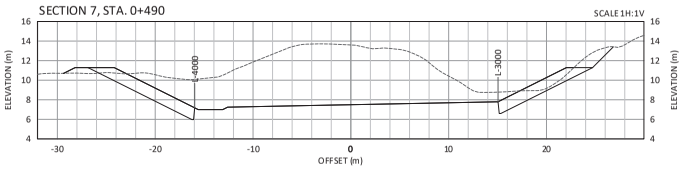


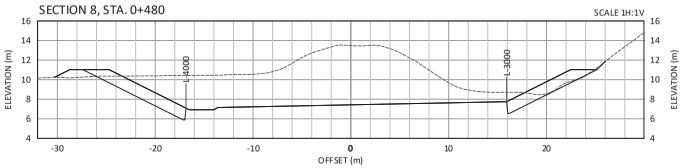


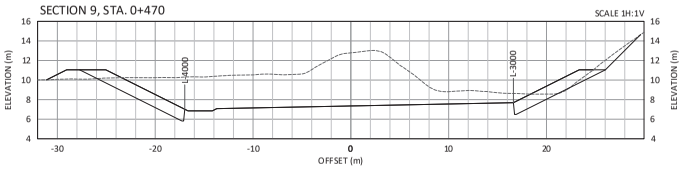


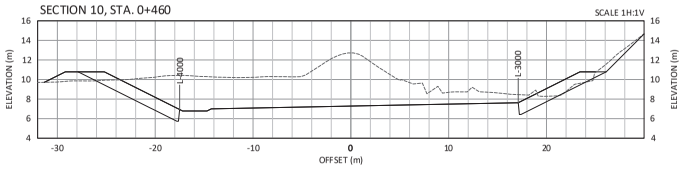


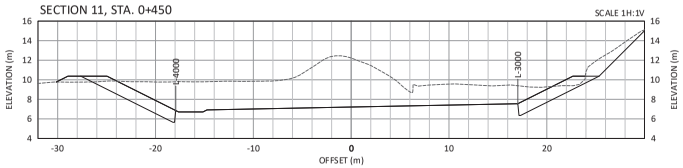


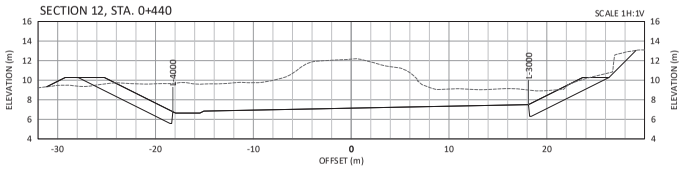


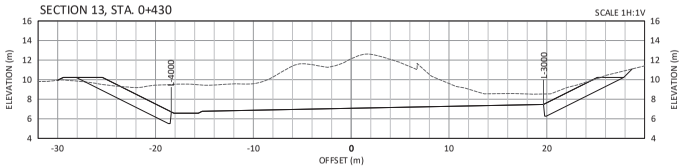


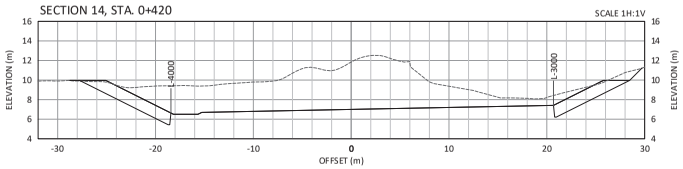


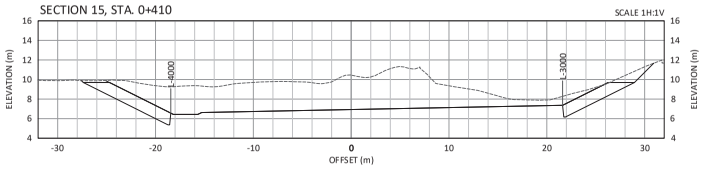












LEGEND

DESIGN GRADE

EXISTING (2023) GROUND

NOTES:

1. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
2. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
3. REFER TO SHEET 006 FOR L-3000 AND L-4000 ALIGNMENT TABLES, AND OFFSET/ ELEVATION TABLES

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION

nhc northwest hydraulic consultants

SEAL:

PROFESSIONAL ENGINEER D. J. GOOLD # 28261 BRITISH COLUMBIA

2024-05-04

PERMIT TO PRACTICE

NORTHWEST HYDRAULIC CONSULTANTS LTD.

PERMIT NUMBER: 1003221

The Association of Professional Engineers and Geoscientists of British Columbia

DEROCHE CREEK RECOVERY SOLUTION

SEDIMENT BASIN

STANDARD SECTIONS

DESIGNED:	DJG	SHEET ID:	3007814-RS-007A	SHEET No:
DRAFTED:	CZZ	STATUS:	ISSUED FOR TENDER	007A
CHECKED:	DJG	SCALE:	AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE:	30 APR 2024	REV No:

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

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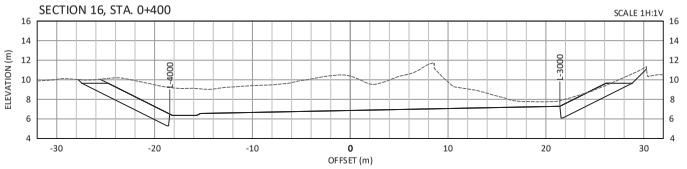
SECTION 16, STA. 0+400



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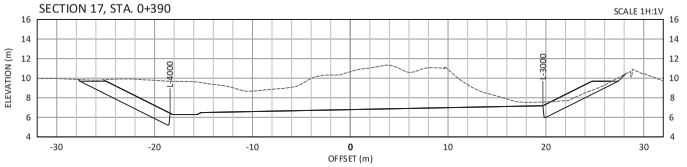

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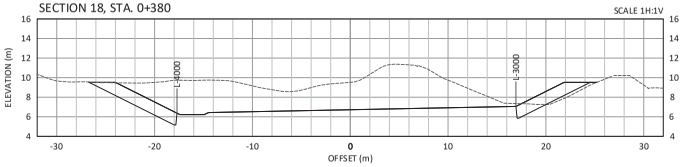

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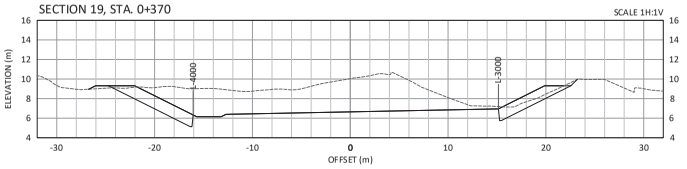

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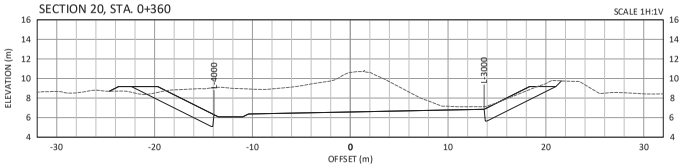
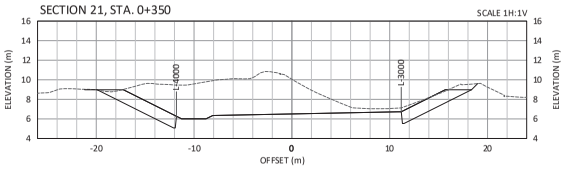
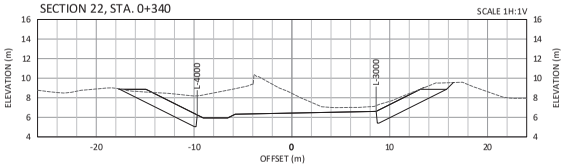


SECTION 21, STA. 0+350



SECTION 22, STA. 0+340



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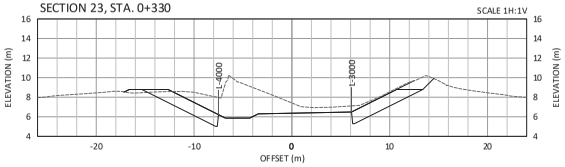

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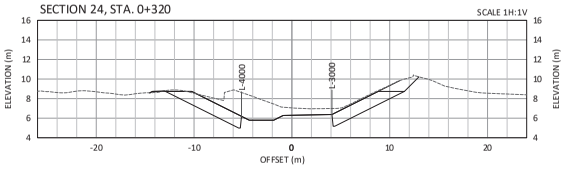

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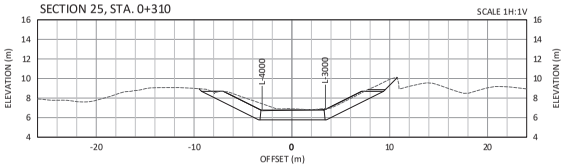
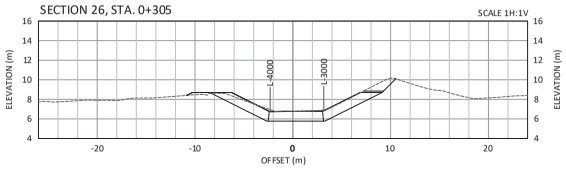


SECTION 26, STA. 0+305



LEGEND

DESIGN GRADE

EXISTING (2023) GROUND

NOTES:

1. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
2. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
3. REFER TO SHEET 006 FOR L-3000 AND L-4000 ALIGNMENT TABLES, AND OFFSET/ ELEVATION TABLES

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION

nhc northwest hydraulic consultants

SEAL:

PROFESSIONAL ENGINEER D. J. GOOLD # 28261 BRITISH COLUMBIA

2024-05-04

PERMIT TO PRACTICE

NORTHWEST HYDRAULIC CONSULTANTS LTD.

PERMIT NUMBER: 1003221

The Association of Professional Engineers and Geoscientists of British Columbia

DEROCHE CREEK RECOVERY SOLUTION

SEDIMENT BASIN

STANDARD SECTIONS

DESIGNED:	DJG	SHEET ID:	3007814-RS-007B	SHEET No:
DRAFTED:	CZZ	STATUS:	ISSUED FOR TENDER	007B
CHECKED:	DJG	SCALE:	AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE:	30 APR 2024	REV No:

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

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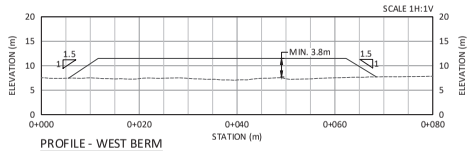
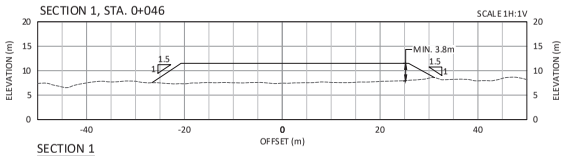
PLAN VIEW - LOT 8-3-3
1:1000

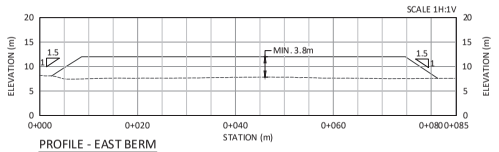
0 10 20 30 40 50m
SCALE = 1:1,000



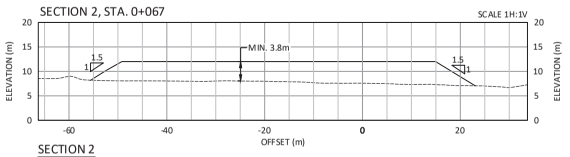
PROFILE - WEST BERM
1:500



SECTION 1
1:500



PROFILE - EAST BERM
1:500



SECTION 2
1:500

LEGEND
DESIGN GRADE
EXISTING (2023) GROUND

CLIENT:
BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION

nhc northwest hydraulic consultants

SEAL:
PROFESSIONAL ENGINEER D. J. GOULD # 29261 PROVINCE OF BRITISH COLUMBIA
2024-05-04

PERMIT TO PRACTICE
NORTHWEST HYDRAULIC CONSULTANTS LTD.
PERMIT NUMBER: 1003221
The Association of Professional Engineers and Geoscientists of British Columbia

DEROCHE CREEK RECOVERY SOLUTION
REACH 2
LOT 8-3-3 GRADING

DESIGNED: DJG	SHEET ID: 3007814-RS-008	SHEET No:	008
DRAFTED: CZZ	STATUS: ISSUED FOR TENDER		
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 3 MAY 2024	REV No:	

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

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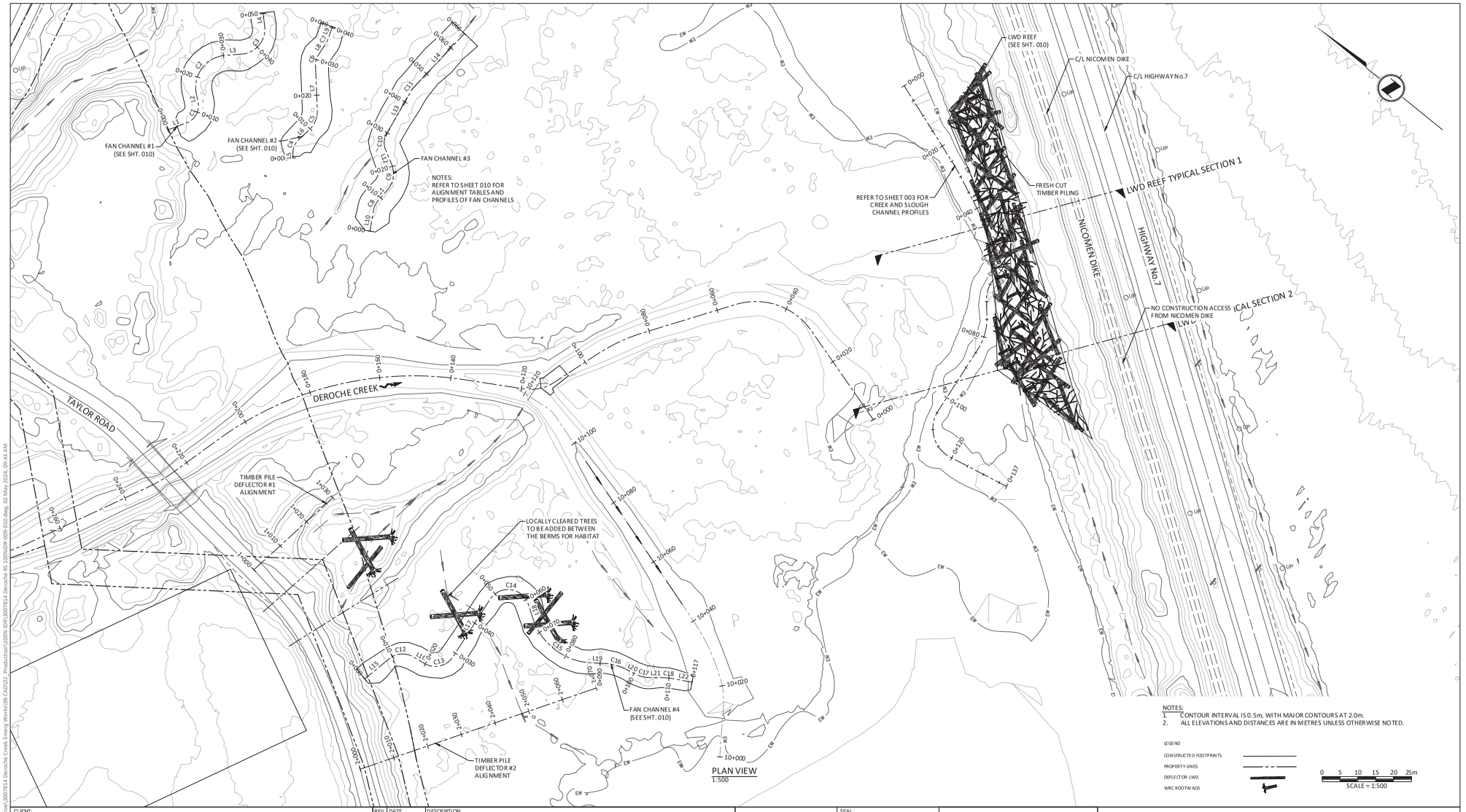

NOTES:
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.

LEGEND
CONSTRUCTED FOOTPRINTS
PROPERTY LINES
DEFLECTOR LWD
WRC ROOTWADS

0 5 10 15 20 25m
SCALE = 1:500

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION

nhc northwest hydraulic consultants

SEAL:

PROFESSIONAL ENGINEER D. J. GOOLD # 28261 BRITISH COLUMBIA
2024-05-04

PERMIT TO PRACTICE
NORTHWEST HYDRAULIC CONSULTANTS LTD.
PERMIT NUMBER: 1003221
The Association of Professional Engineers and Geoscientists of British Columbia

DEROCHE CREEK RECOVERY SOLUTION
OFF-SETTING WORKS
PLAN

DESIGNED:	DJG	SHEET ID:	3007814-RS-009	SHEET No:
DRAFTED:	CZZ	STATUS:	100% IDR	009
CHECKED:	DJG	SCALE:	AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE:	2 MAY 2024	REV No:

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

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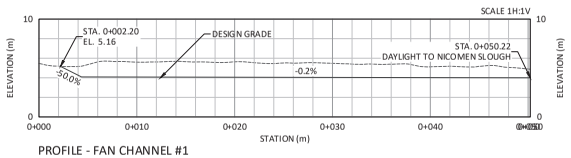
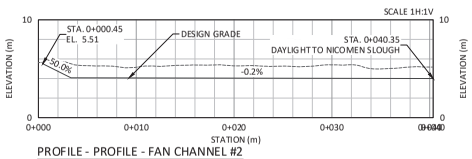
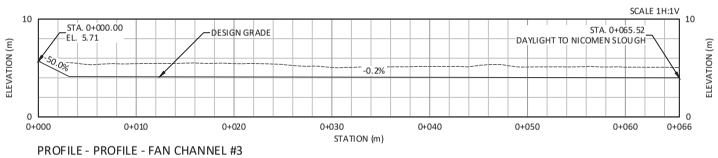


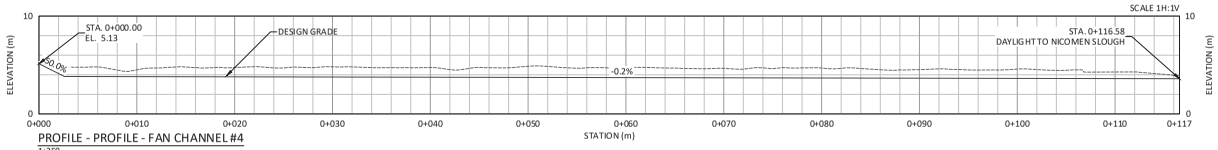
PROFILE - FAN CHANNEL #1
1:250



PROFILE - PROFILE - FAN CHANNEL #2
1:250



PROFILE - PROFILE - FAN CHANNEL #3
1:250



PROFILE - PROFILE - FAN CHANNEL #4
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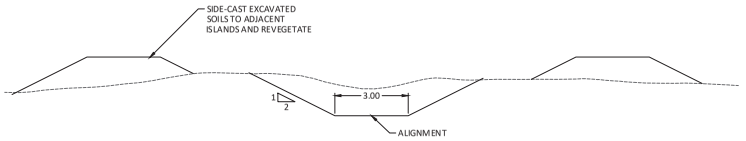


TYPICAL SECTION, FAN CHANNEL 1-4 (SEE SHEET 006)
1:100

FAN CHANNEL 1 ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L1	0+000.000	567581.74	5448355.64	120° 08' 23.70"	5.708	
C1	0+005.708	567586.68	5448352.77	079° 47' 38.43"	7.042	5.000
L2	0+012.750	567593.05	5448353.92	039° 26' 53.15"	2.514	
C2	0+015.264	567594.65	5448355.86	088° 01' 06.32"	15.259	9.000
L3	0+030.522	567608.14	5448356.33	136° 35' 19.49"	4.601	
C3	0+035.123	567611.30	5448352.98	090° 20' 15.26"	11.301	7.000
L4	0+046.425	567621.41	5448352.92	044° 05' 11.03"	3.796	

FAN CHANNEL 2 ALIGNMENT LAYOUT

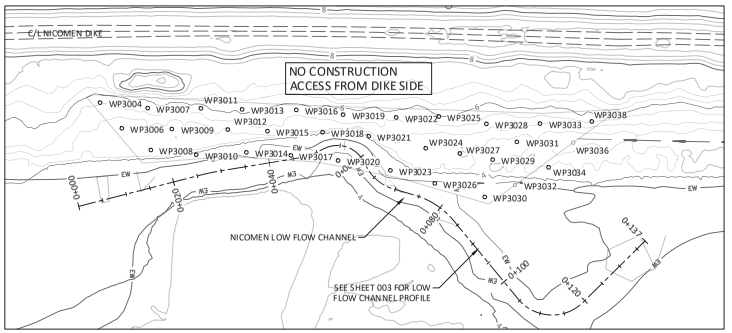
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L5	0+000.000	567597.76	5448323.44	049° 11' 11.75"	1.308	
C4	0+001.308	567598.75	5448324.29	073° 26' 20.84"	4.233	5.000
L6	0+005.541	567602.69	5448325.47	097° 41' 29.92"	4.208	
C5	0+009.749	567606.86	5448324.90	073° 06' 58.60"	6.005	7.000
L7	0+015.754	567612.43	5448326.59	048° 32' 27.27"	12.583	
C6	0+028.337	567621.86	5448334.92	065° 58' 50.42"	3.044	5.000
L8	0+031.381	567624.60	5448336.14	083° 25' 13.57"	3.757	
C7	0+035.137	567628.33	5448336.57	077° 14' 38.75"	1.725	8.000
L9	0+036.862	567630.01	5448336.95	071° 04' 03.94"	3.490	

FAN CHANNEL 3 ALIGNMENT LAYOUT

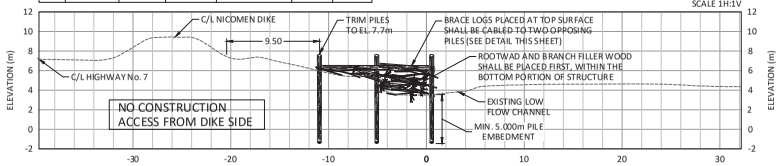
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L10	0+000.000	567595.44	5448293.77	060° 26' 57.00"	5.781	
C8	0+005.781	567600.47	5448296.62	076° 13' 04.29"	3.303	6.000
L11	0+009.083	567603.64	5448297.39	091° 59' 11.59"	3.829	
C9	0+012.912	567607.47	5448297.26	059° 58' 33.88"	7.822	7.000
L12	0+020.734	567613.89	5448300.97	027° 57' 56.17"	4.282	
C10	0+025.016	567615.90	5448304.76	054° 14' 40.76"	4.587	5.000
L13	0+029.603	567619.49	5448307.34	080° 31' 25.34"	13.955	
C11	0+043.558	567633.26	5448309.64	087° 23' 24.85"	1.198	5.000
L14	0+044.756	567634.45	5448309.70	094° 15' 24.36"	20.764	

FAN CHANNEL 4 ALIGNMENT LAYOUT

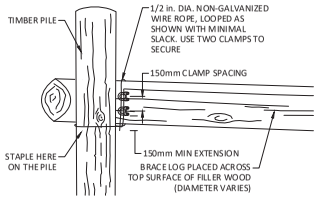
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L15	0+000.000	567497.09	5448215.67	101° 10' 45.55"	8.777	
C12	0+008.777	567505.70	5448213.96	136° 30' 31.15"	7.399	6.000
L16	0+016.176	567510.47	5448208.93	171° 50' 16.75"	3.456	
C13	0+019.632	567510.96	5448205.51	127° 43' 43.89"	9.238	6.000
L17	0+028.870	567517.57	5448200.40	083° 37' 11.03"	19.059	
C14	0+047.930	567536.51	5448202.52	148° 17' 09.33"	13.544	6.000
L18	0+061.473	567542.21	5448193.29	212° 57' 07.62"	4.159	
C15	0+065.632	567539.95	5448189.80	178° 12' 11.59"	21.833	18.000
L19	0+087.466	567540.59	5448169.29	143° 27' 15.55"	3.321	
C16	0+090.786	567542.57	5448166.62	155° 33' 49.34"	6.763	16.000
L20	0+097.550	567545.35	5448160.51	167° 40' 23.13"	2.743	
C17	0+100.292	567545.93	5448157.83	154° 18' 28.02"	4.665	10.000
L21	0+104.957	567547.94	5448153.66	140° 56' 32.91"	2.870	
C18	0+107.827	567549.75	5448151.44	146° 19' 52.20"	3.762	20.000
L22	0+111.589	567551.83	5448148.31	151° 43' 11.49"	4.995	



PILING PLAN - LWD REEF
1:500

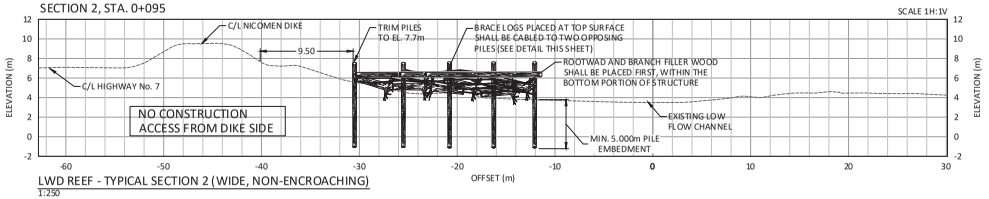


LWD REEF - TYPICAL SECTION 1 (NARROW, ENCROACHING ON CHANNEL)
1:250



BRACE LOG CABLING DETAIL
1:25

SECTION 2, STA. 0+095



LWD REEF - TYPICAL SECTION 2 (WIDE, NON-ENCROACHING)
1:250

LEGEND
DESIGN GRADE
EXISTING (2023) GROUND
DEFLECTOR LWD
WRC ROOTWADS

NOTES:
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
3. CROSS-SECTIONS ARE VIEWED DOWNSTREAM.

PILE LAYOUT TABLE - LWD REEF

PILE #	EASTING (m)	NORTHING (m)
3004	567736.93	5448188.08
3006	567730.10	5448187.21
3007	567730.67	5448180.54
3008	567723.15	5448184.66
3009	567724.39	5448178.72
3010	567717.27	5448177.41
3011	567724.70	5448171.44
3012	567718.06	5448169.20
3013	567719.92	5448164.50
3014	567712.09	5448168.56
3015	567713.36	5448162.59

PILE LAYOUT TABLE - LWD REEF

PILE #	EASTING (m)	NORTHING (m)
3016	567713.80	5448155.27
3017	567706.59	5448161.28
3018	567707.04	5448153.25
3019	567707.75	5448147.78
3020	567700.46	5448153.76
3021	567701.20	5448145.80
3022	567701.35	5448139.00
3023	567692.93	5448145.89
3024	567692.78	5448137.38
3025	567696.75	5448131.58
3026	567685.74	5448139.73

PILE LAYOUT TABLE - LWD REEF

PILE #	EASTING (m)	NORTHING (m)
3027	567688.07	5448132.11
3028	567690.20	5448124.25
3029	567683.37	5448127.17
3030	567677.85	5448132.68
3031	567683.71	5448121.04
3032	567676.53	5448126.14
3033	567684.27	5448115.03
3034	567675.81	5448118.45
3036	567677.29	5448111.45
3038	567678.84	5448105.92

CLIENT:
BRITISH COLUMBIA — Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION

nhc northwest hydraulic consultants

SEAL:
PROFESSIONAL ENGINEER — D. J. GOULD — # 28261 — PROVINCE OF BRITISH COLUMBIA
2024-05-04

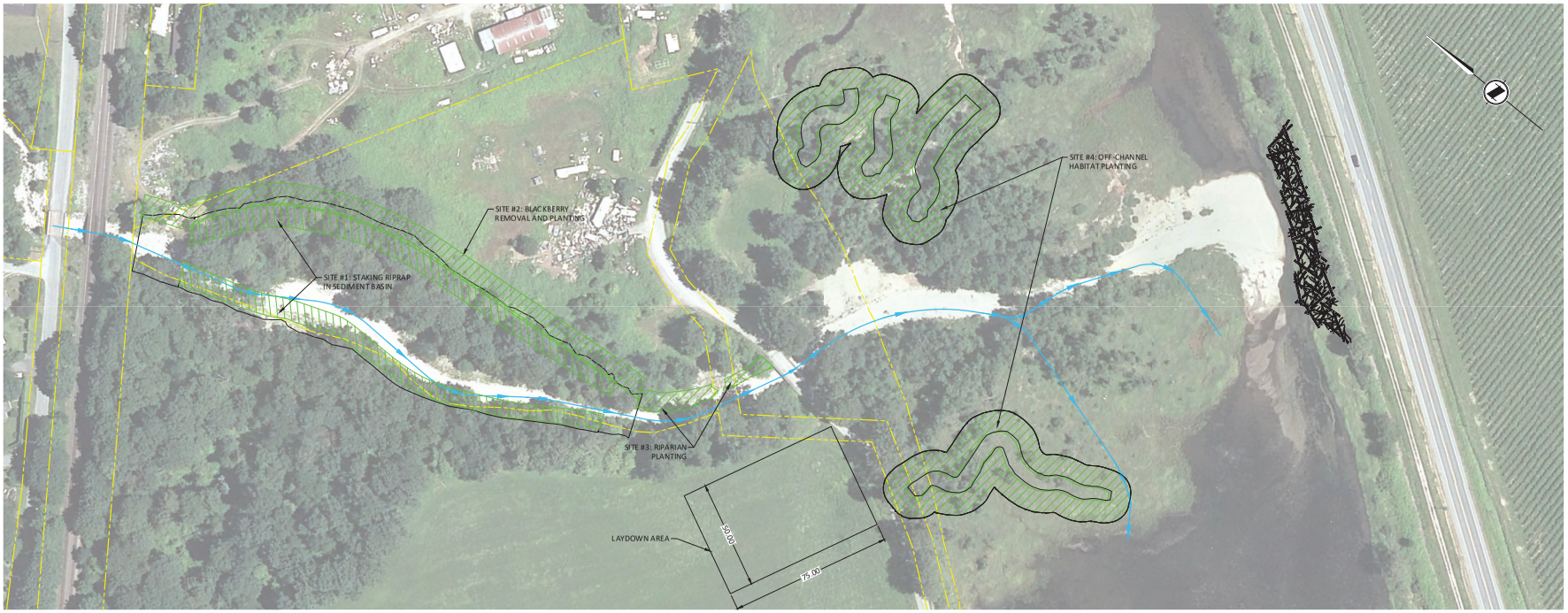
PERMIT TO PRACTICE
NORTHWEST HYDRAULIC CONSULTANTS LTD.
PERMIT NUMBER: 1003221
The Association of Professional Engineers and Geoscientists of British Columbia

DEROCHE CREEK RECOVERY SOLUTION
OFF-SETTING WORKS
TYPICAL SECTIONS AND PROFILE

DESIGNED:	DJG	SHEET ID: 3007814-RS-010	SHEET No: 010
DRAFTED:	CZZ	STATUS: 100% IDR	
CHECKED:	DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE: 2 MAY 2024	REV No:

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nanlfile-van\Projects\Active\3007814 Deroche Creek Emerg Works\06 CAD\02_Production\100% IDR\3007814 Deroche RS 100%IDR-009-010.dwg, 02 May 2024, 09:43 AM



PLANTING PLAN
1:1000

SITE PREPARATION:

1. THE PLANTING AREA SHALL BE CLEARED OF ANY INVASIVE PLANT AND PLANT PARTS, GARBAGE, OR DEBRIS PRIOR TO PLANTING.
2. INVASIVE PLANT MATERIAL SHALL BE REMOVED FROM THE SITE AND DISPOSED OF APPROPRIATELY AT A FACILITY EQUIPPED TO BURY OR BURN INVASIVE PLANT MATERIAL TO PREVENT ITS PROPAGATION.
3. MINIMAL SOIL AMENDMENTS, EARTHWORKS, AND DISTURBANCE ARE RECOMMENDED TO MINIMIZE THE LIKELIHOOD OF COLONIZATION BY INVASIVE PLANTS (I.E., HIMALAYAN BLACKBERRY).

GENERAL RIPARIAN PLANTING NOTES

1. LIVE STAKES, SHRUBS, AND TREES ARE TO BE ARRANGED IN A TRIANGULAR GRID AND SPACED ACCORDING TO THE PLANTING TABLES ON THIS DRAWING.
2. CONFORM TO PLANTING LAYOUT AS SHOWN ON THE PLANTING PLAN. PLANS MAY BE SUBJECT TO CHANGE BASED ON FIELD CONSTRAINTS AND LIMITATIONS. ALL CHANGES MUST BE APPROVED BY THE QEP.
3. CONTAINER STOCK INSTALLATION SHOULD OCCUR DURING THE FALL (SEP-OCT) TO REDUCE WATERING REQUIREMENTS AND IMPROVE SURVIVAL.
4. PLANTS MAY BE FERTILIZED WITH PELLETS OR TEA-BAG TYPE FERTILIZERS HIGH IN NITROGEN AND PHOSPHATE TO ENCOURAGE GROWTH. THIS CAN BE DONE BY PLACING FERTILIZER IN THE BASE OF THE HOLE BEFORE PLANT INSTALLATION.
5. CAREFULLY REMOVE PLANTS FROM CONTAINERS WITHOUT INJURING THE ROOT BALLS, ROOT BOUND STOCK SHOULD BE GENTLY AGITATED TO ENSURE THE ROOTS ARE PLACED IN THEIR NATURAL GROWING POSITION. GENTLY FIRM THE GROWING MEDIUM AROUND THE ROOT SYSTEM AND SETTLE THE SOIL WITH WATER AFTER PLANTING.
6. PLANTING AREAS AND LAYDOWN AREAS SHALL BE SEEDED WITH FALL RYE AT A DENSITY OF 50 KG/HA.

LIVE STAKE INSTALLATION

1. LIVE STAKES SHOULD BE INSERTED SO THAT THE NATURAL ORIENTATION OF THE CUTTING IS PRESERVED. THAT IS, THE OLDER PORTION OF THE PLANT SHOULD BE INSERTED INTO THE GROUND AND THE YOUNGER PORTION SHOULD BE EXPOSED. THE BOTTOM OF THE CUTTING SHOULD BE IDENTIFIABLE BY A 45° TAPER AND THE TOP SHALL BE FLAT. LIVE STAKES SHOULD BE INSTALLED PERPENDICULAR TO THE SURFACE.
2. RATHER THAN DIGGING A HOLE FOR THE CUTTINGS, PUSH CUTTINGS INTO THE SOIL TO A DEPTH EQUAL TO APPROXIMATELY 70% OF THEIR LENGTH.
3. IF THE SOIL IS TOO FIRM TO PUSH THE CUTTING INTO THE SOIL, A PILOT HOLE CAN BE FORMED FIRST USING A MALLET AND METAL ROD OR AN AUGER. THEN THE CUTTING CAN BE PLACED INTO THE HOLE. THE HOLE DIAMETER SHALL BE SMALLER THAN THE CUTTING DIAMETER TO PREVENT AIR POCKET FORMATION.
4. AT LEAST 50 MM AND NOT MORE THAN 100 MM OF THE LIVE STAKE SHOULD BE EXPOSED.
5. AVOID DAMAGING BUDS WHEN INSERTING OR DRIVING THE CUTTING INTO THE GROUND.
6. IF THE CUTTING IS SPLIT WHILE DRIVING, TRIM THE CUTTING BELOW THE SPLIT TO PREVENT DESICCATION AND PLANT MORTALITY.
7. THERE MUST BE FIRM CONTACT BETWEEN THE CUTTING AND THE SOIL. AVOID CREATING AIR POCKETS AROUND THE CUTTING THAT CAN PREVENT ROOTS FROM DEVELOPING. TAMP THE SOIL AROUND THE CUTTING TO FILL IN ANY AIR POCKETS.
8. WATER THE CUTTING IMMEDIATELY AFTER PLANTING, AND DAILY DURING THE INSTALLATION PHASE.

PLANT MATERIALS

1. NURSERIES MUST BE SELECTED IN ADVANCE OF PLANTING. PLANT VOLUMES SHOULD BE ORDERED AS SOON AS POSSIBLE, TO ENSURE ADEQUATE QUALITY STOCK AND SEED IS AVAILABLE AND/OR HARDENED OFF PRIOR TO PLANTING. THIS WILL HELP MEET THE SURVIVORSHIP REQUIREMENTS IN THE PLANT WARRANTY BELOW.
2. ALL PLANT MATERIAL SHALL CONFORM TO BCSLA/BCNLA LANDSCAPE STANDARD.
3. PLANT MATERIAL SHALL BE INSPECTED BY A QUALIFIED ENVIRONMENTAL PROFESSIONAL (QEP) FOR QUALITY AND HEALTH AND MUST BE APPROVED PRIOR TO INSTALLATION.
4. NO SUBSTITUTIONS OF PLANT MATERIALS WITHOUT APPROVAL FROM A QEP.
5. NURSERY STOCK SHOULD BE NATIVE TO THE LOCAL AREA (NO NON-NATIVE CULTIVARS) AND, WHERE AVAILABLE, OF GUARANTEED NURSERY STOCK. PURCHASED PLANT STOCK SHOULD BE A MINIMUM OF TWO YEARS OLD (EXCEPT FOR LIVE STAKES).
6. PLANTS SHOULD HAVE A WELL-DEVELOPED ROOT STRUCTURE AND A HIGH ROOT-TO-SHOOT RATIO.
7. IMPLEMENTATION MONITORING WILL OCCUR IMMEDIATELY AFTER COMPLETION OF WORKS, WILL BE CONDUCTED BY KWL, AND WILL ASSESS THE FOLLOWING COMPONENTS:
   a. GENERAL SITE CONDITIONS:
      I. TOTAL AREA PLANTED,
      II. MATERIALS USED (I.E., TYPE AND SIZE),
      III. IS THERE GARBAGE, REMNANT CONSTRUCTION MATERIALS, OR ANY OTHER DEBRIS ON THE PROJECT SITE?
   b. VEGETATION:
      I. DOES THE PLANTING MATCH THE PLANTING PLAN? APPROPRIATE NUMBER OF PLANTS, SIZE, AND CONDITION OF PLANTED STOCK, SPECIES, AND SPACING?
      II. IS THERE A PLAN IN PLACE FOR ONGOING INVASIVE PLANT MANAGEMENT, ESPECIALLY OVER THE FIRST GROWING SEASON.

WATERING

1. PLANTED MATERIAL SHALL BE WATERED AS NEEDED TO PROMOTE ESTABLISHMENT DURING THE FIRST FORTY-FIVE (45) DAYS FOLLOWING INSTALLATION AND THROUGHOUT THE GROWING SEASONS (MAY 1 - OCT 15) FOR THE TWO (2) YEAR GUARANTEE PERIOD TO PREVENT PLANTS FROM DRYING OUT DURING PERIODS OF INFREQUENT PRECIPITATION.
2. WATER MAY BE SPRAYED FROM A WATER TRUCK OR DISTRIBUTED USING TEMPORARY IRRIGATION LINES. PLANTS MUST BE WATERED AT A VOLUME AND FREQUENCY WHICH WILL SUPPORT DEEP ROOT GROWTH FOLLOWING THESE CRITERIA:
   c. FOLLOWING WATERING, PROBE THE SOIL TO ENSURE WATER PENETRATES TO A DEPTH OF 50 CM.
   d. ADJUST WATERING VOLUME TO ENSURE WATER IS PERCOLATING TO APPROPRIATE DEPTH.
3. 3 DAYS AFTER WATERING AND AGAIN EVERY 3 DAYS, PROBE SOIL TO DETERMINE MOISTURE CONTENT AT 50 CM DEPTH.
4. MAINTAIN A WATERING FREQUENCY WHICH KEEPS SOIL MOIST TO A DEPTH OF 50 CM.
5. PLANTED CONIFER TREES SHOULD BE EQUIPPED WITH WATER BAGS FOR AT LEAST THE FIRST TWO GROWING SEASONS TO INCREASE THE LIKELIHOOD OF SURVIVAL.
6. IF TEMPORARY IRRIGATION LINES ARE USED, ALL IRRIGATION MATERIALS MUST BE REMOVED FROM SITE AFTER THE SECOND GROWING SEASON.

INVASIVE PLANT MANAGEMENT DURING CONSTRUCTION

1. A QEP TRAINED IN THE IDENTIFICATION OF INVASIVE PLANTS FOUND WITHIN THE LOWER MAINLAND OF BRITISH COLUMBIA WILL MONITOR PLANTING ACTIVITIES TO HELP THE CONTRACTOR PREVENT THE INTRODUCTION OF AND THE SPREAD OF INVASIVE PLANTS AT THE SITE.
2. ALL MACHINERY AND HAND TOOLS WILL BE CLEAN, RECENTLY WASHED, AND FREE OF WEED SEEDS OR PLANT MATERIAL UPON ARRIVAL TO SITE.
3. THE CONTRACTOR WILL ENSURE THAT PLANTING ACTIVITIES DO NOT INADVERTENTLY INTRODUCE INVASIVE SPECIES TO THE SITE.
4. THE CONTRACTOR WILL WORK CLOSELY WITH THE BCMOECCS TO ENSURE EARLY DETECTION AND TREATMENT OF INVASIVE SPECIES ON SITE.

PLANT WARRANTY

1. THE CONTRACTOR SHALL PROPOSE A MAINTENANCE SCHEDULE TO THE BCMOECCS. THIS MAY INCLUDE BUT NOT BE LIMITED TO INVASIVE SPECIES MANAGEMENT, SEASONAL WATERING, REPLACEMENT PLANTING.
2. PLANTS SHOULD HAVE MINIMUM 80% SURVIVAL FOR TREES AND SHRUBS AFTER THE FIRST TWO YEARS AFTER PLANTING. LIVE STAKES SHOULD HAVE SUFFICIENT SURVIVORSHIP TO DENSIFY THE UNDERSTOREY.
3. PLANTINGS SHOULD ACHIEVE 65% COVER BY THE THIRD YEAR AFTER PLANTING.
4. PLANT SURVIVAL WILL BE ASSESSED BY A QUALIFIED ENVIRONMENTAL PROFESSIONAL (QEP) IN ACCORDANCE WITH THE FOLLOWING:
   a. NATIVE VEGETATION COVER
   b. RELATIVE COVER OF NATIVE PLANTS COMPARED TO INVASIVE PLANTS.
5. THE CONTRACTOR IS RESPONSIBLE FOR MEETING THE WARRANTY REQUIREMENTS ABOVE AND PROVIDING ADDITIONAL PLANTING IF NECESSARY.

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV	DATE	DESCRIPTION

SEAL:

COLLEGE OF APPLIED BIOLOGISTS — Janice Kwo — RPBio 3279 — CAB

DEROCHE CREEK RECOVERY SOLUTION

PLANTING PLAN

DESIGNED:	JK	SHEET ID: 3007814-RS-011	SHEET No: 011
DRAFTED:	TR	STATUS: ISSUED FOR TENDER	
CHECKED:	JK	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	PL	DATE: 2 MAY 2024	REV No:

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

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Appendix D

Archeological Report

KERR WOOD LEIDAL ASSOCIATES LTD.
consulting engineers

Leq’á:mel First Nation Permit Report
Archaeological Assessment Deroche Creek, Phase 1

(LFNIUP# 2023-003, October 2, 2023)

Prepared for: Stephen McGlenn Leq’á:mel First Nation Lands Department.
Des Goold (NHC) Northwest Hydraulic Consultants, Project Permittee.

Prepared by: Gordon Mohs, M.A., Summit Earthworks Inc. Sr. Archaeologist, First Nations Community & Business Relations.

October 31, 2023

Subject: Permit Report, Archaeological Assessment Deroche Creek, Phase 1, Leq'á:mel First Nation Permit LFNIUP# 2023-003, October 2, 2023.

Date: October 31, 2023

Attention: Stephen McGlenn (stephen@leqamel.ca), Leq'á:mel First Nation Lands Department.
Des Goold (DGoold@nhcweb.com) NHC Northwest Hydraulic Consultants, Project Permittee.

Prepared by: Gordon Mohs, M.A., Summit Earthworks Inc. Sr. Archaeologist, First Nations Community & Business Relations.

EXECUTIVE SUMMARY

Phase 1 Archaeological Investigations are now complete at Lakahahmen IR 11 on the left bank of Deroche Creek within the site of a proposed Sediment Basin. A one (1) hectare area was closely inspected for surface archaeological deposits, after the site area was cleared of surface vegetation. No trees were disturbed and no archaeological excavations occurred. Brush clearing and grubbing occurred to a maximum depth of @ 25cm.

Following 5.5 days of investigations, nothing of an archaeological nature was found within the boundaries of the proposed Sediment Basin, with the possible exception of a small (2x3 inch/5x7.5cm), flat, chipped, river pebble found near the centre of the proposed sediment basin. The chipped pebble is not identified as an archaeological artifact as there is no evidence of use-wear or microdenticulation on the piece. The flake scars at either end of the chipped pebble could have occurred from natural causes. At the same time, the pebble itself is likely a 'manuport' to the site (something carried to the site from somewhere else), as the stone is uncharactistic of all other stones observed at the site.

Three small, glassy-basalt, waterworn artifacts were recovered from the creekbed of Deroche Creek near the northern end of the proposed sediment basin. They are not associated with the site and were likely carried downstream from a location much further up Deroche Creek. The presence of these 3 artifacts is proof of indigenous land-use and occupancy of Deroche Creek and the area in general.

A 'mound' spotted within the densely covered blackberry underbrush of the Sediment Basin area in the spring of 2023, was initially considered a possible 'ancestral burial mound'. Ancestral burial mounds dating between 1,400 – 1,600 years ago are common throughout the region, with many occurring within a 10km radius. Upon brushing and clearing, the mound feature was identified as a mound of glacial/river till deposits, probably associated with construction of the original dike containing Deroche Creek. Altogether, three mounds of this nature were identified, all within the southern third of the of the proposed Sediment Basin.

The southern third of the proposed Sediment Basin is characterized by very minimal soil (humus) cover and significant amounts of historic garbage. One notable historic artifact, a horse-drawn plow, was identified and recovered, at the request of LFN resident Rick McKamey (Willow Creek Environmental Services, Environmental Programs Manager), who identified the plow as belonging to his grandmother. Historically, she owned the farm immediately east of the site area. In addition to the plow, an historic 'dog burial' was identified by LFN Guardian Erik Still at the base of a large cedar tree near Spillway Marker (0+360). Mr. McKamey confirmed Mr. Still's assessment and suggested the dog burial be removed and transported to an adjacent site immediately east of the Sediment Basin.

In summary, further monitoring is recommended during future (Phase 2) excavation works associated with the Sediment Basin.

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SEDIMENT BASIN BACKGROUND

The proposed Sediment Basin at Deroche Creek is envisioned as a Long-Term Solution to major flooding episodes and excessive sediment deposition, associated with extreme weather events in the Lower Mainland Region. Emergency sediment removals took place in the fall of 2022, at the request of Leq'á:mel First Nation and the BC Ministry of Environment and Climate Change Strategy. Summit Earthworks (Summit) was prime contractor for this emergency work through its Joint Venture partnership with Leq'á:mel First Nation (LDLP-SEW JV). Summit responded immediately to requests to mitigate the damage caused to Deroche Creek associated with the atmospheric river weather storms that occurred in the fall of 2021. The 2022 Emergency Sediment Removal Project involved clearing and grubbing along Deroche Creek, the creation of two access points north and south of the Deroche Creek Bridge on Taylor Road; embankment repairs within Deroche Creek, and the in-stream removal of massive amounts of flood-deposited fill from Deroche Creek to enable Chum Salmon migration and spawning within Deroche Creek; Chum Salmon were in Nicomen Slough waiting to spawn while Project Works were taking place. The Deroche Creek Emergency Sediment Removal Project was very successful and resulted in Summit Earthworks & Leq'á:mel First Nation being awarded the 2022 (EMA) Environmental Managers Association of BC prestigious Environmental Remediation Project of the Year Award (Figure 1). The proposed sediment basin covers an area of approximately one (1) hectare and is designed to be excavated to a depth between 3 and 6 meters below the existing floodplain level. Design plans for the sediment basin are near completion (Figure 4). The purpose of the sediment basin is to allow the capture of sediments during flood events, thereby limiting the volume of sediments reaching Nicomen Slough, a major salmon spawning habitat.

ARCHAEOLOGICAL PROJECT SUMMARY

This Project Permit Report describes Phase 1 Archaeological Investigations at Lakahahmen IR 11 associated with the construction of the proposed Sediment Basin bordering Deroche Creek located between Taylor Road and North Nicomen Road along the east side of Deroche Creek (Figures 2 & 3). The sediment basin is key component of the Long-Term Solution to manage sediment deposition in Deroche Creek, designed under the guidance of Northwest Hydraulic Consultants Ltd. (Design Consultant) and Kerr Wood Leidal Consultants Ltd. (Environmental and Construction Management Consultant).

As this Project occurred on Lakahahmen IR 11 (First Nation Reserve Lands), a Provincial Permit was not required. However, a comprehensive Heritage Investigation Permit was applied for—and obtained—from Leq'á:mel First Nation (Appendix 1). In addition to the LFN Investigation Permit, a comprehensive Chance Find Procedure (Appendix 2) was developed for the LFN Lands Department, prior to Archaeological Investigations commencing. A training/orientation program (Appendix 3) was also developed for LFN Guardians/Technicians (and all Project equipment operators) to familiarize them with the LFN Permitting process, Chance Find Procedure requirements, and proposed investigations at the site. Supporting materials for this training included a comprehensive PowerPoint presentation, hands-on familiarization with real artifacts, an on-site orientation, and familiarization with Summit Earthworks Safety Protocols for all individuals working at the site, which included a Site Specific Health & Safety Binder.

ARCHAEOLOGICAL ASSESSMENT OVERVIEW

Summit Earthworks' resident archaeologist, Gordon Mohs, M.A., participated in two preliminary field inspections at Deroche Creek in March and April of 2023. Following these visitations and his observations, Mohs recommended to the Deroche Creek Task Force Committee that the area of the proposed Sediment Basin be thoroughly examined for archaeological/cultural remains, prior to excavation of the basin proper, and that all excavation works be monitored throughout construction. He ascertained a moderate to high probability of archaeological/cultural remains occurring within the area, based on his field observations and background knowledge of the area (detailed comments below). In

this regard, he recommended a 2-Phase Assessment Plan, including the development of a comprehensive Chance Find Procedure (CFP) and Monitoring Plan & Training Program involving Leq'á:mel First Nation Field Technicians.

In addition to the Sediment Basin, it should be noted there are other proposed features associated with this Project, including two Deflection Berms southwest of the Taylor Road Bridge, protection of a Cemetery Berm southeast of the CP/Kansas City Rail Bridge which crosses Deroche Creek on North Nicomen Road, and additional bank stabilization activities. Based on preliminary field inspections, Mohs assessed these activities as having limited surface impact disturbances, as the focus is to be on 'capping' construction activities. Archaeological Monitoring of these areas is, however, recommended to occur as part of the overall heritage resources assessment.

In summary, Cultural Heritage Resources/Archaeological Monitoring of the eastern floodplain of Deroche Creek was the core activity recommended for the Sediment Basin Project, proposed to occur in 2 Phases to coincide with the construction activities:

1) **Phase 1**: A preliminary archaeological investigation to ascertain the presence of any surface cultural/ archaeological features/deposits within the proposed Sediment Basin area, with brush (notably blackberries) and other forest understory cleared by a size 60 excavator to allow a comprehensive inspection of the site area.

2) **Phase 2**: A more comprehensive Monitoring program to occur during deep excavation activities of the proposed Sediment Basin.

Each of these Phases is described in further detail below.

1) Phase 1: Archaeological Assessment Supported by Light Clearing: STATUS = COMPLETE.

Phase 1 Archaeological Investigations are now complete. Investigations involved detailed surface inspections of the proposed sediment basin area east of Deroche Creek within a forested area. Brush and other forest understory was cleared and grubbed to a maximum depth of 25cm by a size 60 excavator to allow inspection.

Phase 1 Archaeological investigations occurred between October 3 – 12, 2023, led by Gordon Mohs M.A., resident archaeologist at Summit Earthworks Inc. (Sub-Contractor to NHC) with key support of Leq'á:mel First Nation (LFN) Lands Department Guardians/Field Technicians: Erik Still, Megan Friesen, and Melissa Friesen.

- 5.5 days were required to complete detailed archaeological investigations.
- Field Investigations activities involved clearing the understory, primarily a heavy cover of blackberries, with a size 60 excavator.
    - No trees greater than 4-inches diameter were removed.
- Comprehensive Archaeological monitoring activities were conducted by a 3-person crew comprised of Archaeologist Gordon Mohs and two Archaeological Technicians/Guardians from Leq'á:mel FN Lands Department. Monitoring Procedures were set out in an Archaeological Chance Find Procedures document, developed as part of this project.

Observations associated with Field Inspections are described in detail below.

2) **Phase 2 Archaeological Monitoring: to Occur During Construction of the Sediment Basin & Berms in Spring/Summer of 2024**

Phase 2 Archaeological Monitoring is to involve detailed inspections of excavation activities associated with the Sediment Basin and Berm construction (Phase 1 & Phase 2 Works) during the construction/excavation stage. It is anticipated that limited materials of a cultural/archaeological nature will be found during this phase of the Monitoring process, except for excavations associated with the Sediment Basin, within the first meter or so of the surface.

- Estimated duration 16 weeks.
- Phase 2 archaeological monitoring is to take place during construction, which is proposed between June - September 2024.
- The focus of Phase 2 is monitoring the removal of subsurface deposits and disturbance of surface deposit by excavator.
- LFN Permit Regulations & Chance Find Procedures will apply during project works.
- As with surface monitoring, inspections during this phase will be conducted by a crew of Summit Earthworks Sr. Archaeologist, Gordon Mohs, and two Leq'á:mel First Nation Guardians/Archaeological Technicians.

CULTURAL BACKGROUND INFORMATION

Cultural background information was important in making archaeological assessments for this Project.

Lakahahmen IR 11: Place Name & Gathering Place

Lakahahmen IR 11 (Leq'á:mel) comprises the eastern part of the historic 1864 'Tlatwaas' (aka Tlat-whas, Klat-waas, Clatwass) Douglas Reserve. Although this Reserve no longer exists, the eastern portion was designated Lakahahmen IR 11.

In 1977, Sto:lo Linguist Brent Galloway recorded ….

> "*IR No. 11 is called "Lakahahmen." "The word for this place means "level place". It was an important gathering place for parties, dances, sports days, feasts, and other occasions. Another meaning is based on this use. The word "la:leq'el" means "visiting one another", and deals with a place where people go to have a big visit (from Elders meeting July 13, 1977)*".

Longhouse

There is evidence that there used to be an old longhouse in the general area, as described to Gordon Mohs by Leq'á:mel Elder Sam Kelly, December 2nd, 1997. One of Sam's stories was about the old longhouse near to where the Big E Restaurant on Taylor Road is now located. Sam said that there used to be a big longhouse here that stretched downriver along the slough about 400 feet and that Jeff Paul's house sits on top of part of it. Sam said he remembered pulling out an old house post when he was younger and that the house post was over 2 feet in diameter. He also said the area has since been ploughed and bulldozed. Sam commented on how the house was constructed and organized. He described it as a shed-type longhouse that ran parallel to Nicomen Slough along Taylor Road. He said that family compartments stretched all along the back wall of the house; the whole front half running along the slough was the common area. Here is where the people did their dancing and where half-a-dozen or more fires were located. Sam said that the broken rock from the fires stretched in an elongated mound along the whole back of the house and that most of this had been leveled out over the years.

Burial Mounds

A major component of archaeological sites in the immediate and regional area are burial mounds, several of which were identified and excavated by Anthropologist/Archaeologist Charles Hill-Tout at Hatzic and at Harrison Mills at the turn of the century (late 1800s – early 1900s). Further excavations of burial mounds occurred in the 1990s. These burial mounds

were located on the right bank of the Harrison River at its confluence with the Fraser River and involved teams of archaeologists from the University of British Columbia and Simon Fraser University. These mounds date to about 1,400 years ago and are very complex burial structures for important tribal ancestors, rich in grave inclusions and elaborate burial features. Examples are showcased in Appendix 2 of the Chance Find Procedure.

PRIMARY OBSERVATIONS AT SEDIMENT BASIN SITE

At Lakahahmen IR 11, within or in close proximity to the proposed Sediment Basin, is a relatively large mound, observed Thursday, March 9, 2023, during a site visitation by Summit's resident archaeologist, Gordon Mohs. At the time, Mohs noted that he was uncertain if this mound was a cultural feature, a natural feature, or a more recent historic feature within the development zone. He also noted that it was impossible to get anywhere near the mound during the March site visitation, as the entire area is heavily overgrown with blackberries.

CHANCE FIND PROCEDURES

Chace Find Procedures for Archaeological investigations were developed by Gordon Mohs in August 2023 (Appendix 2). LFN First Nation Guardians/Field Technicians and Summit's Excavator Operator were oriented to CFP procedures, related documents, maps, and diagrams at the LFN Lands Department office October 4th, 2023 (See Appendix 3 for more information).

POTENTIAL FOR DISCOVERY

The potential for discovery of archaeological deposits was originally assessed as 'Moderate to High', but has subsequently been revised to 'moderate' status, based on current archaeological investigations. In this regard, it should not be overlooked that artifacts were identified within Deroche Creek, that there are significant cultural traditions associated with Deroche Creek, that Deroche Creek is a salmon-bearing creek, that there is an LFN cemetery located in close proximity, at the up-creek boundary of the proposed sediment basin, that historically there was a former longhouse located nearby the outlet of Deroche Creek, and that 'Lakahahmen' was a noted gathering place utilized by the Leq'á:mel peoples and their neighbours in pre-contact and early contact times.

OBSERVATIONS ASSOCIATED WITH 2023 FIELD INSPECTIONS

Phase 1 Archaeological Investigations at Lakahahmen IR 11 on the left bank of Deroche Creek, associated with a proposed 1-hectare Sediment Basin, between the Taylor Road Bridge and the North Nicomen Road Bridge, are now complete. Following 5.5 days of investigations, between October 4-12, 2023, nothing of an archaeological nature was found in the area, with the possible exception of a small (2x3 inch/5x7.5cm), flat, chipped, river pebble found near the centre of the proposed Sediment Basin (Photo 12). The chipped pebble is not identified as an archaeological artifact as there is no evidence of use-wear or microdenticulation on the piece. The flake scars at either end of the pebble could be from natural causes (e.g., dropping, river tumble, machine fracture). However, it should be noted that the pebble itself is likely a 'manuport' to the site (something carried to the site from somewhere else), as it is uncharactistic of all other stones (glacial till/river till deposits) observed at the site.

Three small, glassy-basalt, waterworn artifacts were recovered from the creekbed of Deroche Creek near the northern end of the proposed sediment basin (Photos 11a, 11b, 11c). They are not associated with the site and were likely carried downstream from a location further up Deroche Creek. While not associated with the Sediment Basin, the presence of these 3 artifacts is proof of indigenous land-use and occupancy of Deroche Creek and the general area.

A ‘mound’ was spotted within the densely covered blackberry underbrush of the Sediment Basin in the spring of 2023, and was initially considered a possible ‘ancestral burial mound’ by Archaeologist Gordon Mohs. Ancestral burial mounds dating between 1,400 – 1,600 years ago are common throughout the region, with many recorded within a 10 km radius of Lakahahmen IR 11 (Photos 9, 10 and CFP pp 15-16). Upon brushing and clearing of the extensive blackberry brush cover, three mound features were identified, all characterized as glacial till deposits, possibly associated with construction of the original dike containing Deroche Creek. All 3 mounds were identified within the southern third of the of the proposed Sediment Basin.

To the north of the gravel mounds, north of Spillway Marker (0+380), soils are characterized by a thin to moderate humus layer (10 – 30 cm thick), underlain by a yellow, sandy-gravel layer or silty-loam. Within this area, one notable historic artifact, a horse-drawn plow (Photo 13), was identified and recovered. LFN resident Rick McKamey (Willow Creek Environmental Services, Environmental Programs Manager) identified the plow as belonging to his grandmother, who owned the farm immediately east of the site area. Also within this area, an historic ‘dog burial’ (Photos 7-8) was identified by LFN Guardian Erik Still at the base of a large cedar tree near Spillway Marker (0+360). Mr. McKamey suggested the dog burial be removed and transported to an adjacent site immediately east of the Sediment Basin.

Within the southern third of the proposed Sediment Basin (between survey marker 0+380 and the Taylor Road Deroche Creek Bridge – Figure 4), it is unlikely that anything of a cultural/archaeological nature will be found, as the soils in this area are characterised by glacial till deposits. This area was a former creekbed, materials of which were excavated and utilized to construct the current dike along the east (left) bank of Deroche Creek. Significant amounts of historic garbage occur throughout this area.

North of Sediment Basin Spillway Marker (0+360) there is a ‘Moderate’ likelihood that additional objects of a cultural/archaeological nature may be found. As a consequence, further monitoring is recommended during future (Phase 2) excavation works associated with the Sediment Basin.

SUMMARY

In summary, nothing of archaeological significance was found during Phase 1 investigations associated with the proposed Sediment Basin at Deroche Creek. However, given the probability of cultural heritage resources within the area, further monitoring is recommended during future (Phase 2) excavation works associated with the Sediment Basin and other features associated with this Project.

Sincerely yours



Gordon Mohs, M.A.
Sx̱wōx̱wíyam, El:ólìye, Pop’qo’les
First Peoples’ Community/Business Relations
604-820-0569 (office); 604-302-8983 (cell)
gordon@summitearthworks.ca

Photo 1

Summit Excavator Clearing & Grubbing Underbrush



LFN GUARDIAN Melissa Friesen in foreground at Spill Channel Stake (0+360)

Note: one of three Till Mounds just beyond Melissa at Spillway location (0+370)

Glacial till deposits predominate south of Sediment Basin Spillway Channel Marker (0+380)

Photo 2

Summit Excavator Clearing & Grubbing Underbrush



Excavator working near Spillway Channel Marker (0+440)

Note: Entire Sediment Basin north of Spillway Marker 0 + 380 appears relatively undisturbed but was extension of historic farm (Rick McKamey, Willow Creek Environmental Services, Environmental Programs Manager, personal communication).

There are few blackberries in this area, except along the dike embankment.

The soils north of Spillway Marker 0 + 380 are characterized by a thin to relatively thick humus layer (10 – 30 cm thick), underlain by a yellow sandy gravel layer or silty loam. Relatively fine till deposits can be seen on left (west) and right (east) sides of picture.

Photos 3 & 4

LFN Guardians Melissa Friesen & Erik Still conducting detailed site inspections



LFN Guardian Melissa Friesen in foreground at Spillway Channel east-boundary Stake (0+320)



LFN Guardian Erik Still inspecting exposed surface after rainfall within the Sediment Basin in proximity to Spill Channel Marker (0 + 440)

FIGURE 5



LFN Guardians Megan Friesen & Erik Still conducting detailed site inspections within the Sediment Basin in proximity to Spillway Channel Marker (0+420)

Note: Surface glacial till deposits in this area decrease in size moving northwards within the Sediment Basin

FIGURE 6

LFN Guardians Melissa Friesen & Erik Still conducting site inspections within the Sediment Basin adjacent the Deroche Creek dike in proximity to Spillway Channel Marker (0+360)



Note: there is significant historic garbage within this area of the Sediment Basin from Spillway Channel Marker (0 + 280) to Spillway Channel Marker (0 + 380)

FIGURES 7 & 8
Historic Structural Feature: Dog Burial





LFN Guardian Eric Still identified this feature as a Dog Burial. Apparently, Bella was poisoned and buried by her owners at this location. Erik's comments were confirmed by Rick McKamey (Willow Creek Environmental Services, Environmental Programs Manager) whose grandmother formerly lived on a farm immediately east of the proposed Sediment Basin.

Rick suggested the dog burial could be moved immediately east of the proposed Sediment Basin utilizing an excavator. Rick noted that his own (former) dog is buried nearby.

***It should be noted that none of the stones associated with the feature displayed any characteristics of artifact manufacture such as chipping, pecking, grinding, etc.

FIGURES 9 & 10
GRAVEL/TILL MOUNDS



Three Gravel Mounds were identified between Sediment Basin Markers (0 + 340) and (0 + 380)



These mounds were first identified in the spring of 2023 and were covered with blackberries

GLASSY VOLCANIC BASALT ARTIFACTS

FIGURE 11a



Three water-worn glassy volcanic basalt artifacts were discovered within the current Deroche Creek channel adjacent Sediment Basin Marker (0+460).

FIGURE 11b



FIGURE 11c



***It is very unlikely these artifacts are associated with the proposed Sediment Basin area. Deroche Creek is a dynamic creek and these artifacts likely rolled down the creek a significant distance. They are all quite water-worn. The adjacent creek embankment was carefully examined for archaeological deposits by Erik and Melena and nothing but gravel was noted. In addition, the adjacent Sediment Basin area was carefully inspected following two October rain events (one of the best times for searching for artifacts), and nothing was found.

***Of note: A significant amount of fill was removed from Deroche Creek in 2022 where the artifacts were found.

FIGURE 12 CHIPPED PEBBLE (77 x 52cm)



(actual size)

A small, chipped river pebble was identified on the surface within the Sediment Basin in proximity to Spill Channel Marker (0 + 380).

There are 2 small fractures at the wider end (right end in photo), including a small curved fracture (top right) that is fairly recent (assessment based on the lack of patination), and a larger composite fracture below the smaller fracture, estimated to be much older (based on the patination). Neither fracture is characterized by microdenticulaton or use-wear.

There is also a small chip/fracture at the opposite end of the river pebble. It too is lacking micro-denticlation or use-wear and is characterized by patination, similar to that of larger fracture on the right end of the pebble. There are also recent scratchmarks across the surface of the stone, possibly related to Summit's excavator activity.

***Of Note: this pebble is interesting as it uncharacteristic of all the other stones (till deposits & creekbed deposits) on site, which strongly suggests it is a 'manuport' (an object transported or carried to the site).

FIGURE 13
Historic Horse-Drawn Plow



Plow was found partially buried in silty humus layer within the Sediment Basin in proximity to Spill Channel Marker (0+440)

Note: Rick McKamey (Willow Creek Environmental Services, Environmental Programs Manager) commented that the plow belonged to his grandmother who formerly lived on the property immediately east of the proposed Sediment Basin.

FIGURES 14 & 15
HISTORIC GARBAGE



Historic garbage was observed throughout the southern third of of the proposed Sediment Basin extending from Spill Channel Marker (0+280) to (0+400+). Garbage observed included tires, casettes, foam, metal piping, car parts, bottles, wire, metal containers, purses, etc.



FIGURE 1: Summit Earthworks/Leq'amel FN EMA BC, Deroche Creek, Project of Year Award



FIGURE 2: DEROCHE CREEK SEDIMENT BASIN/SPILLWAY LOCATION (Google Earth Map)



FIGURE 3: SEDIMENT BASIN MAP



FIGURE 4: PROPOSED SEDIMENT BASIN/SPILLWAY DESIGN PLAN

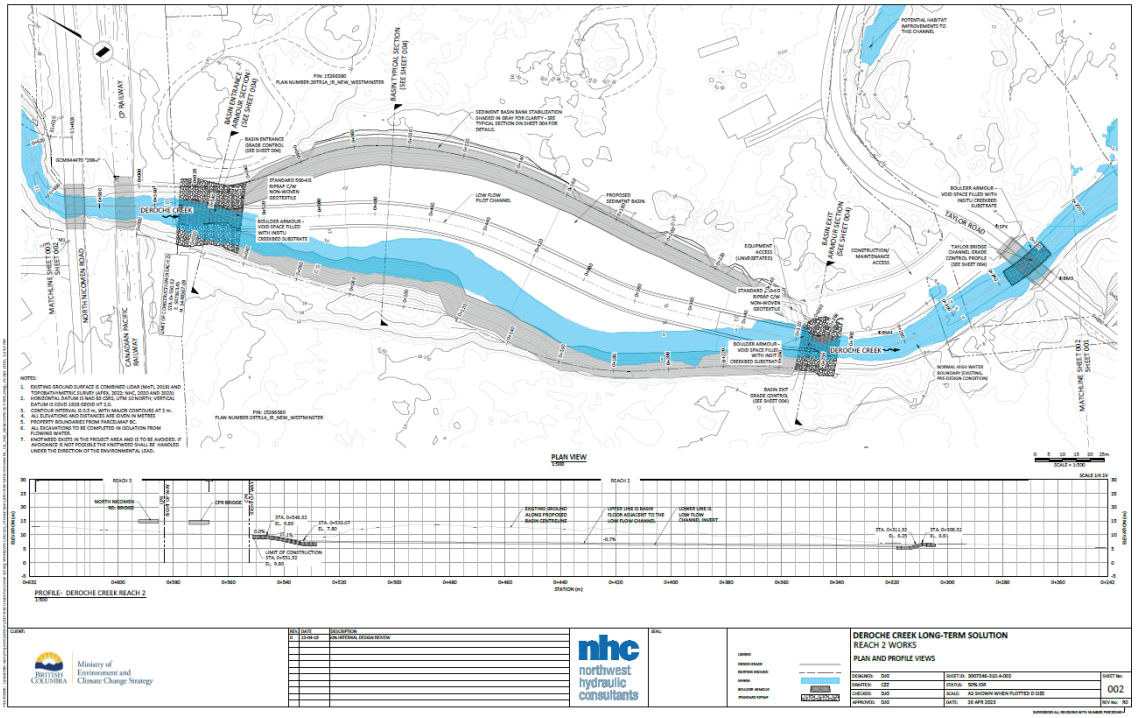
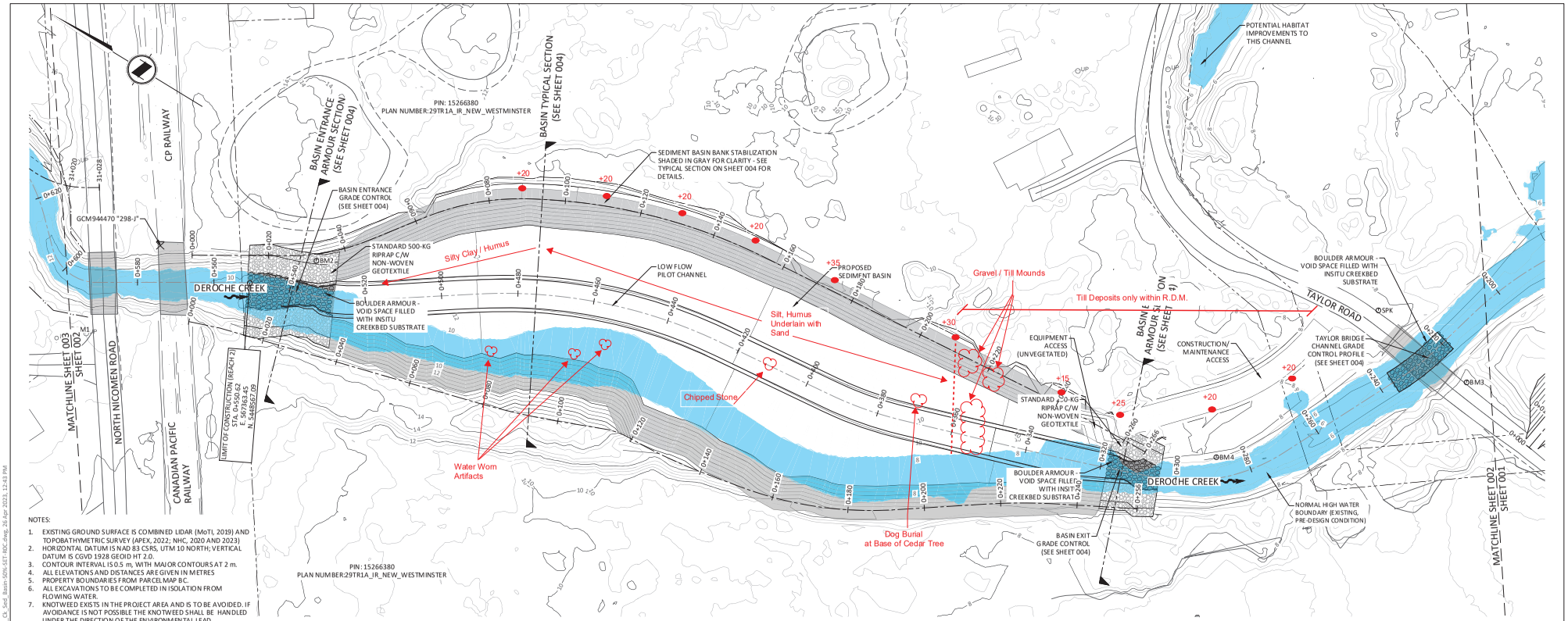


FIGURE 5: ARCHAEOLOGICAL ASSESSMENT FIELD MAP

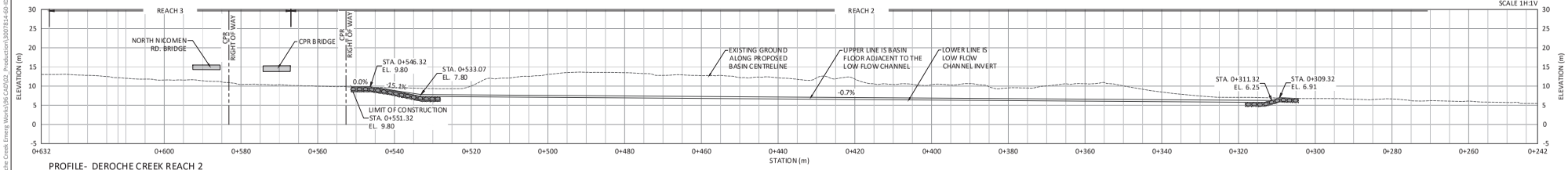


NOTES:

1. EXISTING GROUND SURFACE IS COMBINED LIDAR (MoTI, 2019) AND TOPOBATHYMETRIC SURVEY (APEX, 2022; NHC, 2020 AND 2023)
2. HORIZONTAL DATUM IS NAD 83 CSRS, UTM 10 NORTH; VERTICAL DATUM IS CGVD 1928 GEOID HT 2.0.
3. CONTOUR INTERVAL IS 0.5. m, WITH MAJOR CONTOURS AT 2 m.
4. ALL ELEVATIONS AND DISTANCES ARE GIVEN IN METRES
5. PROPERTY BOUNDARIES FROM PARCELMAP BC.
6. ALL EXCAVATIONS TO BE COMPLETED IN ISOLATION FROM FLOWING WATER.
7. KNOTWEED EXISTS IN THE PROJECT AREA AND IS TO BE AVOIDED. IF AVOIDANCE IS NOT POSSIBLE THE KNOTWEED SHALL BE HANDLED UNDER THE DIRECTION OF THE ENVIRONMENTAL LEAD.

PLAN VIEW
1:500

SCALE = 1:500



PROFILE- DEROCHE CREEK REACH 2
1:500

SCALE 1H:1V

CLIENT:

Ministry of Environment and Climate Change Strategy
BRITISH COLUMBIA

REV	DATE	DESCRIPTION
0	2304-18	50% INTERNAL DESIGN REIVEW

nhc northwest hydraulic consultants

SEAL:

LEGEND
DESIGN GRADE
EXISTING GROUND
NHWM
BOULDER ARMOUR
STANDARD RIPRAP

DEROCHE CREEK LONG-TERM SOLUTION
REACH 2 WORKS

PLAN AND PROFILE VIEWS

DESIGNED:	DJG	SHEET ID: 3007346-310.4-002	SHEET No: 002
DRAFTED:	CZZ	STATUS: 50% IDR	
CHECKED:	DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE: 26 APR 2023	REV No: R0

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nanlfile-van\Projects\Active\3007814 Deroche Creek Emerg Works\06 CAD\02_Production\3007814-60-IDR-Deroche_OL_Sed_Basin-50%-SET-R0C.dwg, 26 Apr 2023, 12:43 PM

LEQ'Á:MEL FIRST NATION
Investigative Use Permit

Permit No.:	**LFNIUP#2023-003**
Date of Issuance:	**October 2, 2023**
Expiration Date:	**October 1, 2024**
Permittee:	**Northwest Hydraulics Consultants Ltd.**
Permittee Representative:	**Des Goold, P. Eng. Principal - Northwest Hydraulic Consultants (NHC), 30 Gostick Place, North Vancouver BC, V7M 3G3. Email: DGoold@nhcweb.com. Phone: 604-969-3013.**

WHEREAS:

A. NHC (the "**Permittee**") is proposing to develop a sediment basin for Deroche Creek between Taylor Road and North Nicomen Road. The sediment basin is part of a long-term solution to manage sediment in Deroche Creek, and is being designed under the guidance of NHC Ltd and Kerr Wood Leidal Consultants Ltd. The Permittee is proposing to develop high flow deflection berms and sediment basin, erosion protection and bank stabilization works (the "**Proposed Development**") on certain Leq'á:mel First Nation ("**Leq'á:mel**") Lands, legally described as Deroche Creek Reach 1 and 2 between Canadian Pacific Kansas City Railway creek crossing and downstream to the confluence of the Nicomen Slough, and depicted in the maps enclosed in Schedule "B" to this Permit (the "**Permit Lands**");

B. The Permittee has submitted a request to Leq'á:mel Lands Department to access the area and conduct a preliminary archaeological investigation to ascertain if there are any obvious surface cultural/archaeological materials within the one (1) hectare area of the proposed sediment basin. Brush and other forest understory are proposed to be cleared to allow investigation, but no trees will be removed. Archaeological investigations are to be led by Gordon Mohs M.A., resident Archaeologist at Summit Earthworks Inc. (sub-contractor) with participation of the Leq'á:mel Guardians. Despite the resident Archaeologists association with Summit Earthworks, Leq'á:mel in no way implies, supports or guarantees any further work on the Deroche Creek project for Summit Earthworks Inc.

C. The Permittee may require access to the area to conduct other general field investigations necessary for the advancement of the Proposed Development, including environmental assessments, geotechnical investigations, topographic surveys, etc., which may be authorized under this permit, subject to the prior written approval of the Leq'á:mel Lands Department, in particular:

   i. preliminary investigations of archaeological chance finds in the Permit Lands, specifically in the areas of Reach 1 and Reach 2 of Deroche Creek;

   ii. preliminary investigations of proposed project footprint exceeding the present east top bank in Deroche Creek Reach 2 as identified in NHC Engineered Construction Drawings (also enclosed in Schedule "B" to this Permit); and

   iii. preliminary investigations of Reach 1 high flow deflection berm footprint south of Taylor Road and west of the present Deroche flow channel alluvial fan,

(collectively, the "**Investigative Works**"); and

D. The Leq'á:mel Lands and Natural Resources Department has considered the proposal for Investigative Works, and has determined after consultation with Chief & Council at a duly convened meeting on August 21, 2023, that the Permittee shall have the right to carry out the Investigative Works in accordance with the terms and conditions set out in this Investigative Use Permit, including the Schedules enclosed hereto, (collectively, the "**Permit**").

NOW THEREFORE:

1. This Permit is issued to the Permittee with a commencement date of October 2, 2023 and an expiry date of October 1, 2024, unless terminated earlier in accordance with this Permit.

2. Pursuant to this Permit. the Permittee is authorized to carry out only the Investigative Works authorized hereunder within the Permit Lands, which works must be carried out in strict compliance with both (i) the terms and conditions attached to this Permit, and (ii) all Leq'á:mel laws and all other applicable laws.

3. This Permit only grants the Permittee a right of access and use of the Permit Lands for the purposes of carrying out the Investigative Works in compliance with the Terms and Conditions of this Permit. For certainty, nothing herein grants the Permittee exclusive use or occupation of the Permit Lands.

4. The Terms and Conditions and Schedule "A" enclosed to this Permit form part of this Permit.

5. Leq'á:mel retains the right to terminate this Permit at any time, and in its sole discretion, effective on notice to the Permittee.

LEQ'Á:MEL FIRST NATION
Investigative Use Permit

Permit No.:	**LFNIUP#2023-003**
Date of Issuance:	**October 2, 2023**
Expiration Date:	**October 1, 2024**
Permittee:	**Northwest Hydraulics Consultants Ltd.**
Permittee Representative:	**Des Goold, P. Eng. Principal - Northwest Hydraulic Consultants (NHC), 30 Gostick Place, North Vancouver BC, V7M 3G3. Email: DGoold@nhcweb.com. Phone: 604-969-3013.**

Schedule "A" – Terms and Conditions

The following terms and conditions apply at all times to this Permit and the Permittee's rights and obligations hereunder:

a) The Permittee shall provide advance written notice for any investigative uses proposed under this permit and shall comply with any instructions provided by the Leq'á:mel Lands Department.

b) The Permittee expressly acknowledges that no development related work is approved under this permit, and may not proceed in relation to the project until Leq'á:mel First Nation has issued the required approvals.

c) The Permittee expressly acknowledges that they shall be jointly and severally liable and responsible for the cost of any future remedial work and restoration, any related expenses, if required as a result of any investigative uses, and administrative and professional fees and costs that may be incurred by Leq'á:mel or others in reviewing the related reports in accordance with Leq'á:mel law.

d) The Permittee shall comply with all applicable laws, including all Leq'á:mel laws, at all times, and shall immediately report to Leq'á:mel Lands Department any non-compliance or potential non-compliance, and comply with any corresponding instructions provided in respect thereof by the Leq'á:mel Lands Department.

e) The Permittee shall keep the Permit Lands safe, clean and in a sanitary condition, satisfactory to the Leq'á:mel Lands Department.

f) There will not be any environmental disturbances to the Permit Lands, and no hazardous materials may be brought onto or released on the Permit Lands at any time.

g) Equipment used on the Permit Lands must comply with all Leq'á:mel Laws, including the Leq'á:mel Land Code and Leq'á:mel Environmental Laws, and including, but not limited to, the following requirements:

   a. drip trays must be deployed while mechanized equipment is sitting idle;

   b. approved spill kits must be on the Permit Lands and within reach of equipment operators;

   c. all mechanised equipment must use environmentally approved lubrication.

h) In the event of a discovery of any historic, cultural, or archaeological materials, all activities are to be stopped immediately until further directions are provided to the Permittee by the Leq'á:mel Lands Department.

i) The Permittee shall always maintain a copy of this Permit on the Permit Lands.

j) Subject to conditions m) and n) below, the Permittee shall maintain access protocols throughout the term of this Permit to ensure only personnel engaged in the Investigative Works are present on the Permit Lands during the conduct of the Investigative Works.

k) If requested by the Leq'á:mel Lands Department, the Permittee shall provide written notice delivered to the doors of nearby residents informing them of the investigative works.

l) A Leq'á:mel Lands Department representative will attend the Permit Lands at any time before, during and after the Investigative Works are conducted.

m) The Permittee shall ensure that a Leq'á:mel monitor is present on the Permit Lands at all times that any Investigative Works are carried out, at the sole cost and expense of the Permittee.

n) The Permittee shall provide up to date contact information to the Leq'á:mel Lands Department for its key field personnel carrying out the Investigative Works.

o) Any incidents shall be promptly reported to the Leq'á:mel Lands Department, and the Permittee shall comply with all corresponding directions provided by the Leq'á:mel Lands Department.

p) The Permittee shall report to the Leq'á:mel Lands Department when the Investigative Works are completed, participate in a site inspection with the Leq'á:mel Lands Department, and share copies of all reports completed as a result of the Investigative Works within thirty (30) days of the expiry date of this Permit.

q) The Permittee shall indemnify and release Leq'á:mel First Nation for all claims and costs however incurred as a result of the issuance of this Permit.

r) This Permit is issued solely to the Permittee and is not transferable or assignable.

s) This Permit does not authorize any cutting or removal of timber, or excavation or removal of any soil or other materials, from the Permit Lands, without the prior written consent of the Leq'á:mel Lands Department.

t) The Permittee shall not commit any wilful or voluntary waste, spoil, or destruction on the Permit Lands, or do anything that may be or become a nuisance.

u) The Permittee shall not construct or affix any improvements on the Permit Lands, except as reasonably required to carry out the Investigative Works.

v) This Permit to the Permit Lands is granted on an "as is" basis

w) The Permittee shall make all payments when due and owing under this Permit and applicable laws.

The undersigned authorized signatory for Leq'á:mel Lands Department hereby issues this Investigative Use Permit to the Permittee as of the date of issuance indicated on the first page hereof.

Signed on behalf of the Leq'á:mel Lands Department

sept. 29

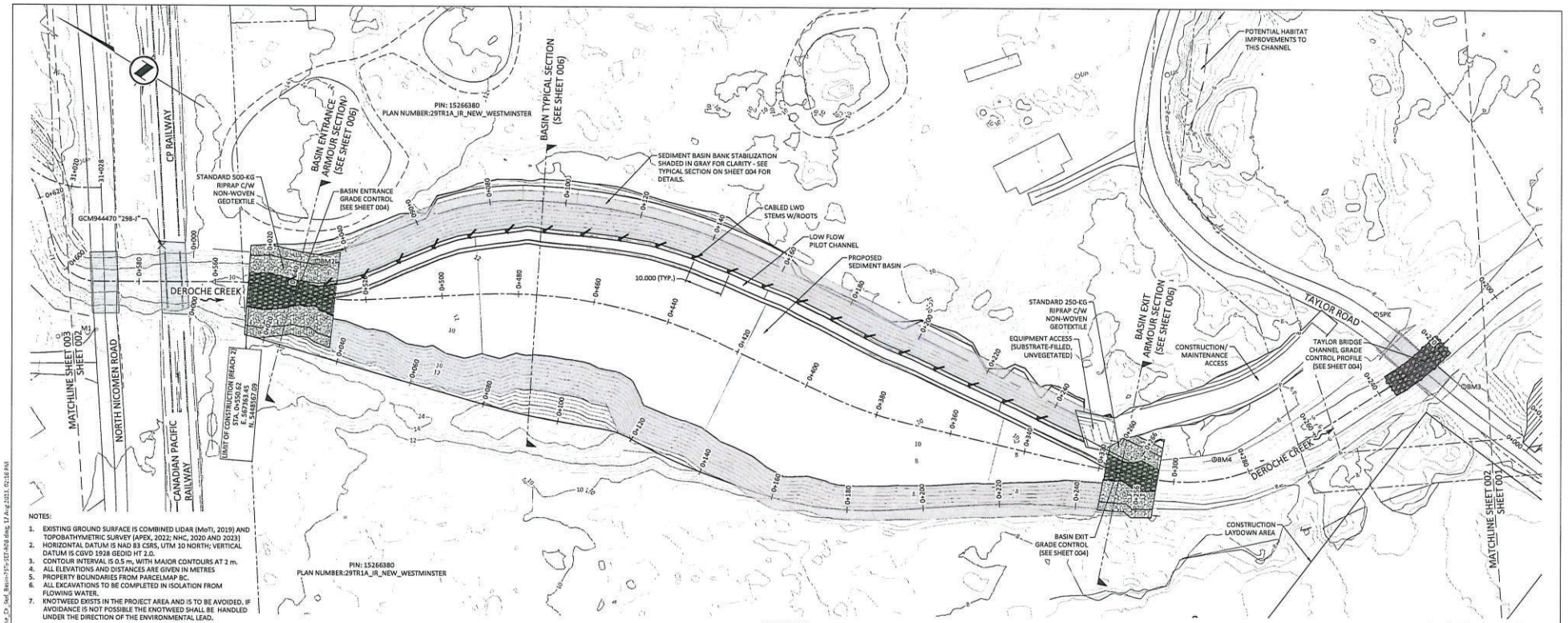
The Permittee hereby agrees and commits to comply with this Permit at all times:

Signed by an authorized representative of the Permittee

LEQ'Á:MEL FIRST NATION
Investigative Use Permit

Permit No.:	LFNIUP#2023-003
Date of Issuance:	October 2, 2023
Expiration Date:	October 1, 2024
Permittee:	Northwest Hydraulics Consultants Ltd.
Permittee Representative:	Des Goold, P. Eng. Principal - Northwest Hydraulic Consultants (NHC), 30 Gostick Place, North Vancouver BC, V7M 3G3. Email: DGoold@nhcweb.com. Phone: 604-969-3013.

Schedule "B" – Map of Permit Lands

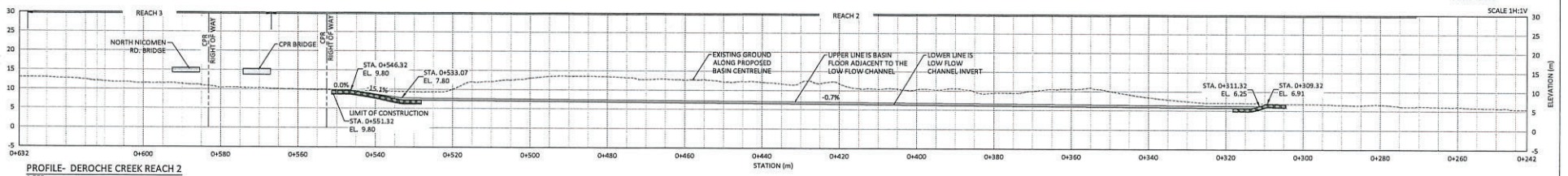


NOTES:

1. EXISTING GROUND SURFACE IS COMBINED LIDAR (MoTI, 2019) AND TOPOBATHYMETRIC SURVEY (APEX, 2022; NHC, 2020 AND 2023)
2. HORIZONTAL DATUM IS NAD 83 CSRS, UTM 10 NORTH; VERTICAL DATUM IS CGVD 1928 GEOID HT 2.0.
3. CONTOUR INTERVAL IS 0.5 m, WITH MAJOR CONTOURS AT 2 m.
4. ALL ELEVATIONS AND DISTANCES ARE GIVEN IN METRES
5. PROPERTY BOUNDARIES FROM PARCELMAP BC.
6. ALL EXCAVATIONS TO BE COMPLETED IN ISOLATION FROM FLOWING WATER.
7. KNOTWEED EXISTS IN THE PROJECT AREA AND IS TO BE AVOIDED. IF AVOIDANCE IS NOT POSSIBLE THE KNOTWEED SHALL BE HANDLED UNDER THE DIRECTION OF THE ENVIRONMENTAL LEAD.

PLAN VIEW
1:500

0 5 10 15 20 25m
SCALE = 1:500



PROFILE- DEROCHE CREEK REACH 2
1:500

CLIENT:

BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
0	23-04-18	50% INTERNAL DESIGN REIVEW
1	23-08-16	75% INTERNAL DESIGN REIVEW

nhc northwest hydraulic consultants

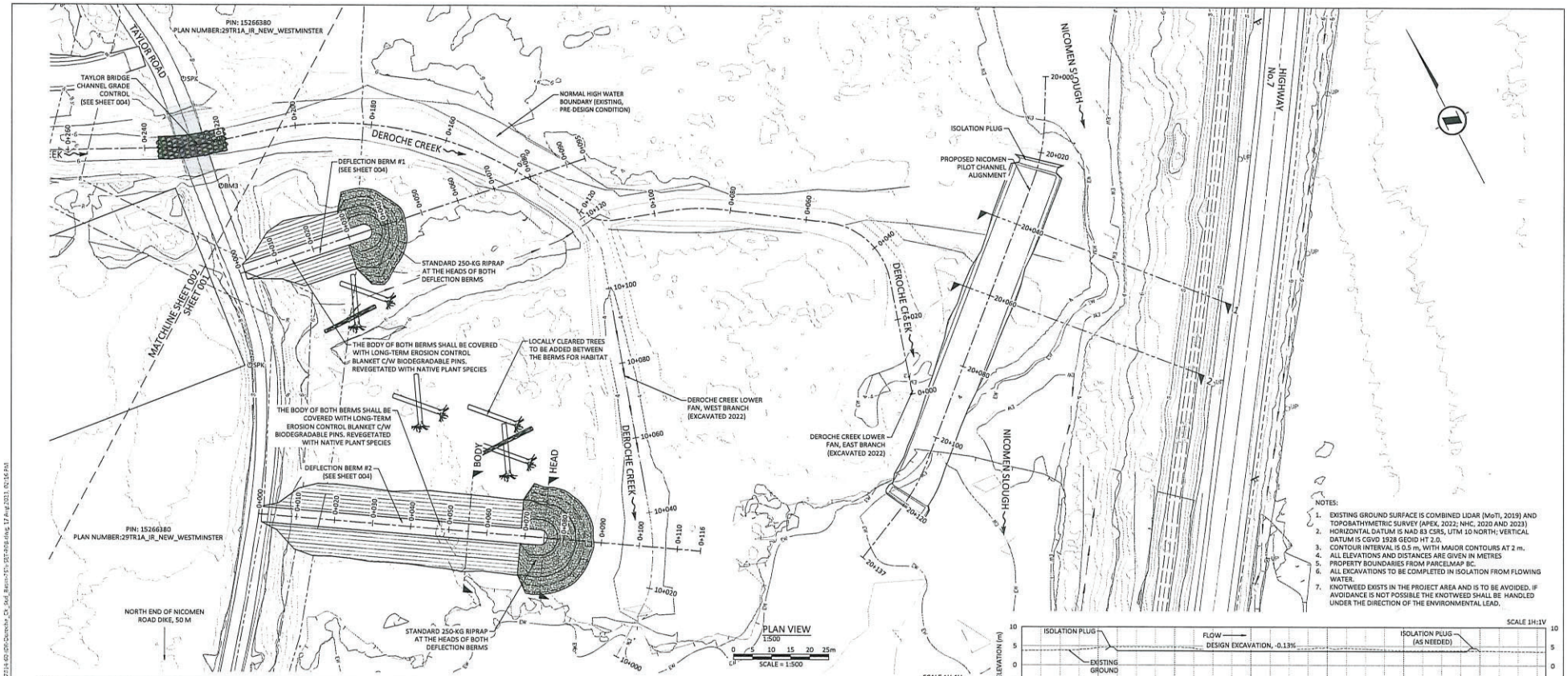
SEAL:

LEGEND
DESIGN GRADE
EXISTING GROUND
200 YEAR (TO COME)
BOULDER ARMOUR
STANDARD RIPRAP
SUBSTRATE-FILLED RIPRAP
CABLED LWD

DEROCHE CREEK LONG-TERM SOLUTION
REACH 2 WORKS
PLAN AND PROFILE VIEWS

DESIGNED: DJG	SHEET ID: 3007814-LTS-004	SHEET No: 004
DRAFTED: CZZ	STATUS: 75% IDR	
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED: DJG	DATE: 17 AUG 2023	REV No: R1

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING



NOTES:

1. EXISTING GROUND SURFACE IS COMBINED LIDAR (MoTI, 2019) AND TOPOBATHYMETRIC SURVEY (APEX, 2022; NHC, 2020 AND 2023)
2. HORIZONTAL DATUM IS NAD 83 CSRS, UTM 10 NORTH; VERTICAL DATUM IS CGVD 1928 GEOID HT 2.0.
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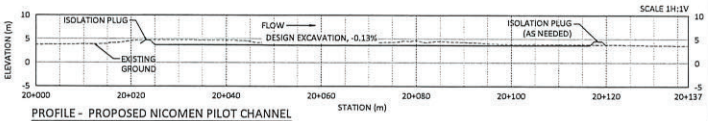
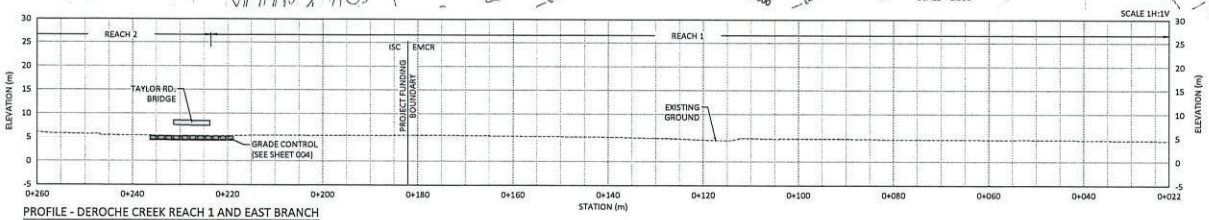
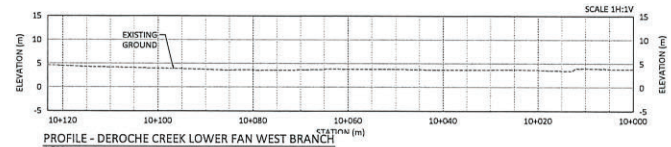


PROFILE - PROPOSED NICOMEN PILOT CHANNEL
1:500



PROFILE - DEROCHE CREEK REACH 1 AND EAST BRANCH
1:500



PROFILE - DEROCHE CREEK LOWER FAN WEST BRANCH
1:500

CLIENT:

BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
0	23-04-18	50% INTERNAL DESIGN REIVEW
1	23-08-16	75% INTERNAL DESIGN REIVEW

nhc northwest hydraulic consultants

SEAL:

LEGEND
DESIGN GRADE
EXISTING GROUND
200-YEAR (TO COME)
BOULDER ARMOUR
STANDARD RIPRAP

DEROCHE CREEK LONG-TERM SOLUTION
REACH 1 WORKS
PLAN AND PROFILE VIEWS

DESIGNED: DJG	SHEET ID: 3007814-LTS-003		SHEET No:
DRAFTED: CZZ	STATUS: 75% IDR		003
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 17 AUG 2023		REV No: R1

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

DEROCHE CREEK
ARCHAEOLOGICAL CHANCE FIND PROCEDURE

PREPARED FOR

Leq'á:mel First Nation Lands & Resources Department
Attention: Stephen McGlenn, Manager

&

Northwest Hydraulic Consultants
Attention: Des Goold P.Eng. | Principal

PREPARED BY
Gordon Mohs, M.A.
Sr. Archaeologist & First Nations Community/Business Relations Consultant
Summit Earthworks Inc.

August 15, 2023

SUMMIT EARTHWORKS

ARCHAEOLOGY CHANCE FIND PROCEDURES

To:	All Project Consultants & Contractors & Leq'á:mel First Nation representatives involved in Project Development
From:	Leq'á:mel First Nation Lands Department
Date:	August 15, 2023
Subject:	Leq'á:mel First Nation – 2023 Deroche Creek Spillway Archaeological Chance Find Procedures

For additional information or questions on this matter, contact:

Stephen McGlenn, Lands & Natural Resources Manager,
Leq'á:mel First Nation
43101 Leq'á:mel Way, Deroche, BC, Canada V0M 1G0
Phone: (604) 826-7976
Email: stephen@leqamel.ca

Gordon Mohs, M.A., Senior Project Archaeologist & First Nations Community Relations, Summit Earthworks Inc.
33171 2nd Ave., Mission BC Canada (V2V-6T8
Phone: (604) 820-0569; cell: (604) 302-8983
Email: Gordon@summitearthworks.ca

Des Goold P. Eng. Principal, Northwest Hydraulic Consultants
Phone: (604) 980-6011; cell: (604) 837-8289
Fax: 604-857-1651
Email: dgoold@nhcweb.com

ARCHAEOLOGICAL/HERITAGE RESOURCE CHANCE FIND PROCEDURES

Background
The British Columbia Archaeology Branch, Ministry of Forests, states that a Chance Find Procedure (CFP) for development projects should include the following:

1. Scope of Work,

2. Overview of Potential for Discovery of previously unknown archaeological sites,

3. Explanation of the importance of properly implementing protocols and procedures laid out in the operation's Archaeological CFP,

4. Outlining the protocol for identifying a possible Archaeological Sites, including a list of common visible identifying features,

5. Outlining procedures to be followed in the event of discovery of what may be a possible

Archaeological Site, including contact information, and

6. Outlining procedures to be followed in the event of discovering what may be human remains, including contact information.

Key Contact Information in Event of Chance Find

(1) Leq'á:mel First Nation

Stephen McGlenn
Lands & Natural Resources Manager, Leq'á:mel First Nation
43101 Leq'á:mel Way, Deroche, BC, Canada V0M 1G0
Phone: (604) 826-7976
Email: stephen@leqamel.ca

(2) Des Goold P. Eng.

Principal, Northwest Hydraulic Consultants
Phone: (604) 980-6011; cell: (604) 837-8289
Email: dgoold@nhcweb.com

(3) Archaeological Consultant

Gordon Mohs, M.A.,
Senior Project Archaeologist & First Nations Community Relations, Summit Earthworks Inc.
33171 2nd Ave., Mission BC Canada (V2V-6T8
Phone: (604) 820-0569; cell: (604) 302-8983
Email: Gordon@summitearthworks.ca

(4) Archaeology Branch, Ministry of Forests

a) Contact: Jillian Rousselle, Director

Telephone: (250) 953-3355 (direct)
Fax: (250) 953-3340
Email: Jillian.Rousselle@gov.bc.ca
Location Address: #3-1250 Quadra Street, Victoria BC
Mail Address: Box 9816 – STN Prov. Gov't, Victoria BC, V8W-9W3

b) Arch Branch Alternate:

Nathan Friesen | Permitting & Assessments
Telephone: 250-953-3306 (direct)
Fax: 250-953-3340
Email: Nathan.P.Friesen@gov.bc.ca

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(1) PROJECT LOCATION

Deroche, British Columbia, within Deroche Creek between Taylor Road and North Nicomen Road on Lakahahmen IR 11 (**Figure 1**).

(2) PROJECT DESCRIPTION

Deroche Creek Reach 3 Development Project: Phase 2 Spillway Clearing & Excavation Project:

- 3007814 - Deroche Creek Long Term Solution Phase 2.2 Archaeological Assessment

This Chance Find Procedure has been developed at the request of Leq'á:mel First Nation Lands & Resources Department, in the event Archaeological Chance Finds are observed during the construction phase of the Deroche Creek Spillway Site & Long-Term Solution Reach 3 Development Project. The General Contractor for the Project is Northwest Hydraulic Consultants. Summit Earthworks is the Subcontractor responsible for conducting Archaeological Assessments associated with the Deroche Creek Spillway and other Long-Term Solution Reach 3 Project Works.

This Chance Find Procedure has been reviewed and approved by the Leq'á:mel First Nation Lands Department and by the General Contractor for the Project. Gordon Mohs M.A., Summit Earthworks, is the designated Senior Archaeologist overseeing Field Monitoring Activities for this Project and is the individual responsible for developing this Chance Find Procedure.

SCOPE OF WORK: BACKGROUND INFORMATION

The Archaeological Investigations described herein are for the Deroche Creek Long-Term Solution Project. Emergency sediment removals took place in the fall of 2022, at the request of Leq'á:mel First Nation and the BC Ministry of Environment and Climate Change Strategy. Summit Earthworks (Summit) was prime contractor for the emergency work and responded immediately to requests to mitigate damage caused to Deroche Creek from the atmospheric river weather storms that occurred in the fall of 2021. The 2022 Project involved clearing and grubbing along Deroche Creek, the creation of two access points north and south of the Deroche Creek Bridge on Taylor Road; embankment repairs within Deroche Creek, and in-stream removal of large amounts of flood-deposited fill from Deroche Creek to enable Chum Salmon migration and spawning within Deroche Creek; Chum Salmon were in Nicomen Slough waiting to spawn while Project Works were taking place. The emergency sediment removal was very successful.

CURRENT PROPOSED WORKS

The focus of current works is construction of a Sediment Basin within Deroche Creek between Taylor Road and North Nicomen Road on Lakahahmen IR 11 (**Figures 1 & 2**). The proposed sediment basin covers an area of approximately one (1) hectare and will be excavated to a depth between 3 and 6 meters below the existing east floodplain level. Design plans for the sediment basin are nearing the 75% stage of completion. The purpose of the sediment basin is to increase the capture of sediments during floods, thereby limiting the volume of sediment that reaches Nicomen Slough.

General Assessment

Summit Earthworks' resident archaeologist, Gordon Mohs, M.A., participated in a field visit to Deroche Creek Thursday, March 9, 2023, and again April 12, 2023. Gordon recommended to the Deroche Creek Task Force Committee that the area of the proposed sediment basin be thoroughly examined for archaeological/ cultural remains, prior to excavation of the basin proper and that all excavation works be monitored throughout construction. He ascertained a moderate to high probability of archaeological/cultural remains occurring within the area of the proposed sediment basin based on his observations and background knowledge of the area (see comments below). In this regard, Gordon recommended a 2-Phase Assessment

Plan, including the development of a comprehensive Chance Find Procedure (CFP), as well as a Monitoring Program & Training Plan involving Leq'á:mel First Nation Field Technicians.

It should be noted: There are other proposed features associated with the current Phase of remediation activities at Deroche Creek, including two Deflection Berms, a Cemetery Berm, and additional bank stabilization activities. Based on his preliminary field inspections, Mohs assessed these activities as having limited surface impact disturbances, as the focus is on 'capping' construction activities. Archaeological Monitoring of these areas will, however, occur as part of the current Assessment.

In summary, Archaeological Monitoring is the core activity proposed in the developed Chance Find Procedure. This is to occur in two phases designed to coincide with the construction activities.

ASSESSMENT & MONITORING

1) **Phase 1: Archaeological Assessment supported by light clearing.**

Phase 1 Archaeological Investigations will involve detailed inspections of the eastern portion of the proposed sediment basin, which lies outside the existing creek in a forested area. Brush and other forest understory will be cleared and grubbed to allow inspection.

- Estimated duration: 4.5 days
- Phase 1 activities are to include clearing of understory, primarily a heavy cover of blackberries, with a size 60 excavator.
    - There is to be no removal of trees greater than 6-inches diameter at breast height.
    - Further light excavation will occur, as warranted, without threatening trees.
- Archaeological Monitoring/Inspections will be conducted by a crew comprising a Senior Archaeologist (Gordon Mohs) and two Archaeological Assistants (Leq'á:mel FN).
- Procedures to be followed in the event that archaeological features or deposits are set ou in these Chance Find Procedures.
    - In summary… if archaeological deposits are identified during Project Works, all clearing/excavation activities in the immediate area of the Chance Find will be discontinued, until a thorough Archeological Assessment can be made by the Senior Project Archaeologist, in collaboration with First Nation Archaeological Field Technicians.
    - If significant deposits are identified, alternative design plans may be necessary (see Appendix 1, CFP Flow Diagram, for possible scenarios).
    - If deposits are deemed 'significant', all further clearing/excavation activities within the proposed spillway area will be halted.
        - Examples of significant archaeological features and deposits are illustrated in Appendix 2.

2) **Phase 2 Archaeological Monitoring: During Construction (Excavation) of the Sediment Basin**

Phase 2 Archaeological Monitoring will involve detailed inspections of the sediment basin during its construction (excavation). It is anticipated that little will be found during this phase of the Monitoring process, except within the first meter or so of the surface.

- **Estimated duration 16 weeks**
- The focus of Phase 2 is monitoring the removal of subsurface deposits by Excavator.
- Chance Find Procedures will apply, in the event significant subsurface deposits are identified.

- As with surface monitoring, inspections during this phase will be conducted by a crew of one Senior Archaeologist and two Leq'á:mel First Nation Archaeological Technicians.

CULTURAL BACKGROUND INFORMATION

Cultural background information was important in making assessments of the sediment basin area.

Lakahahmen IR 11: Place Name & Gathering Place

Lakahahmen IR 11 (Leq'á:mel) comprises the eastern part of the historic 1864 'Tlatwaas' (aka Tlat-whas, Klat-waas, Clatwass) Douglas Reserve. Although this Reserve no longer exists, the eastern portion was designated Lakahahmen IR 11.

In 1977, Sto:lo Linguist Brent Galloway recorded ….

> "*IR No. 11 is called "Lakahahmen." "The word for this place means "level place". It was an important gathering place for parties, dances, sports days, feasts, and other occasions. Another meaning is based on this use. The word "la:leq'el" means "visiting one another" and deals with a place where people go to have a big visit (from Elders meeting July 13, 1977)*".

Longhouse:

There is evidence that there used to be an old longhouse in the general area, as described to Gordon Mohs by Leq'á:mel Elder Sam Kelly, December 2nd, 1997. One of Sam's stories was about the old longhouse near to where the Big E Restaurant on Taylor Road is now located. Sam said that there used to be a big longhouse here that stretched downriver along the slough about 400 feet and that Jeff Paul's house sits on top of part of it. Sam said he remembered pulling out an old house post when he was younger and that the house post was over 2 feet in diameter. He also said the area has since been ploughed and bulldozed. Sam commented on how the house was constructed and organized. He described it as a shed-type longhouse that ran parallel to Nicomen Slough along Taylor Road. He said that family compartments stretched all along the back wall of the house; the whole front half running along the slough was the common area. Here is where the people did their dancing and where half-a-dozen or more fires were located. Sam said that the broken rock from the fires stretched in an elongated mound along the whole back of the house and that most of this had been leveled out over the years.

Burial Mounds:

A major component of archaeological sites in the immediate and regional area are burial mounds, several of which were identified and excavated by Anthropologist/Archaeologist Charles Hill-Tout at Hatzic and at Harrison Mills at the turn of the century (late 1800s – early 1900s). Further excavations of burial mounds occurred in the 1990s. These burial mounds were located on the right bank of the Harrison River at its confluence with the Fraser River and involved teams of archaeologists from the University of British Columbia and Simon Fraser University. These mounds date to about 1,400 years ago and are very complex burial structures for important tribal ancestors, rich in grave inclusions and elaborate burial features. Examples are showcased in *Appendix 2* of this Chance Find Procedure.

Recent Observations at Proposed Sediment Basin

At Lakahahmen IR 11, within—or in close proximity to—the proposed sediment basin is a relatively large mound, observed Thursday, March 9, 2023, during a site visitation by Summit Earthworks' resident archaeologist, Gordon Mohs. It is unknown if this mound is a cultural feature, a natural feature, or a more recent historic feature within the development zone. It should be noted that it was impossible to get anywhere near the mound during the March site visitation, as the entire area is heavily overgrown with blackberries.

CHANCE FIND PROCEDURES

As part of their training, First Nation Field Technicians will be provided with the Deroche Creek Sediment Basin Chance Find Procedure, as well as all relevant documents, maps, and diagrams. These will be reviewed with the Sr. Project Archaeologist. Complementing these documents are an orientation PowerPoint Program, for both First Nation Field Technicians and Consultants/Contractors working at the site, and '*Archaeological Monitoring Forms*', which require FN Field Technicians to document:

- Nature of activities
- Location of activities
- Description of project work activities
- Size of area impacted on a daily basis with project works
- Nature of deposits, if applicable, including subsurface profiles
- Depth of excavation activities
- Observation of fill deposits, including photographic records.

In addition, all on-site construction workers will be required to familiarize themselves with the Deroche Creek Sediment Basin Chance Find Procedures and associated protocols. All Construction personnel working on site will be provided a training session prior to any excavation activities occurring. This will include a PowerPoint presentation on Chance Finds.

(3) CONSTRUCTION SCHEDULE 2023/2024

Phase 1 archaeological investigations are proposed to begin and to be completed in August of 2023.
Phase 2 archaeological monitoring will take place during construction, which is proposed to take place between June 2024 and September 2024.

(4) POTENTIAL FOR DISCOVERY

The potential for discovery of archaeological deposits is deemed moderate – high, given that Deroche Creek is a salmon-bearing creek, a proximal location of a former longhouse site, and a gathering place utilized by the Leq'á:mel First Nation and their neighbours in pre-contact and early contact times.

(5) IMPORTANCE OF IMPLEMENTING PROCEDURES

These Chance Find Procedures are to be followed by all Project representatives, contractors, and subcontractors. Failure to follow protocols and procedures could seriously jeopardize the Project, severely harming fish migrations, and could seriously affect Leq'á:mel First Nation's reputation regarding protection of its cultural heritage resources. Moreover, given that a small part of this project is 'off-reserve', failure to follow procedures for Chance Finds could be deemed an offence under the *Heritage Conservation Act (1996)*.

(6) PROTOCOLS FOR SITE IDENTIFICATION

Identifying archaeological sites, features and objects requires a person or persons with archaeological training and, preferably, culture-specific training and knowledge of local First Nation cultural resources and cultural traditions. Normally, this includes an archaeologist approved by local First Nations, as well as First Nation Technicians with training and experience in archaeology and/or culture heritage resources management. The Sr. Project Archaeologist, Gordon Mohs, has extensive archaeological experience in the region as well as extensive experience involving Coast & Interior Salish Elders, cultural traditions, & cultural heritage resources management, including Heritage Policies development.

- Training will be offered to all First Nations representatives by Sr. Project Archaeologist Gordon

Mohs. A comprehensive program has been designed specifically for this purpose.

In the event Chance Finds are identified, the Sr. Project Archaeologist will make a preliminary assessment and the Leq'á:mel First Nation Lands & Resources Department will be contacted. If the cultural remains are deemed significant, the Provincial Archaeology Branch will also be notified, upon approval of Leq'á:mel First Nation.

(7) IDENTIFYING ARCHAEOLOGICAL/HERITAGE RESOURCES

Definition: For purposes of simplicity for current investigations, archaeological heritage resources include archaeological sites, features, objects, or other evidence of human occupation or human use before 1846 (*Heritage Conservation Act, 1996, Section 13(2)-d*), including, but not limited to artifacts, lithic materials, and cultural features, such as cache pits, roasting pits, house features, anthropogenic deposits, and evidence of human remains, examples of which are presented in Appendix 2. It is acknowledged that Cultural Heritage Resources also include cultural resource sites and materials of importance to local First Nation peoples, such as traditional use sites, historic artifacts, such as net-sinkers, culturally-modified trees, and other post-1846 cultural resources identified as important to First Nation peoples, some of which on-site contractors may not be familiar with.

(8) Archaeological Sites Protection

Archaeological sites in British Columbia are protected under the *Heritage Conservation Act [RSBC 1996] Chapter 187.* They cannot be disturbed, whether located on Crown lands or private property. Archaeological sites and Cultural Heritage Resources on First Nation lands, notably Indian Reserves, are not protected under provincial legislation, although many Nations have agreed to recognize provincial regulations, whereas others have developed their own Cultural Heritage Resources Policies and CHRM Protection Protocols.

Regarding the proposed Sediment Basin Project, all remediation activities are within the boundaries of Lakahahmen IR 11. It should also be noted there is a cemetery bordering Deroche Creek at the northwest corner of IR 11. Some remediation activities are to occur in this area and the team assembled for the Phase 2 Spillway Clearing & Excavation component of the Deroche Creek Reach 3 Development Project will be involved in Project Works in this area. This Chance Find Procedure will apply to any Project works in this area, as well as construction activities associated with the two Deflection Berms and additional embankment stabilization activities.

Some associated remediation activities for the greater Deroche Creek Reach 3 Development Project are located 'off-reserve'. Prior to any works occurring in these areas, a Provincial Heritage Investigation Permit will be required. For purposes of this Chance Find Procedure, the procedures outlined below are to be followed, if previously unknown archaeological/heritage resources are identified, exposed, or found during the life of the Project.

(9) Leq'á:mel First Nation Protocols in the Event of a Chance Find

a) In the event of a Chance Find discovery, all Project Works in the vicinity of the cultural heritage resource find will stop, until such time that a formal archaeological assessment is made by the Sr. Project Archaeologist and designated Leq'á:mel First Nation representatives. The Leq'á:mel Lands & Natural Resources Department and the General Contractor will both be notified, following a preliminary assessment by the Sr. Project Archaeologist.
    - A minimum 5 meter-diameter buffer-zone of the Chance Find will be implemented.

- This area will be flagged until a detailed assessment can be completed.

b) The Project's Site Superintendent(s) will acknowledge any assessment made by Field Technicians.

c) All on-site Contractors will respect Leq'á:mel First Nation heritage policies/protocols regarding Chance Find discoveries.

d) Leq'á:mel First Nation understands that Chance Find discoveries can seriously delay Project Works, depending on the nature of the Chance Finds. Discovery of Chance Finds may require a formal archaeological assessment (AIA), possibly including a Heritage Investigations Permit from the Provincial Government for areas not located 'on-reserve' (normally a minimum 6-month approval process), which could result in extensive archaeological investigations at the Project site.

e) In the event of a Chance Find, the Sr. Project Archaeologist will provide Leq'á:mel First Nation, the General Contractor and senior Project representatives with a detailed Chance Find Assessment, in collaboration with First Nation Field Technicians.
   - This assessment will include recommended mitigation alternatives, taking into consideration relevant First Nation community heritage policies/protocols.

(10) PROCEDURES TO BE FOLLOWED IN THE EVENT OF DISCOVERING WHAT MAY BE HUMAN REMAINS

a) If human remains, or what appear to be human remains, are encountered, all work on site will cease until such time that a comprehensive assessment is made and meaningful consultations with Leq'á:mel First Nation leadership occurs. Human remains will not to be handled, moved, or exhumed, until appropriate mitigation measures are approved by Leq'á:mel First Nation leadership (cultural & political), including LFN Lands & Resources Department.

b) Leq'á:mel First Nation leadership, including Leq'á:mel Lands & Resources Department, the General Contractor, all subcontractors working on-site, and appropriate Government representatives, will be notified immediately of the discovery of human remains and informed of Stop Work protocols and procedures.

c) Appropriate mitigation measures will be determined through negotiations between Leq'á:mel First Nation, Project representatives, including the Project Archaeologist and other qualified specialists, possibly including the Archaeology Branch.

d) In the event human remains are found, all on-site contractors will be sensitive to Leq'á:mel First Nation concerns and will recognize all Leq'á:mel cultural and spiritual protocols, which may be very different from mainstream protocols, regarding the handling & treatment indigenous human remains.

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FIGURE 1: DEROCHE CREEK PROPOSED SPILLWAY LOCATION

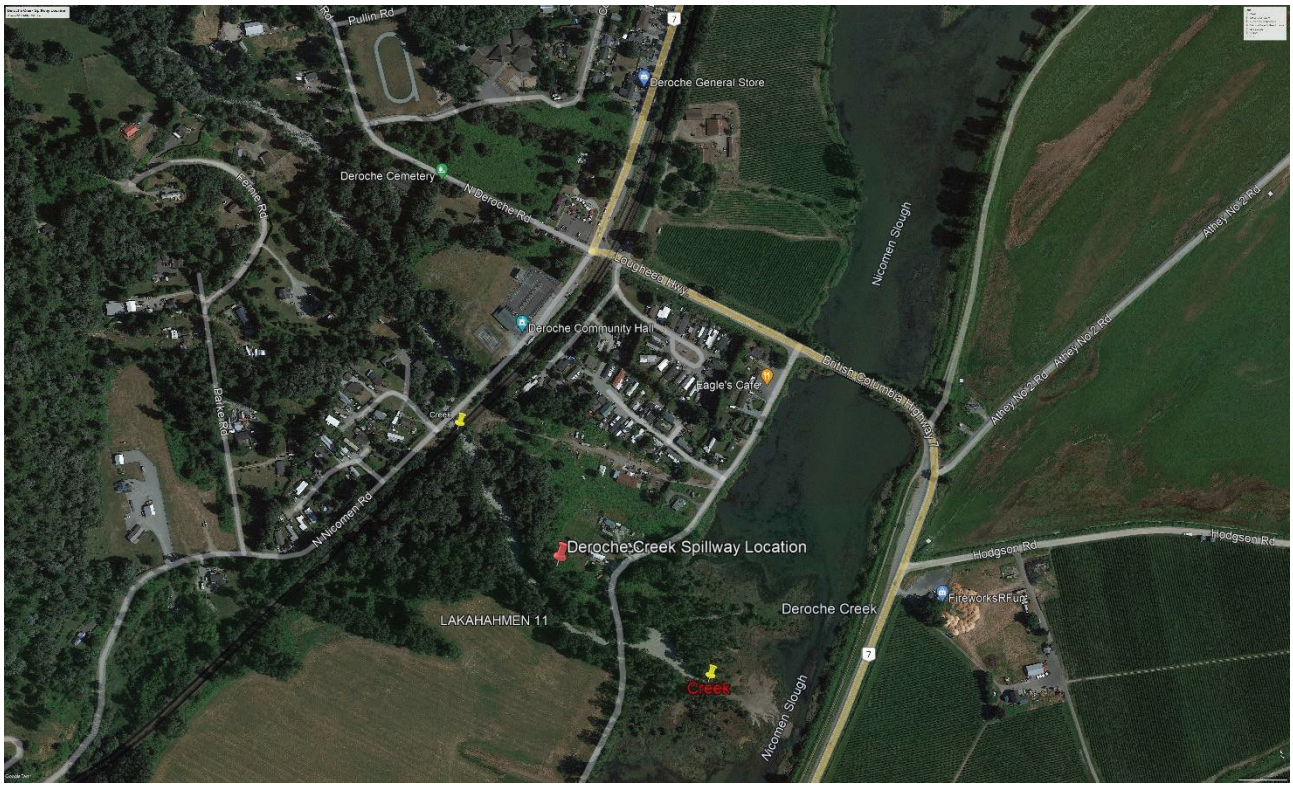
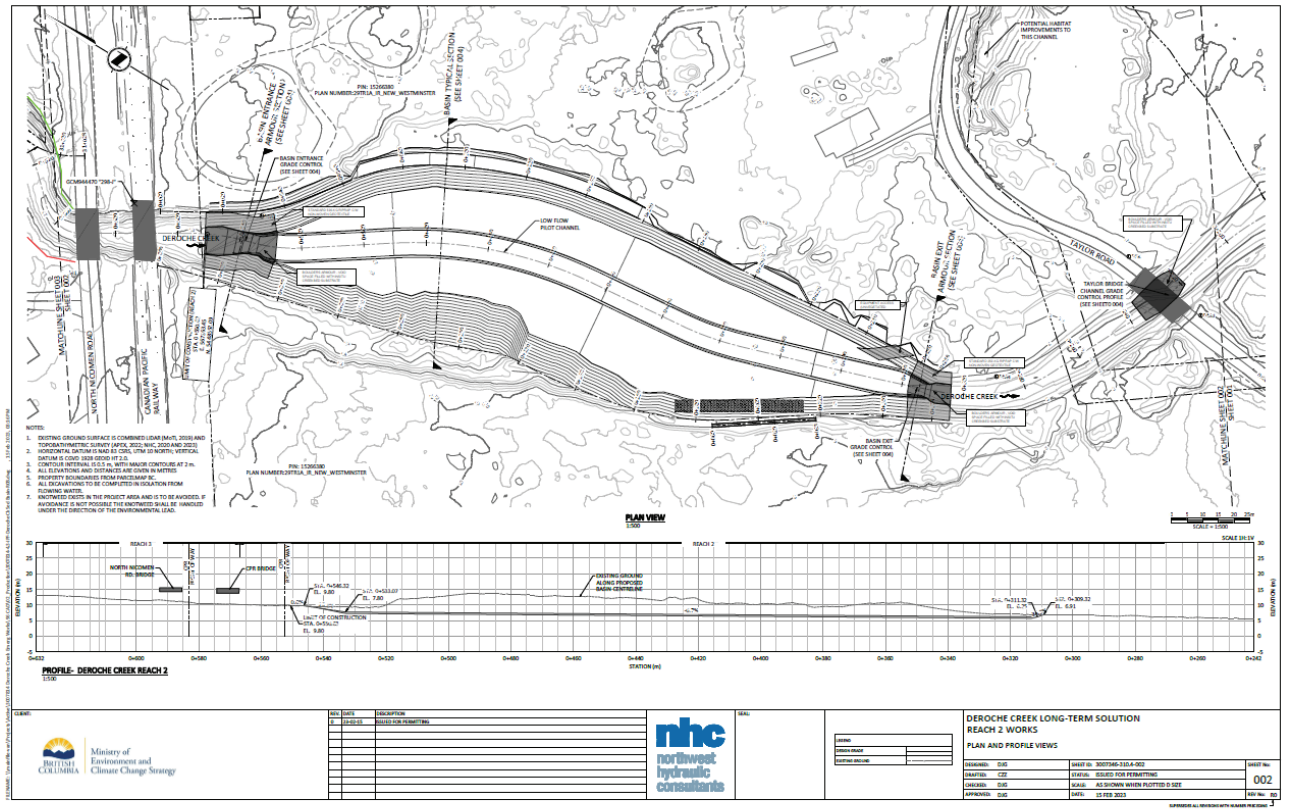
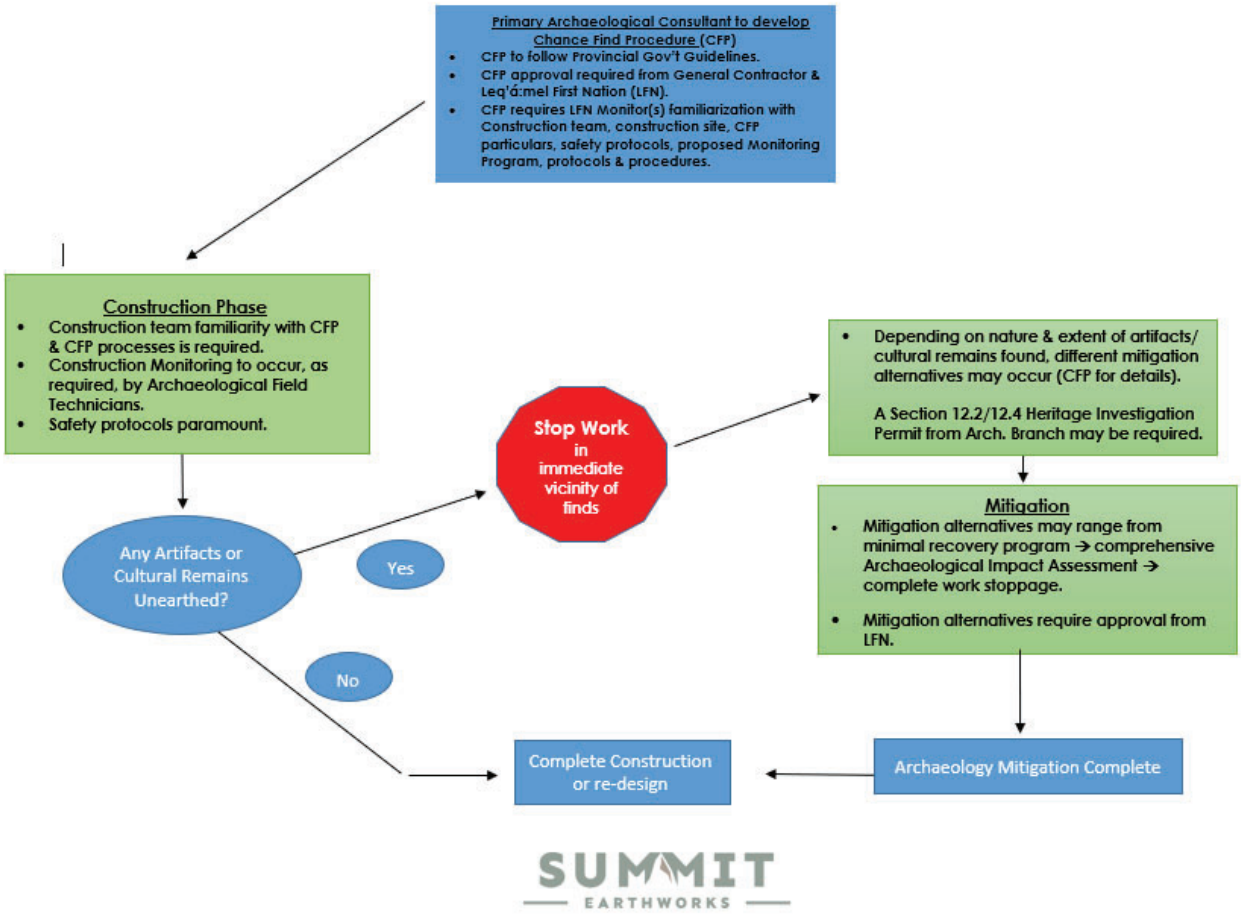


FIGURE 2: PROPOSED SPILLWAY DESIGN PLAN



APPENDIX 1

Deroche Creek Sediment Basin Archaeology CFP Flow Diagram



APPENDIX 2
WHAT TO LOOK FOR:
Common Visible Identifiable Features

The following are characteristics typical of cultural heritage & archaeological sites found within Stó:lō Region.

(a) Artifacts & Artifact Scatters:

Example of Artifact Scatter from beach on Fraser River at d'Herbomez Creek (below St. Mary's) and a large basalt biface found near Nelson Park (currently in Mission Museum)





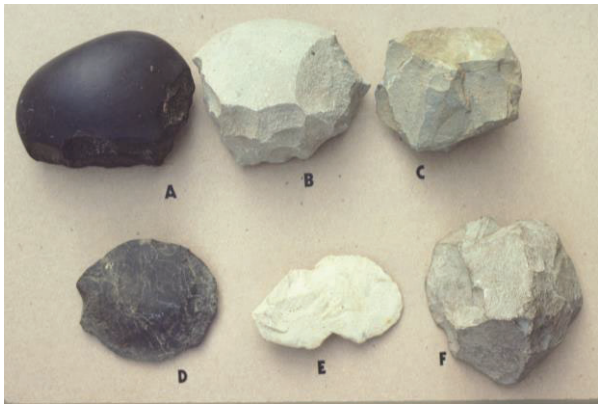
(b) Example of Ground stone artifacts

kw'éts'tel (slate fish knives), t'emq'ethel (jade adze), and tótesem (grinding stone)





(c) Cobble tools & Projectile Points (bifaces) from Xá:ytem (Hatzic Rock Site)



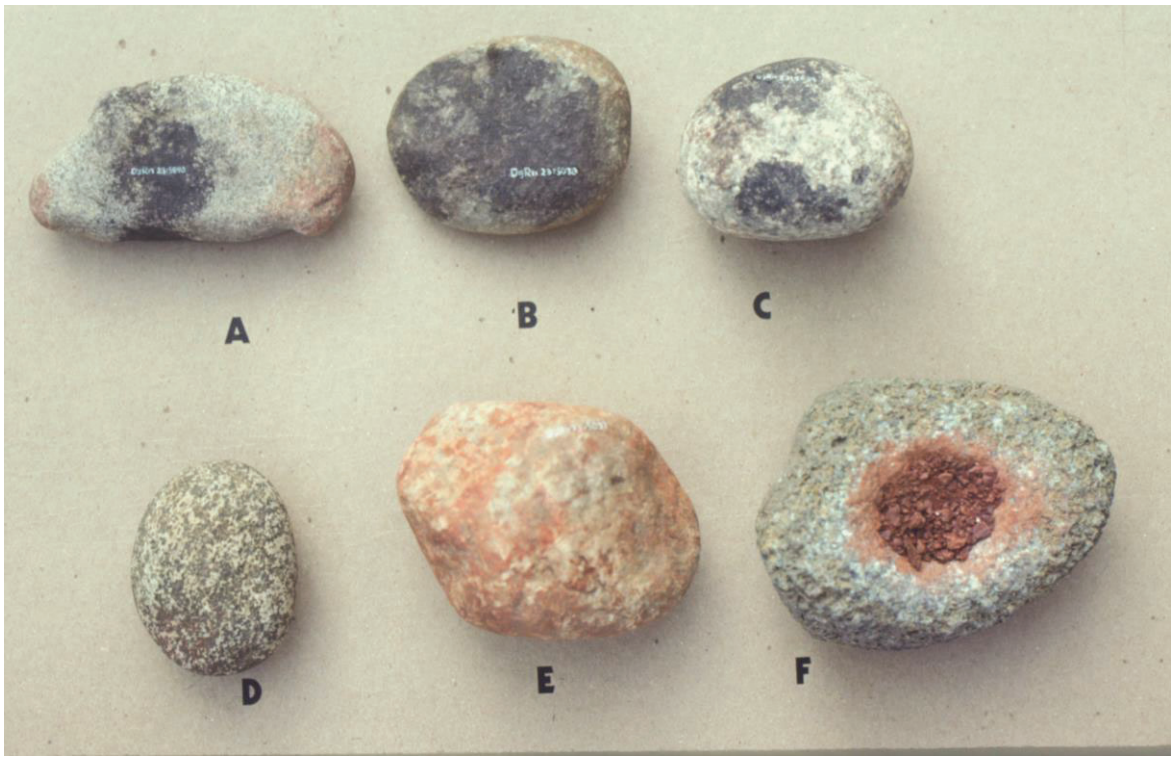


(d) More Xá:ytem Artifacts

Cobble tools, hammer stones, paint stones, stone club, boiling stones, projectile points, obsidian



(e) Paint Stones Xá:ytem (Hatzic Rock Site)



(f) Exotic Artifacts from the Hatzic Rock Site & Hatzic Lake

Obsidian (from Oregon), a segmented stone (earliest art in region) and a stone bowl (spiritual use)

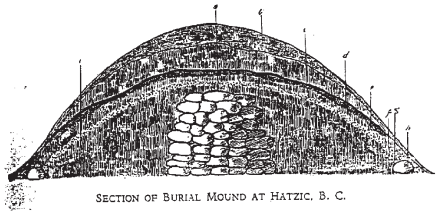




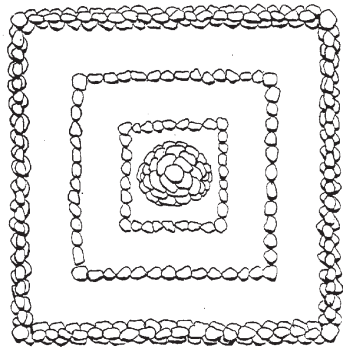


(g) Examples of Burial Mounds excavated by Charles Hill-Tout 1895

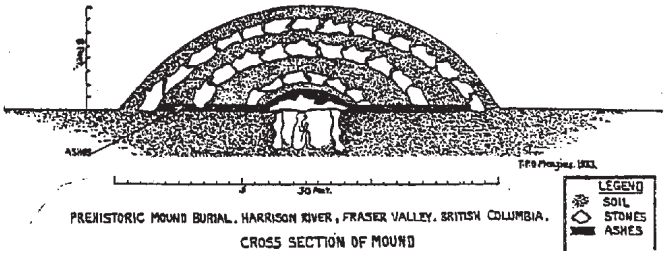
Image on left: burial mound excavated at Hatzic (near Shook Road).
Image on right: burial mound excavated at Harrison River (across from Sasquatch Inn).



SECTION OF BURIAL MOUND AT HATZIC, B. C.



PLAN OF BURIAL MOUNDS



Artifacts found by Hill-Tout (Hatzic) (currently in Royal BC Museum)





(h) Examples of Burial Mounds: Scowlitz (near Williams Reserve) at Mouth of Harrison River




Ancestral Burial Mound 1: Scowlitz at Mouth of Harrison River

***Mound 1: included over 3 tonnes of stone in complicated alignments encasing a middle-aged man with numerous exotic artifacts, including copper, over 7,000 dentalia shell beads, haliotis & abalone shell.




Artifacts associated with burial mounds

Left photo… sawn dentalia shell beads (from Nootka Sound), Copper (origin unknown), abalone (California)




Right photo… sawn stone beads, obsidian (Oregon), amber, crystal, and other tools…

(i) Cultural Depressions

Any depression seen on the ground surface that appears to have been excavated can be a cultural feature of archaeological and cultural historical significance. These “pits” were dug for a variety of reasons such as for food storage, food processing, cooking, roasting, or as a foundations for dwellings. These features can range in size from under a meter to over 10 meters in diameter, and are usually found associated with other artifacts such as hearths, fire broken rock and lithic scatters.

…below is a large cultural depression located at John Mac Slough, Sts’ailes

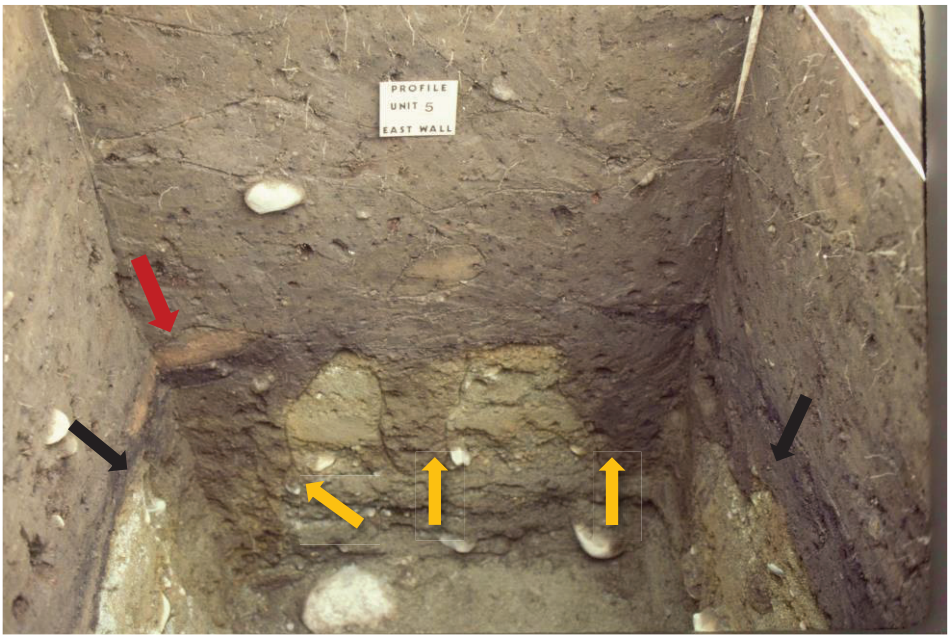


(j) Subsurface Stratigraphy what to look for:

Here is a bench feature in an underground house (sqémél) situated above river gravels.



Below: here we have 3 house post impressions (yellow arrows, the wood has decomposed), a hearth (red arrow) with orange-stained (burnt) soil & charcoal, and a house floor (black arrows) on sterile gravel deposits.



Fire Broken Rock, boiling stones, and Hearth features: Fire-broken rock (FBR) results from the use of fire during cooking, heating and processing activities, characterized by jagged edges and usually charcoal. Boiling stones are usually small, flat, rounded stones that are heated in a fire and dropped into a water-tight basket which has food to be cooked. Hearth features include old fires often characterized by black & orange/red-stained soils, charcoal and FBR.

****

Deroche Creek Sediment Basin
Archaeological Assessment Project
Field Technician Orientation & Training Program

OVERVIEW

A comprehensive Field Technician and Equipment Operator Orientation & Training Program was developed by Summit Earthworks resident archaeologist, Gordon Mohs M.A. There were several components to this:

1. Overview of Deroche Creek Sediment Basin Archaeological Assessment Project 2023/2024.
2. Development & acquisition of Leq'á:mel First Nation Investigations Permit
3. Field Technician Meeting Outline.
4. Development of Chance Find Procedures (CFP) in the event that cultural historical artifacts and/or features were discovered in the course of field investigations.
5. CFP Orientation PowerPoint
6. Field Technician Monitoring Procedures & Protocol Development.
7. Orientation to local archaeological finds.
8. Field Monitoring Documentation and Field Technician orientation to field supplies and investigation protocols.
9. Safety Protocols.
10. Field Orientation Outline.

An Archaeological Technician Training Program occurred at the Leq'á:mel First Nation (LFN) Lands Department Office at 43101 Lougheed Highway, Deroche BC (V0M-1G0) October 4, 2023. In attendance were LFN Guardians: Erik Still, Melissa Friesen, Jason Thompson, and Guardian Coordinator Tina Pederson. Summit Earthworks Excavator Operator Brent Vanraamsdonk was also in attendance but a late arrival. Additional coaching with Brent occurred on site. LFN Guardian Megan Friesen, missed the formal training session at the Lands Office but was subsequently coached on-site. Erik and Megan were the primary Field Technicians for the duration of fieldwork between October 4 – 12.

1. **Field Technician Meeting**
    a. LFN Lands Department representatives (identified above) met Sr. Project Archaeologist, Gordon Mohs. A primary goal was introductions to one another and to review the 10 components of the Training/Orientation Program set out above.

2. **Field Technician Overview of Deroche Creek Sediment Basin Archaeological Assessment Project 2023/2024.**
    a. Project background information outlined re nature of work that occurred within Deroche Creek in 2022, notably in-stream work involving the removal of gravels, associated with Atmospheric River events of 2021 and relation to current Project.
    b. The scope of current Project outlined, including full scope of the proposed Sediment Basin and the reasons for an archaeological assessment.
    c. 2-Phase Archaeological Assessment outlined:
        - Phase 1: Current Assessment following surface grubbing and clearing of Sediment Basin area.
        - Phase 2: Future Archaeological Monitoring during deep excavation of Sediment Basin and with construction of other Project features (e.g., Berms).
    d. Long-Term Solution Deroche Creek Site Maps presented.
    e. Other components of the proposed Sediment Basin presented, including migrating birds, tree & stump removal.
    f. Other cultural features (e.g., cemetery) discussed.

3. **Leq'á:mel First Nation Heritage Investigations Permit**
    a. Leq'á:mel First Nation Heritage Investigations Permit (LFNIUP# 2023-003, October 2, 2023) reviewed with Guardians with focus on Schedule A 'Terms & Conditions.

4. **Deroche Creek Sediment Basin Chance Find Procedures (CFP)**
    a. Comprehensive Review of Chance Find Procedure document & Project Overview via PowerPoint with focus on Field Technician Authority to implement Work Stoppages. Brent also familiarized with process and Guardian authority.
    b. Review Field Technician responsibilities
    c. Review Deroche Creek Sediment Basin Archaeological Assessment Flow Diagram regarding potential outcomes.
    d. Hardcopy of CFP provided to Lands Department.

5. **Field Technician CFP Monitoring Procedures & Protocols**
    a. Field Technician review & familiarization with CFP Monitoring Procedures Document
    b. Field Technician review and familiarization with CFP Monitoring Forms
        - *forms were not needed with site investigations.
    c. Field Technician & Excavator Operator review of Site-Specific Health & Safety requirements.

d. Guardians & Excavator Operator informed that a copy of the LFN Heritage Investigations Permit, Chance Find Procedures & H&S Binder to remain on site at all times during permitted investigations.
e. Guardians informed that LFN Guardians presence was required on-site at all times during brushing, clearing & archaeological inspections.
f. A 'field-binder' was prepared containing copies of all relevant documents relating to investigations at the site.

6. Field Technician Familiarization with Local Archaeological Finds

a. This was a hands-on experience to familiarize Guardians with archaeological finds from the Fraser River shoreline at d'Herbomez Creek (adjacent the Mission Visitor Centre located below the St. Mary's Heritage Park).
    - Hands-on experience was very beneficial in familiarizing Guardians with scope of archaeological artifacts to look for at the site.

7. Archaeological Field Materials & Supplies

a. Field Technicians were presented with two archaeological Marshalltown pointing trowels. Both were partially sharpened with a good flat-blade file.
b. Trowel purposes were outlined: notably that they are used to clean-up excavation wall profiles to get better idea of subsurface sediment/soil layers in areas excavated (illustrated in CFP and PowerPoint).



c. Field Technicians were provided with flagging tape and metal tent stakes for marking the position of any artifacts identified in the field.
d. Laminated Field Maps presented to Guardians.

8. Site Orientation

a. Following the Boardroom Training Session, the LFN Guardians were provided a comprehensive site orientation, which was primarily a mapping exercise. A 5-meter rope-chain was prepared during the Lands Department Training session, but this quickly proved inadequate for locating the site flag-pegs bordering the east boundary of the Sediment Basin, which were apparently placed every 20 meters up-creek (north) of the Taylor Road bridge over Deroche Creek.

b. Erik macheted his way thru the blackberry jungle and eventually found the first peg on the floodplain east of Deroche Creek located at (0+280 meters).

c. Brent moved the excavator onto the dike immediately north of Taylor Road on the east bank (left bank) of Deroche Creek, then he and Erik investigated the north end of the Sediment Basin to determine which would be the better approach for the excavator. At the north end of the Sediment Basin, Erik and Brent found two stakes. It was decided it was best to begin clearing and grubbing at the south end of the proposed Sediment Basin.

d. On day 2, October 5th, an attempt at GIS Mapping utilizing Avenza Mapping failed. The following morning Gordon purchased 50meters of cotton rope and with the help of Megan Friesen marked off the rope in 5-meter lengths with pink flagging tape. This enable a fairly quick means to identify 'flagging stakes' along the entire eastern boundary of the proposed Sediment Basin, which made clearing and grubbing so much easier for Brent and his excavator. The 'rope-chain' is an old archaeological technique used by BC Field Archaeologist and it proved extremely valuable in identifying features on site. Erik and Megan became quite proficient utilizing the rope-chain on site.

***

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Appendix E

Construction Environmental Management Plan

KERR WOOD LEIDAL ASSOCIATES LTD.
consulting engineers

KERR WOOD LEIDAL
consulting engineers

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Deroche Creek Recovery Solution Project

Construction Environmental Management Plan

Final Report – Revision 2
June 3, 2025
KWL Project No. 2838.003

Prepared for:
BC Ministry of Environment and Climate Change Strategy

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Report Submission

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1. Introduction

1.1 Project Description

The Ministry of Environment and Climate Change Strategy (ENV) and Leq'a:mel First Nation (LFN) are working to address the impacts of sedimentation in Deroche Creek that resulted from significant precipitation and flooding during the November 2021 Atmospheric River Event (ARE). Kerr Wood Leidal Associates Ltd. (KWL) has been retained as a subconsultant to the Engineer-of-Record, Northwest Hydraulic Consultants (NHC), to provide environmental services during design, permitting support, contract administration, construction management, and construction environmental monitoring for the Project.

KWL has prepared this document as an updated Construction Environmental Management Plan (CEMP) for this phase of the works. This CEMP includes general guidance on the following topics:

- Environmental monitoring
- Timing of works
- Protection of fish and fish habitat
- Protection of birds and wildlife
- Tree protection and vegetation management
- Invasive plant management
- Erosion and sediment control
- Deleterious substance control and spill management
- Clean up and restoration

1.2 Purpose of the Construction Environmental Management Plan

This Construction Environmental Management Plan (CEMP) provides overarching guidance and sets out the requirements and measures that will be adopted to avoid, minimize, and mitigate the potential adverse environmental impacts of the Project. This plan is to be implemented by the Contractor throughout the duration of the Project and applies to the construction phase.

The CEMP is a living document and will be updated over the course of construction as planning and sequencing for work activities are adjusted and finalized, and as observations made by Environmental Monitors warrant changes in environmental management.

1.3 Roles and Responsibilities

The parties involved in the Project have the following roles and responsibilities with respect to environmental management:

1. The Owner's (LFN's) representative, shall:
    a. ensure that the appropriate resources are available to establish, implement, maintain, and improve environmentally responsible construction practices;
    b. liaise with the EM about potential impacts to environmental components during construction;
    c. contract Qualified Professionals[1] (QPs) with specific expertise required for the Project liaise with all QPs as needed; and
    d. provide resources required for environmental awareness and protection training, environmental documents specific to the Project, and financial resources.
2. The Project Sponsors, Ministry of Environment and Climate Change Strategy (ENV) and Indigenous Services Canada, shall:
    a. provide project funding; and
    b. provide general guidance and oversight of works.
3. The Environmental Monitor (EM), KWL, shall:
    a. advise the Contractor of environmental protection and monitor environmental protection measures;
    b. identify deficiencies of the Contractor and communicate with the Contractor on how to address deficiencies;
    c. have written authority to halt or modify any construction activity if it is deemed necessary in order to protect fish and wildlife populations or their habitats; and
    d. report to the Consultant.
4. The Contract Administrator, KWL, shall:
    a. ensure that the appropriate resources are available to establish, implement, maintain, and improve environmentally responsible construction practices;
    b. liaise with the EM about potential impacts to environmental components during construction;
    c. liaise with all QPs involved with the Project as needed; and
    d. provide the resources required for environmental awareness and protection training, contract QPs with specific expertise as needed, environmental documents specific to the Project, and financial resources.
5. The Engineer of Record, NHC, shall:
    a. have specific expertise or knowledge needed to advise and/or support the EM and the Contractor where specific engineering input is required related to environmental concerns;
    b. liaise with the EM about potential impacts to environmental components during construction; and

[1] QPs will have the expertise or knowledge needed to advise and/or support the Consultant, the EM, the Contractor, and KWL with respect to environmental or other engineering concerns.

c. liaise with any other QPs involved with the project as needed.

6. The Contractor (to be determined) includes any company and its field staff retained by LFN to construct a component of the Project. The Contractor shall:
   a. plan and conduct activities in compliance with the CEMP and all applicable legislation, approvals, and best management practices;
   b. report directly to the Consultant regarding all site activities;
   c. ensure that there is no release of deleterious substances into Deroche Creek or any other nearby watercourses or waterbodies;
   d. ensure all staff, including subcontractors, are familiar with the CEMP and know their responsibilities in meeting the outcomes of the plan;
   e. communicate changes in construction plans or activities that could impact the implementation of the CEMP to the Consultant, the EM, and KWL as quickly as possible; and
   f. keep a copy of the CEMP on-site at all times.

1.4 Guiding Documents

The following guidance documents were used to develop the CEMP:

- *Requirements and Best Management Practices for Making Changes In and About a Stream in British Columbia*. Version 2022.01. Government of British Columbia, 2022.
- *Measures to Protect Fish and Fish Habitat*, Fisheries and Oceans Canada, 2019.
- *A Field Guide to Fuel Handling, Transportation and Storage*, Ministry of Water, Land and Air Protection, 3rd Edition, 2002.
- *B.C. Approved Water Quality Guidelines*, Ministry of Environment and Climate Change Strategy Updated 2018
- *Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia*, Ministry of Water, Land and Air Protection, 2004.
- *Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia*, Ministry of Environment and Climate Change Strategy, 2014.
- *Land Development Guidelines for the Protection of Aquatic Habitat, Fisheries and Oceans, 2nd Edition, 1993.*
- *New Migratory Birds Regulations,* Environment and Climate Change Canada, 2022.

2. Project Location and Scope of Work

2.1 Project Location and Physical Setting

Deroche Creek flows through Lakahahmen IR 11 where it enters Nicomen Slough, a historical side channel of the Fraser River that has had its inflow from the river regulated by diking and the "Bell Dam" since the 1930s. Lakahahmen IR 11 is located on and adjacent to the Deroche Creek alluvial fan, approximately 22 km east of the City of Mission, BC. The project location is the mainstem of Deroche Creek, starting to the west of the intersection of North Deroche Road and Cooper Road, running southeast to Taylor Road, and ending at the downstream edge of the alluvial fan within Nicomen Slough.

Emergency sediment removal was conducted in November 2022 to remove sediments introduced by the 2021 Atmospheric River Event (ARE) and repair the highest risk bank erosion sites. The following Project now aims to provide a long-term solution to the sediment accumulation in Deroche Creek to mitigate future impacts on infrastructure and salmon habitat. Continued sediment deposition on the alluvial fan poses potential threats such as channel avulsion, bank erosion, and negative impacts to fish passage. Initial emergency sediment removal works have been completed, but further long-term solutions are required to mitigate future risks.

The proposed Deroche Creek Recovery Solution Project includes the following works:

- Construction of a sediment basin with a low-flow channel in Reach 2 to increase area available for sediment deposition and reduce infilling of the lower channel and fan, which has the potential to impede the migration of fish during low flows and smother spawning habitat downstream.
- Installation of bed armouring at Ministry of Transportation & Infrastructure's Taylor Road Bridge in Reach 2, downstream of the proposed sediment basin, to prevent degradation due the reduction in sediment supply.
- Construction of two timber pile deflectors on the Deroche Creek alluvial fan perpendicular to the Taylor Road to prevent high flows from eroding the embankment of Taylor Road.
- Construction of rearing habitat channels in the Deroche Creek alluvial fan.
- Installation of a large woody debris reef along the Highway 7 embankment to improve habitat complexity and stabilize the bank.
- Enhancement of riparian habitat of Deroche Creek through invasive species removal and native planting.

More details about construction are provided in subsequent sections of the CEMP.

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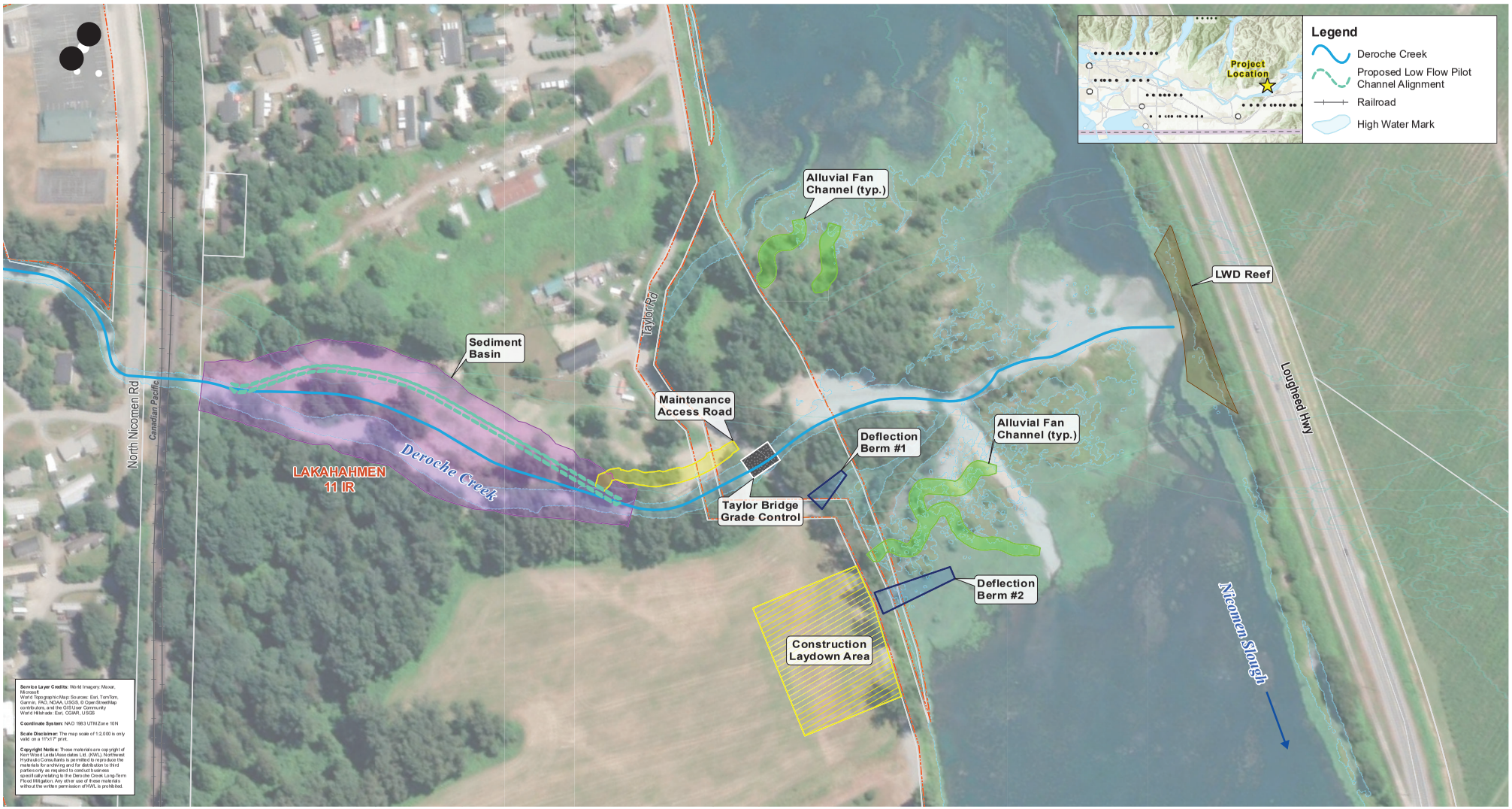
Northwest Hydraulic Consultants
Deroche Creek Long-Term Flood Mitigation

KERR WOOD LEIDAL consulting engineers



Project No. 2838.003
Date May 2025
Scale 1:2,000
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Proposed Works

Figure 2-1

2.2 Scope of Proposed Works

The construction stage, activity, and description of activity for construction works are described in the tables below.

Table 2-1: Proposed Construction Methods for Sediment Basin

Stage	Activity	Description of Activity
Site Preparation	Clearing and Grubbing	Remove vegetation for access path from Taylor Road to the downstream extent of the sediment basin. Remove vegetation on east bank of Deroche Creek within the basin footprint.
	Site Isolation	The work site will be isolated from flow and dewatered so that work can be conducted in the dry. Flow will be pumped around the site or through a bypass channel. Exclusion fencing of construction area to prevent fish access; salvage of all fish, amphibians, and mammals from enclosed site.
Construction	Basin Construction	Excavation and grading of sediment basin. The west bank of Deroche Creek will act as the west wall of the sediment basin. A low flow channel will be established along the left bank to convey base surface flows once they return to the creek. All construction below the normal high-water mark will occur in the dry and/or fully isolated from creek flows.
	Hauling and Disposal	Excavated material will be hauled by truck and either used on-site for construction of other project components, disposed of on Lot 8-3-3, or disposed of off-reserve at a location(s) determined by the Contractor. Machine access will occur from Taylor Road.
	Instream Complexing	Large woody debris (sourced from clearing) and habitat boulders will be placed in the low flow channel to add habitat complexity for salmonids.
	Bank Stabilization	Banks of the sediment basin will be stabilized using a mix of rock and appropriate growing substrate for vegetation above the normal high-water mark.
	Surface Restoration	Refinish roads and seed exposed soils disturbed from the works.
Site Restoration	Site Restoration and Enhancement	The banks of the sediment basin will be planted with native riparian plant species and live stakes.

Table 2-2: Proposed Construction Methods for Taylor Bridge Grade Control

Stage	Activity	Description of Activity
Site Preparation	Site Isolation	The work site will be isolated from flow and dewatered so that work can be conducted in the dry. Flow will be pumped around the site if necessary.
	Clearing and Grubbing	Remove riparian vegetation along the machine access path from Taylor Road.
Construction	Excavation	Excavate sediment to subgrade, place boulders in a checkerboard pattern, and fill voids between boulders using excavated sediment and add coarse rock to the side slopes.
	Hauling and Disposal	Excavated material will be hauled by truck and either used on-site for construction of other Project Elements or disposed of on Lot 8-3-3.
	Surface Restoration	Refinish roads and seed and exposed soils disturbed from the works.
Site Restoration	Site Restoration and Enhancement	Replant cleared area with native riparian plant species.

Table 2-3: Proposed Construction Methods for Timber Deflectors

Stage	Activity	Description of Activity
Site Preparation	Clearing and Grubbing	Remove vegetation along access path and within the berm footprints from Taylor Road.
Construction	Installation of wood piles	Drive timber piles (sourced from sediment basin clearing) into the Deroche Creek fan approximately 5 m below grade.
	Installation of woody debris	Woody debris from cleared trees will be placed between the timber piles to form the timber deflectors.
	Surface Restoration	Refinish roads, driveways, and other surfaces disturbed due to the works.
Site Restoration	Site Restoration and Enhancement	Disturbed areas will be replanted with native shrubs and trees.

2.3 Construction Timeline

A portion of pre-construction tree and shrub clearing was completed in February and March 2024, prior to the start of general migratory bird nesting window for the area. Additional tree clearing was conducted in February and March 2025. Construction will begin in June 2025, starting with partial excavation of the sediment basin, construction of the offsetting channel, and installation of the timber deflectors. These works will be done in the dry. Instream works occurring during the reduced-risk work window for fish and wildlife for Deroche Creek (August 1 to September 15). This includes Taylor Bridge grade control, LWD reef, and completion of the sediment basin. Planting and staking will occur in fall 2025.

3. Environmental Setting

Deroche Creek provides important spawning and rearing habitat for several species of salmon, however, the frequent movement and deposition of sediment, channel instability, and intermittent flows currently impair its value. The creek supports runs of coho (*Oncorhynchus kisutch*) and chum salmon (*Oncorhynchus keta*). Records of cutthroat trout (*Oncorhynchus clarkii*) are also known from the creek. No new fish sampling was conducted by KWL as part of the environmental assessment.

The riparian vegetation within the assessed area of Deroche Creek consists disturbed young deciduous forest and mixed forest. Riparian vegetation on the alluvial fan consists of small black cottonwoods (*Populus tricocarpa*) and red alders (*Alnus rubra*) with an understory consisting predominantly of invasive reed canary grass (*Phalaris arundinacea*). Upstream of Taylor Road, the riparian community transitions into a mixed forest with larger cottonwood and western redcedar (*Thuja plicata*) with a sparse understory.

Invasive species observed through this reach include Himalayan blackberry (*Rubus armeniacus*), English ivy (*Hedera helix*), Japanese knotweed (*Fallopia japonica*), and Scotch broom (*Cytisus scoparius*).

The assessed area does not contain critical habitat for any aquatic or terrestrial species or birds protected under Schedule 1 of Canada's *Species at Risk Act*.

4. Regulatory Reviews, Permits, and Approvals

The following regulatory reviews, permits, and approvals have been identified as being required for the project:

- Fisheries and Oceans Canada – *Fisheries Act* Authorization.
- Fisheries and Oceans Canada – Scientific Licence for fish salvage activities for federally-regulated fish species.
- BC Ministry of Water, Land and Resource Stewardship – *Water Sustainability Act* Change Approval for Works In and About a Stream.
- BC Ministry of Water, Land and Resource Stewardship – Scientific Fish Collection Permit for fish salvage activities for provincially-regulated fish species.
- BC Ministry of Water, Land and Resource Stewardship – General Wildlife Permit for potential salvage of amphibians during construction.
- BC Ministry of Forests – Heritage Inspection/Investigation Permit.
- Leq'a:mel First Nation – Approval under Nation's Environmental Assessment Law (2018).
- Leq'a:mel First Nation – Permit under Nation's Soil Transport, Deposit, and Removal Law (2020).
- Leq'a:mel First Nation – Archaeological Permit for site investigation and, if required, alteration.

As institutional projects are generally not subject to the Riparian Areas Protection Regulation (RAPR), a provincial RAPR assessment is not required for this project.

A federal *Species at Risk Act* Permit is not required as no critical habitat for any listed aquatic or terrestrial species at risk has been designated within the site.

5. Construction Environmental Management Plan

The following measures will be used to avoid, minimize, and mitigate potential environmental impacts of the Project and to ensure compliance with all environmental legislation, permits, and approvals.

5.1 Environmental Monitoring

Environmental monitoring will be conducted to ensure appropriate measures are being taken to protect the environment. The Environmental Monitor (EM) must be an appropriate Qualified Environmental Professional (QEP). The EM will regularly inspect the work site for compliance with the environmental requirements of the Project. Observations will be recorded and reported to the Owner's Representative and the Contractor. The EM must be familiar with the regulatory requirements of the Project and has the responsibility to report all non-compliance events and stop work if necessary. The EM will be on-site at the project start-up and during any sensitive activity. A copy of this document will be kept on-site for the duration of the Project. Responsibilities of the EM will include, but are not limited to, the following:

- Review all permits, best management practices, and the CEMP.
- Be on site for Project start-up and critical instream works and works adjacent to sensitive areas.
- Meet with the Contractor before construction to explain all mitigation and environmental protection measures.
- Monitor project compliance with the CEMP, address changes with the Contractor and Consultant to ensure CEMP is continuously updated, as needed.
- Inspect all mitigation and erosion and sediment control (ESC) measures to ensure they are appropriate and working properly and recommend modifications and repairs when necessary.
- Have written authority to halt any construction activity if it is deemed necessary to protect fish, wildlife, and their habitat.
- Identify, monitor, and promptly report any situations of ongoing or potential damage to the environment.
- Report to the Engineer of Record and relevant regulatory agencies on environmental issues encountered during construction.
- Prepare and submit a monitoring summary report after the Project's completion to the Engineer of Record and any regulatory agencies, as required.

5.2 Timing of Works

- Project activities will be scheduled for dry weather conditions whenever possible.
- All instream works will be completed during the reduced risk work window for fish species documented in Deroche Creek (August 1 – September 15).
- Unless absolutely necessary to proceed with project works, tree removal and vegetation clearing is to take place outside the regional bird nesting period (March 1 to August 30) to avoid impacts to migratory birds. In certain areas with low habitat complexity (e.g., unvegetated, sparsely vegetated, isolated trees), bird nest searches may be considered at the discretion of a QEP. In the event that a bird nest search is conducted, the following will apply:
    - if an active nest is identified, a no-work zone buffer will be established and maintained around the active nest to minimize access and sensory disturbance;
    - the buffer distance will vary depending on the species of bird. Therefore, the buffer distance will be determined based on best management practices and the professional judgement of the QEP;
    - nests will be monitored to assess nest activity and effectiveness of the buffer. Clearing (disturbance) can continue once the EM has determined that the nest is no longer active;
    - if no active nests are found in surveyed areas, vegetation clearing (disturbance) can commence, but must be complete within 36 hours of the pre-disturbance nest survey being conducted; and
    - nests of birds in Schedule 1 of the Migratory Birds Regulations (2022) will be reported as required by the regulations and will be protected for the duration of time required by the regulations (e.g., 36 months for pileated woodpecker).

5.3 Protection of Fish and Fish Habitat

- Where instream works are isolated using a flow bypass or other similar means (if necessary), fish salvage will be undertaken before and during dewatering of the isolated area. To prevent the dewatering of areas outside of the work site, an appropriate bypass discharge location will be selected.
- During reinstatement of flows to the work area, measures will be taken to ensure the area downstream of the work site does not dewater (i.e., some flows should still be bypassed downstream).
- All pump intakes will be equipped with fish screens (mesh width < 2.54 mm) to prevent entrainment and impingement of fish, in accordance with the DFO Interim Code of Practice for End-of-pipe fish protection screens (DFO, 2020).
- Slow commencement of in-water activities is recommended to encourage mobile aquatic species to leave the construction area.
- The duration of in-water work and activity will be minimized so that it does not diminish the ability of fish to carry out one or more of their life processes.
- Minimal disturbance will occur to natural materials (e.g., embedded logs) and vegetation that contributes to habitat or stream channel stability.
- Minimal disturbance will occur to existing vegetation on and adjacent to the stream banks.

5.4 Tree Protection and Vegetation Management

- Professional arborists and biologists will be consulted throughout the site clearing and construction phases to minimize impacts to vegetation communities.
- Clearing will be limited to areas necessary for the works. Existing roads, trails, and other access points will be used where possible.
- A tree or other structure containing a nest of eagles, peregrine falcons, gyrfalcons, ospreys, and herons must not be felled, even outside of the breeding season for these species. This is in accordance with Section 34(b) of the *Wildlife Act*.
- Wildlife trees will be retained if possible. They provide essential habitat to birds and other wildlife.
- Where topping or removing dead limbs of dangerous trees will remove the hazard, this option is preferred over removing the entire tree.
- Cleared areas will be revegetated with native trees and shrubs when work is complete.

5.5 Invasive Plant Management

- All machinery will be inspected by the QEP before entering or leaving the construction site to remove any invasive plant propagules.
- All invasive vegetation removed will be disposed of off site at an appropriate facility.
- All material used on site (e.g., straw, hydroseeding, etc.) must be certified weed-free.
- Upon Project completion, native shrubs and trees will be planted in disturbed areas within the footprint to maintain soil stability and to minimize the potential for invasive species colonization.
- If patches of knotweed or hogweed are encountered during site clearing or other works in the Project area, they will be flagged off and reported to the QEP immediately. Knotweed must be managed carefully as it is able to reproduce from rhizomes and stem fragments. The following procedures will be adhered to:
    - all plant and soil material must be removed from site in a way as to minimize transfer of plant parts to other areas;
    - all plant parts must be removed, potentially by hand with appropriate personal protective equipment, sealed in plastic bags, and disposed of appropriately off site; and
    - topsoil within 10 m of the extent of the knotweed patch may not be used as backfill. The soil should be disposed off site at an appropriate waste management facility experiences in dealing with knotweed-contaminated soils.

5.6 Soil Testing and Handling

Materials excavated from the Project site may require sampling for contaminants before being removed from the site. If additional sampling is required, the contractor will coordinate with the EM to allow access for soil sampling when required. Any signs of soil contamination (staining, odor, sheen on water in excavation site) should be reported immediately to the EM.

If soil contamination is suspected, excavated materials will need to be stored on site until analytical results have been received. The material should be stored in a manner where potential contaminants will not runoff into adjacent waterbodies. The location should be coordinated with the EM.

If soil is deemed to be contaminated, special handling and disposal by the contractor may be required. The contractor will need to work under the direction of a qualified contaminated sites professional who will provide direction on appropriate soil excavation, handling, and disposal procedures to ensure all regulatory requirements for contaminated sites management are met.

5.7 Erosion and Sediment Control Plan

The purpose of erosion and sediment control (ESC) is to prevent the introduction of sediment (e.g., silt, clay, or sand) into watercourses. An ESC Plan will be prepared for the project which prescribes methods to prevent the erosion and mobilization of sediment of exposed areas by rainfall or water flow through the work site, to intercept and manage sediment-laden runoff from works before leaving the work site and entering the watercourse, and/or manage the risk of a sediment discharge.

The ESC measures can be adapted or added to before, during, and after construction as required based on the recommendations of the EM. ESC measures will be set up before starting work. Measures will be monitored regularly and maintained until all disturbed ground has been stabilized.

ESC measures included in the ESC Plan will incorporate the following measures at a minimum:

- Undertake works during dry weather where possible.
- Deposit all spoil materials above the high-water mark, ensuring sediment re-entry into watercourses or waterbodies is prevented.
- Cover all disturbed areas and spoil piles with poly sheeting or a reasonable alternative under the direction of the Consultant and/or if inclement weather is expected.
- Minimize vegetation disturbance on banks to the furthest extent possible.
- Deploy perimeter ESC measures such as silt fences, berms, and check dams as necessary.
- All ESC measures will be monitored regularly by both the Contractor and the EM and maintained until all disturbed ground has been stabilized.
- Any other measures needed to prevent erosion of a watercourse and work site, or sediment from entering any watercourse, as determined by the QEP, EM or Engineer.

5.8 Deleterious Substance Control and Spill Management

- Instream works will be carried out in accordance with the *Requirements and Best Management Practices for Making Changes In and About a Stream in British Columbia*. (Government of British Columbia, 2022) and *Best Management Practices for Site Restoration or Maintenance* (Government of BC 2022).
- Construction activities will follow Fisheries and Oceans Canada's *Land Development Guidelines* (DFO, 1993) to maintain the quantity and quality of fish habitat at the productive level present before development activities occurred.
- Machinery and equipment shall not be operated below the high-water mark of Deroche Creek or the Nicomen Slough unless it has been converted to use biodegradable hydraulic fluid and grease.
- All fueling of vehicles and equipment will be done off-site or onsite in a designated fueling area over a spill containment tray at least 30 m from Deroche Creek and Nicomen Slough.
- All equipment washing must be done off-site or onsite in a designated area at least 30 m from any watercourse or in a manner that will prevent wash from reaching any waterway.
- Generators, pumps, and other stationary equipment will be placed on spill trays or equipped with other secondary containment. Where possible, generators will be located at least 30 m from Deroche Creek or Nicomen Slough. Noise from generators will be suppressed using a suitable method (e.g., enclosing generators in plywood).
- All machinery will be clean, in good working condition and free of excess oil and grease. Equipment will be inspected daily and documented.
- Containers will be labelled according to the *Transportation of Dangerous Good Act* and *Workplace Hazardous Materials Information Systems* (WHMIS) regulations.
- Oil waste, filters, absorbent pads, and cartridges will be collected and disposed of off-site at an appropriate facility in accordance with federal, provincial, and municipal regulatory requirements.
- To prevent the release of substances toxic to fish, there will be no use of treated wood products within a watercourse.
- A spill response plan and spill kit will be on site and suitable for all substances on-site, and staff trained in its use.

Spill Response

- The contractor will prepare a spill management plan which includes notification procedures, contact telephone numbers and spill report forms.
- A spill kit will remain on site during construction. The kit will be stocked with appropriate supplies for the site size and conditions (e.g., absorbent pads, booms, granular absorbent). Staff will be trained in the proper use of the kit.
- Any spill of a toxic or deleterious substance over the reportable limits as outlined in the Ministry of Environment and Climate Change Strategy Spill Reporting Factsheet (MOE, 2021)[2] will be reported immediately to the BC Provincial Emergency Program 24–hour phone line at 1-800-663-3456.
- If a spill of toxic or deleterious substances occurs within a watercourse or waterbody both FOR and DFO will be notified immediately. All spills will be reported to the EM immediately.

5.9 Clean up and Restoration

- All construction materials, recyclables and garbage will be removed from site and responsibly disposed of after the Project is complete.
- Erosion and sediment control devices and measures will be removed following the stabilization of all disturbed areas.
- The contractor will be responsible for leaving the site in compliance with all Permits, Approvals, and Authorizations.

[2] https://www2.gov.bc.ca/assets/gov/environment/air-land-water/spills-and-environmental-emergencies/docs/materials/fact_sheet_spill_reporting.pdf

Report Submission

Prepared by:

KERR WOOD LEIDAL ASSOCIATES LTD.



Janice Kwo, M.Sc., RPBio
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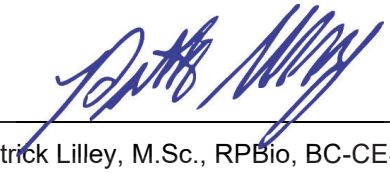

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Revision History

Revision #	Date	Status	Revision	Author
2	June 3, 2025	Final	Update Project footprint	JVK
1	November 20, 2024	Final	Updated based on schedule change to 2025 construction	JVK
0	May 30, 2024	Final	Issued for Tender	JVK

References

Fisheries and Oceans Canada (DFO). 1993. *Land Development Guidelines for the Protection of Aquatic Habitat.* URL http://www.sxd.sala.ubc.ca/9_resources/fed_%20files/fed%20land%20development%20guidelines.pdf

Fisheries and Oceans Canada (DFO). 2019. *Measures to Protect Fish and Fish Habitat*. URL https://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures-eng.html

Fisheries and Oceans Canada (DFO). 2020. *DFO Interim Code of Practice for End-of-pipe fish protection screens for small water intakes in freshwater.* URL https://www.dfo-mpo.gc.ca/pnw-ppe/codes/screen-ecran-eng.html.

Government of British Columbia. 2022. *Requirements and Best Management Practices for Making Changes In and About a Stream in British Columbia*. Version 2022.01. URL https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/wsa-cias-requirements-bmps.pdf

Ministry of Environment (MOE). 2006. *Guidelines for Reduced Risk Instream Work Windows*. URL: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/work_windows_low_main.pdf

Ministry of Environment (MOE). 2014. *Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia.* URL https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/best-management-practices/develop-with-care

Ministry of Environment and Climate Change Strategy (MOE). 2021. B.C. Approved Water Quality Guidelines: Aquatic Life, Wildlife, and Agriculture. URL https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/wqg_summary_aquaticlife_wildlife_agri.pdf

Ministry of Water, Land, and Air Protection (WLAP). 2002. *A Field Guide to Fuel Handling, Transportation and Storage*. URL https://www2.gov.bc.ca/assets/gov/environment/waste-management/industrial-waste/industrial-waste/oilandgas/fuel_handle_guide.pdf

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Appendix F

Prior Works Reporting

KERR WOOD LEIDAL ASSOCIATES LTD.
consulting engineers

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NHC Reference 3007346-10
October 5, 2022

PricewaterhouseCoopers
250 Howe Street, Suite 1400
Vancouver, BC V6C 3S7

Attention: **Fred Bjork, MSc, P.Eng., LEED AP, Project Manager**
MJ Siahdashti, MBA, P.Eng., Senior Manager

Via email: fred.bjork@pwc.com
Mj.siahdashti@pwc.com

Re: **Site Assessment of Potential Areas of Concern for Fall-Winter 2022**
PwC Site CR-30 Deroche Creek, Fall-Winter Final, Rev. 0

1 Introduction

The purpose of this high level and preliminary assessment of identified Potential Areas of 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 fall and winter flood season, 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.

The assessment of this potential Area of Concern follows this general approach:

1. High level review: senior engineering review of available, relevant information, site inspections, and communication with stakeholders.
2. Hazard and risk assessment: identification of flood threat to the safety of people, property, infrastructure, and the environment.
3. Flood mitigation: identification and prioritization of potential mitigation measures, including consideration of need and timing of further validation work as well as implementation of mitigation measures.

NHC first visited Site CR-30 on May 19, 2022 accompanied by Mr. Yogan Reddy of PwC and Jason Thompson and Rick McKamey of the Leq'a mel First Nation (LFN). The purpose of that visit was to assess the risks associated with spring flooding in Deroche Creek, which are comparatively small. At the time of that assessment, emergency sediment removal was not recommended but further assessment, design and implementation of long-term holistic solutions, including sediment management in the lower reaches of the creek were recommended (NHC, 2022).

As the 2022 fall and winter season approaches, flooding will be more intense in Deroche Creek and the risks to people, property, infrastructure, and the environment are elevated.

2 Site Information

Table 2-1 Summary of site Information

Site ID	CR-30
Site Description	Deroche Creek from North Nicomen Rd. (Lucy-Harris) Bridge downstream to Taylor Road (Reach 2) and from Taylor Road to the mouth of the Creek at Nicomen Slough (Reach 1) (see Figure 1, attached)
Location	Upstream end of Site CR-30 at Lucy-Harris Bridge: 49.186513° N, -122.075816° W
Local Authority	Leq'a mel FN; CP Rail; MoTI
Waterbody	Deroche Creek (alluvial fan) and Nicomen Slough

3 Site Hazard

3.1 Hazard Assessment Methodology

NHC re-visited Site CR-30 on September 30, 2022 accompanied by Rick McKamey of the Leq'a mel First Nation (LFN). There were no representatives present from the BC Ministry of Transportation and Infrastructure (MoTI) or Canadian Pacific Railway (CPR). Representatives from PwC and the BC Government had met with members of LFN the day prior. Discussion with Mr. McKamey, NHC's observations, measurements and photos from the site visit, and an update of hydraulic modelling from a previous study (NHC, 2021) form the basis for this hazard and risk assessment.

3.2 Hazard Assessment Summary

Site CR-30 has experienced aggradation (sediment build-up) that has elevated the streambed by 0.2 m to 1.0 m in Reach 2 (Photos 1 and 2; Figure 2) and by 1.0 m to 1.2 m in Reach 1 (Photos 5 and 6; Figure 2). The estimated depths of build-up are based on select measurements made using the Theodolite Application for iPhone, and a tape measure at the bridges. The level of build-up elsewhere has been either interpolated or extrapolated based on those measurements.

The estimates of sediment build-up have been used to update a 1D hydraulic model of the creek that was developed for previous assessment of Deroche Creek for the BC Ministry of Transportation and Infrastructure (NHC, 2021). The updated model results for 10-year peak instantaneous flow in the creek are shown in Figure 3. The results show that estimated 10-year flood levels in the creek have risen by up to 0.8 m, most notably upstream of Taylor Rd. (Kelly-Deroche) Bridge, and downstream of Taylor Rd as the creek approaches Nicomen Slough. A 10-year return period is considered an appropriate index flood on which to base assessed risk for a single flood season.

The model results in Figure 3 assume unobstructed flow conditions in the creek (i.e. no debris blockages or further sediment accumulation). Both these assumptions are weak, but preferable to guessing at the degree of obstruction that might occur. There are several large trees within Reach 2 that will be

outflanked by flood waters or are undermined (Photos 3 and 4). While these large trees will not likely float downstream if they fall, they will induce considerable bank erosion and introduce a lot of smaller debris to the channel. This smaller debris could easily obstruct flow at Kelly-Deroche Bridge. Even without further obstruction, the 10-year flood peak currently surcharges against the girders of Kelly-Deroche Bridge. An obstruction could lead to overtopping of the bridge and washout of its approach roads (Figure 4).

The elevated flood levels pose some flood risk to residential properties east of the creek and rural properties to the west (Figure 5 and Figure 6). They also threaten to overtop a containment berm on the right (west) bank of the creek downstream of Taylor Rd. (Figure 7). Overtopping of the berm could then pose an erosion risk to the downstream embankment of Taylor Rd., which serves as a flood protection dike.

The banks of the creek in this reach have loose soils, having been constructed of side-cast material from past sediment removals, making them susceptible to erosion and loss of riparian vegetation. The sediment build-up also degrades habitat values in the creek and Nicomen Slough, which have been in decline for decades.

4 Preliminary Risk Evaluation

The preliminary risk evaluation is prepared to assess the flood risks associated with fall and winter flooding. The risk ratings associated with public safety, river capacity, environmental and infrastructure for site are shown in Table 4-1. The risk matrices are appended to this memo for reference.

Table 4-1 Consequence and preliminary risk rating for fall and winter floods at Site CR-30

Indices	Preliminary Risk Rating	Anticipated Consequence
Public Health and Safety	High	Aggradation (sediment build-up) along the lower reaches of Deroche Creek results in a high potential for overbank flow upstream of Taylor Rd. (Kelly-Deroche) Bridge, which may result in flooding around residential properties east of the Creek and a rural property to the west. Trees may also be undermined, contributing to obstruction at the bridge, overtopping of Taylor Rd. and washout of the approach roads, or damage to an adjacent dike. It is anticipated that the worst of these effects could result from winter and fall floods with recurrence intervals of 2- to 10-years and higher.
River Capacity	Very High	
Environmental	High	The bank soils along the lower reaches of Deroche Creek are loose and highly erodible. The flooding in November 2021 left the banks and several large trees vulnerable to erosion and loss. A few large trees have had to be felled already but others that pose a risk remain. The loss of cover from these trees, and the loss of resting, rearing and spawning habitat due to sediment build-up further degrades habitat values in the creek and Nicomen Slough, which have been in decline for decades.
Infrastructure	High	Sediment build-up results in a high potential for flooding and erosion damage along Taylor Rd. and at Kelly-Deroche Bridge,

Indices	Preliminary Risk Rating	Anticipated Consequence
		from fall or winter floods with recurrence intervals of 5- to 10-years. Potential damages to the road or bridge may force the closure of both for several days. The capacity of the CP Rail and North Nicomen Rd. Bridges will also be negatively impacted, although overtopping of those structures would occur at higher recurrence intervals and erosion damage is less likely due to more robust armouring there.

5 Site Opinion and Advice

Based on the hazard and risk assessment, it is our opinion that Site CR-30 is an Area of Concern (AC), requiring sediment removal prior to the 2022 fall and winter flood season and long-term holistic solutions as follows:

Emergency Works (asap):

- Removal of sediment in Reaches 1 and 2, to re-establish pre-November 2021 creek bed levels (as shown in Figure 2).
- LFN indicates that they have the equipment and resources to have this work carried out.

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

- Design and construction of a sediment basin downstream of North Nicomen Rd. to continuously manage sedimentation and flood risk in the lower reaches of the creek.

6 Closure

Please contact Des Goold at 604 837-8289 or dgoold@nhcweb.com if there are additional questions or concerns.

Report prepared by:

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Principal

Report reviewed by:



2022-10-04

Meg Broswick, P.Eng.
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Permit to Practice #: 1003221

References:

NHC (2022). *Preliminary Site Assessment of Potential Areas of Immediate Concern; PwC Site CR-30 Deroche Creek (Final, R1).* Report prepared for PricewaterhouseCoopers and the BC Ministry of Environment and Climate Change Strategy.

NHC (2021). *Deroche Creek Geomorphological Assessment and Hydrotechnical Scoping.* Report prepared for Mott MacDonald Canada Ltd. and the BC Ministry of Transportation and Infrastructure.

Attachments:

Risk Matrices: Public Safety, River Capacity, Environment, Infrastructure (4)
Photos and Figures

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Public Health and Safety

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.
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

Notes: Sediment build-up along the lower reaches of Deroche Creek results in a high potential for overbank flow upstream of Taylor Rd. (Kelly-Deroche) Bridge, which may result in flooding around residential properties east of the creek and a rural property to the west. Trees may also be undermined, contributing to obstruction at the bridge, overtopping of Taylor Rd. and possible washout of the approach roads, or damage to an adjacent dike. It is anticipated that the worst of these effects could result from winter and fall floods with recurrence intervals of 2- to 10-years and higher.

Selected consequence and risk rating

nhc

River Capacity

Risk Evaluation and Response						
	Consequence Rating	Very Low	Low	Medium	High	Very High
Indices	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
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

Notes: Sediment build-up along the lower reaches of Deroche Creek results in a high potential for overbank flow upstream of Taylor Rd. (Kelly-Deroche) Bridge, which may result in flooding around residential properties east of the creek and a rural property to the west. Trees may also be undermined, contributing to obstruction at the bridge, overtopping of Taylor Rd. and possible washout of the approach roads, or damage to an adjacent dike. It is anticipated that the worst of these effects could result from winter and fall floods with recurrence intervals of 2- to 10-years and higher.

Selected consequence and risk rating

Environmental

Risk Evaluation and Response						
	Consequence Rating	Very Low	Low	Medium	High	Very High
Indices	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.
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

Notes: The bank soils along the lower reaches of Deroche Creek are loose and highly erodible. The flooding in November 2021 left the banks and several large trees vulnerable to erosion and loss. A few large trees have had to be felled already but others that pose a risk still remain. The loss of cover from these trees, and the loss of resting, rearing and spawning habitat due to aggradation (sediment build-up) further degrades habitat values in the creek and Nicomen Slough, which have been in decline for decades.

Selected consequence and risk rating

Infrastructure

Risk Evaluation and Response						
	Consequence Rating	Very Low	Low	Medium	High	Very High
Indices	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.) will require immediate repair.	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

Notes: Sediment build-up results in a high potential for flooding and erosion damage along Taylor Rd. and at Kelly Deroche Bridge, from fall or winter floods with recurrence intervals of 5- to 10-years. Potential damages to the road or bridge may force the closure of both for several days. The capacity of the CP Rail and North Nicomen Rd. Bridges will also be negatively impacted, although overtopping of those structures would occur at higher recurrence intervals and erosion damage is less likely due to more robust armouring there.

Selected consequence and risk rating

Site CR-30 Deroche Creek Site Photos and Images (September 30, 2022)

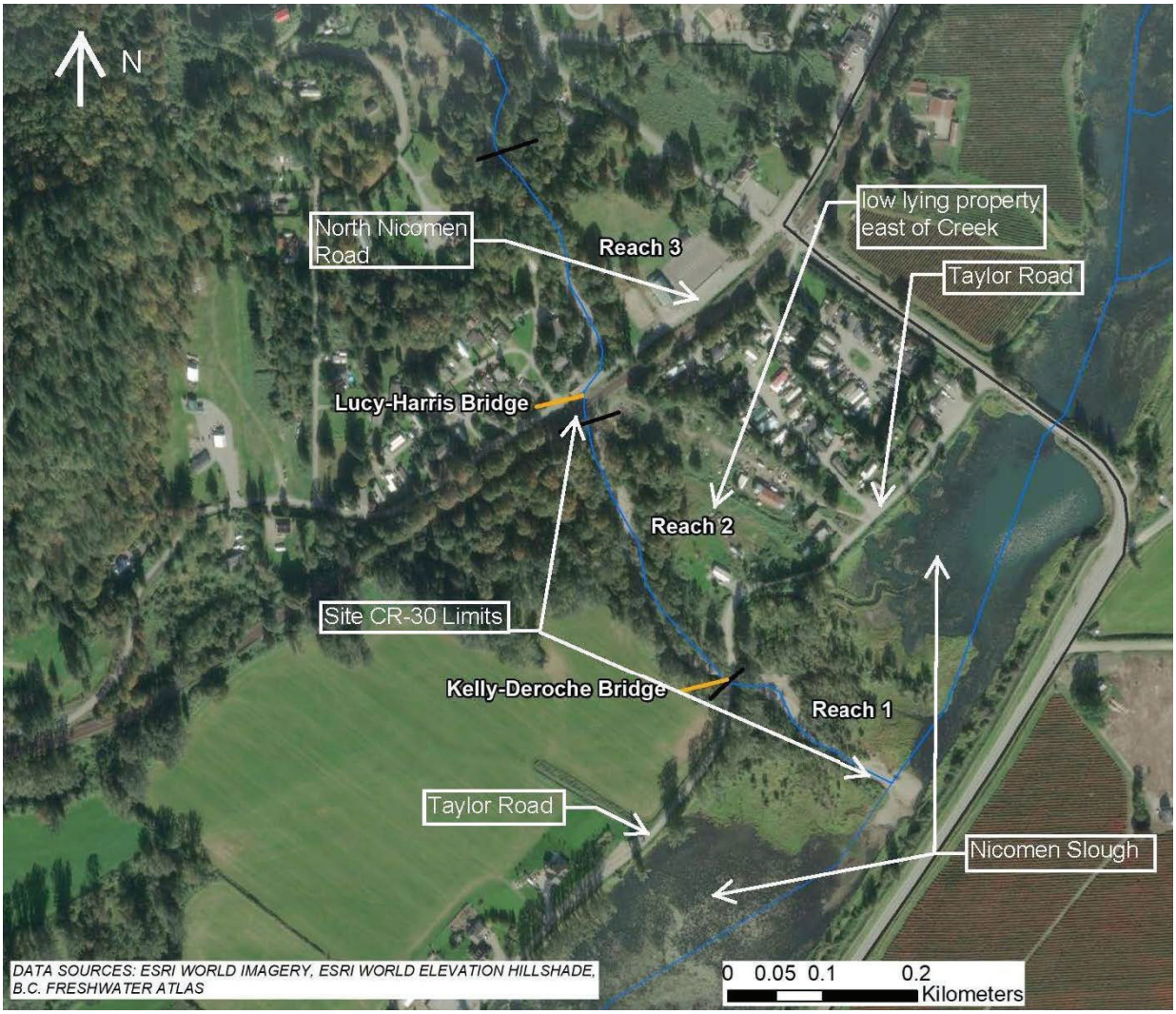

Figure 1. Location map showing the lower reaches of Deroche Creek on the Deroche Creek alluvial fan.



Photo 1. Looking upstream to the MoTI Bridge (Lucy Harris) at North Deroche Rd., the upstream extent of sediment build-up from November 2021. The creek bed has risen between 0.5 m and 1 m at the MoTI and CPR bridges, respectively. (September 30, 2022).



Photo 2. Looking upstream to the CPR Bridge from about 50 m downstream. The creek bed is about 0.2 m higher at this location (September 30, 2022).



Photo 3. Large cottonwood tree outflanked due to erosion in the reach between the CPR Bridge and Taylor Rd. (September 30, 2022).



Photo 4. Large cedar trees undermined due to erosion in the reach between the CPR Bridge and Taylor Rd. (September 30, 2022).



Photo 5. Looking upstream to the MoTI Bridge (Kelly-Deroche) and sediment build-up in the channel downstream of Taylor Rd. (September 30, 2022).



Photo 6. Looking downstream at the sediment build-up in the channel 50+ m downstream of Taylor Rd. (September 30, 2022).

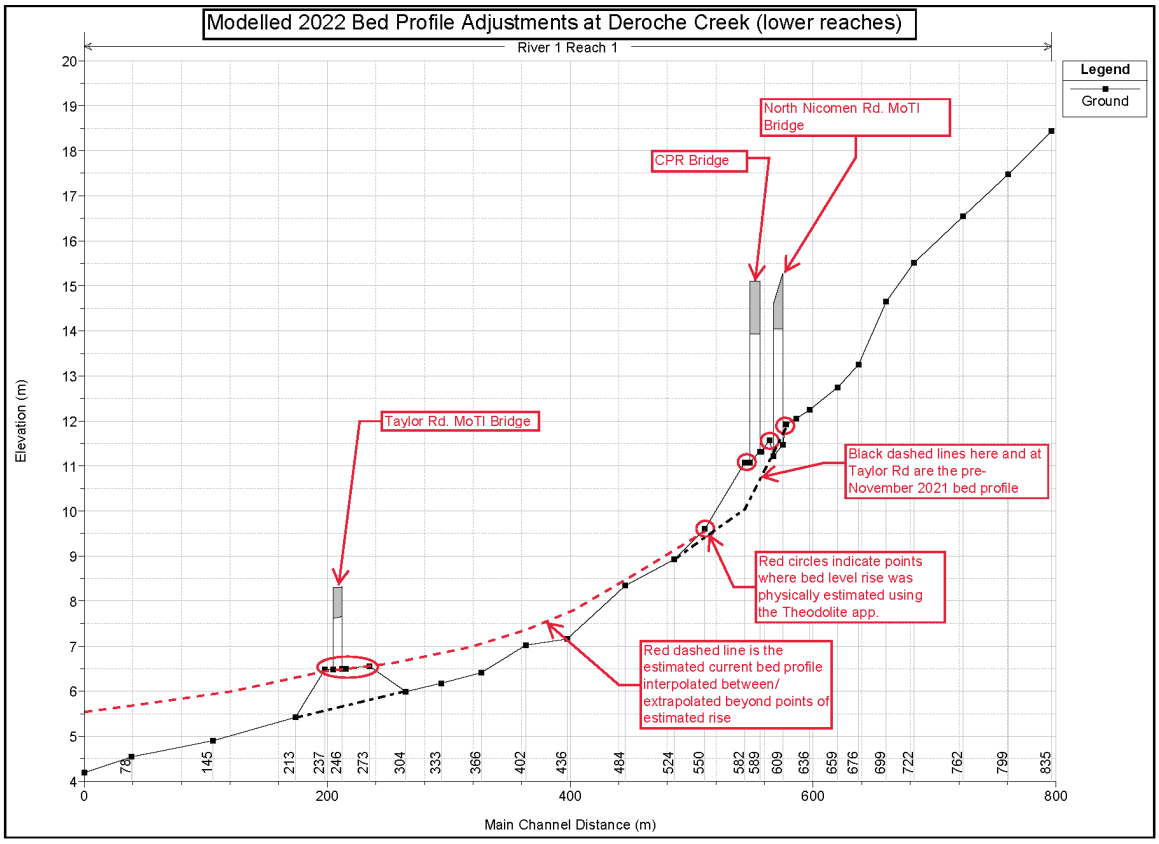

Figure 2. Streambed profile of Lower Deroche Creek showing estimated, observed and interpolated/ extrapolated bed levels as of September 30, 2022.

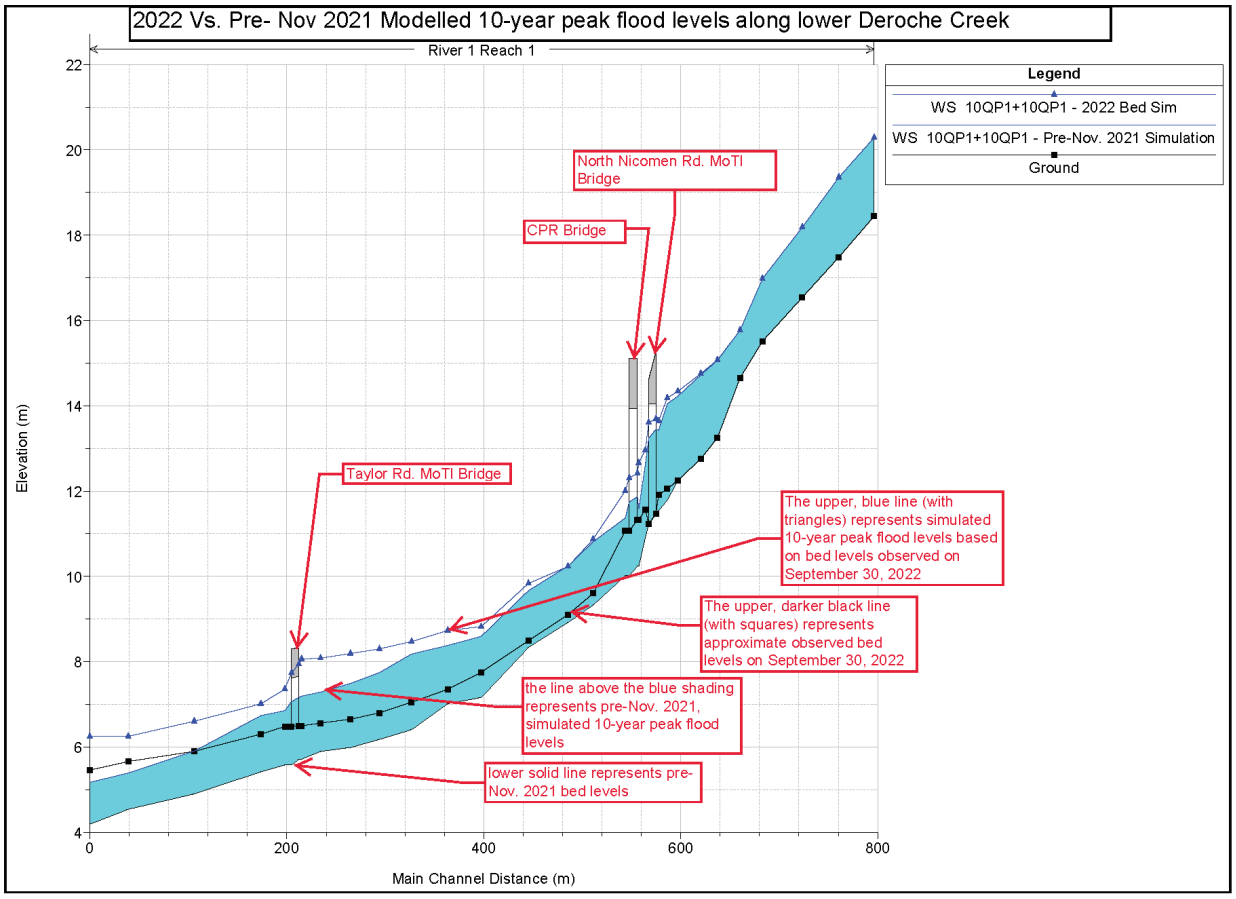

Figure 3. Simulated 10-year peak flood levels along lower Deroche Creek: Pre-Nov. 2021 Vs. September 30, 2022.

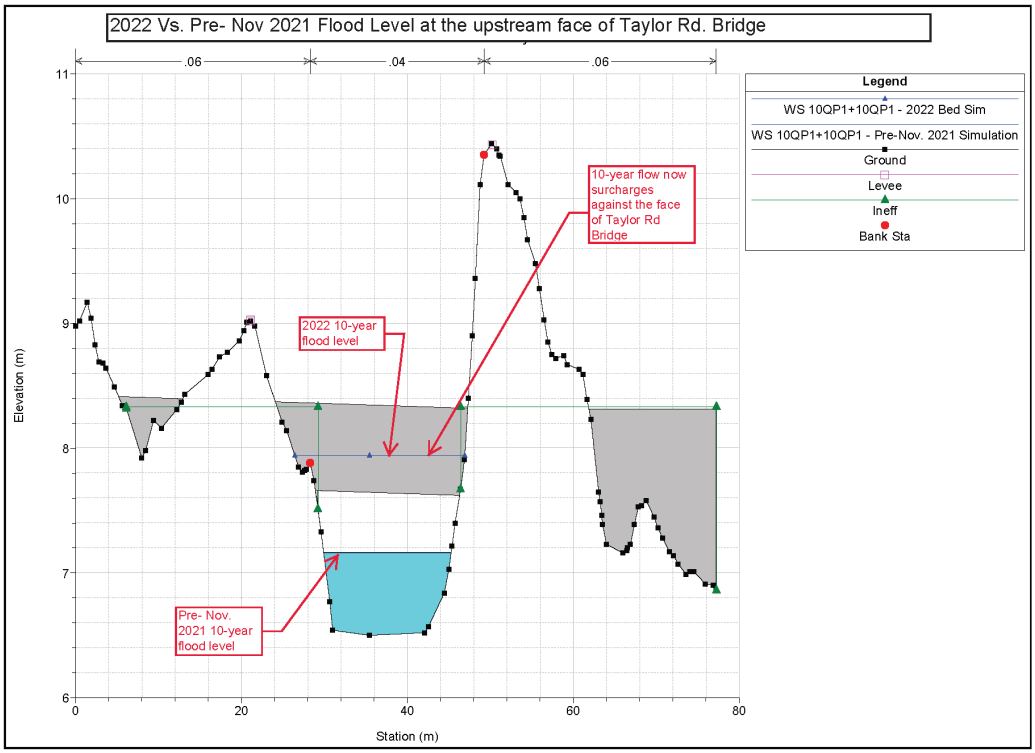

Figure 4. Simulated 10-year peak flood levels at the upstream face of MoTI's Taylor Rd. (Kelly-Deroche) Bridge: Pre-Nov. 2021 Vs. September 30, 2022.

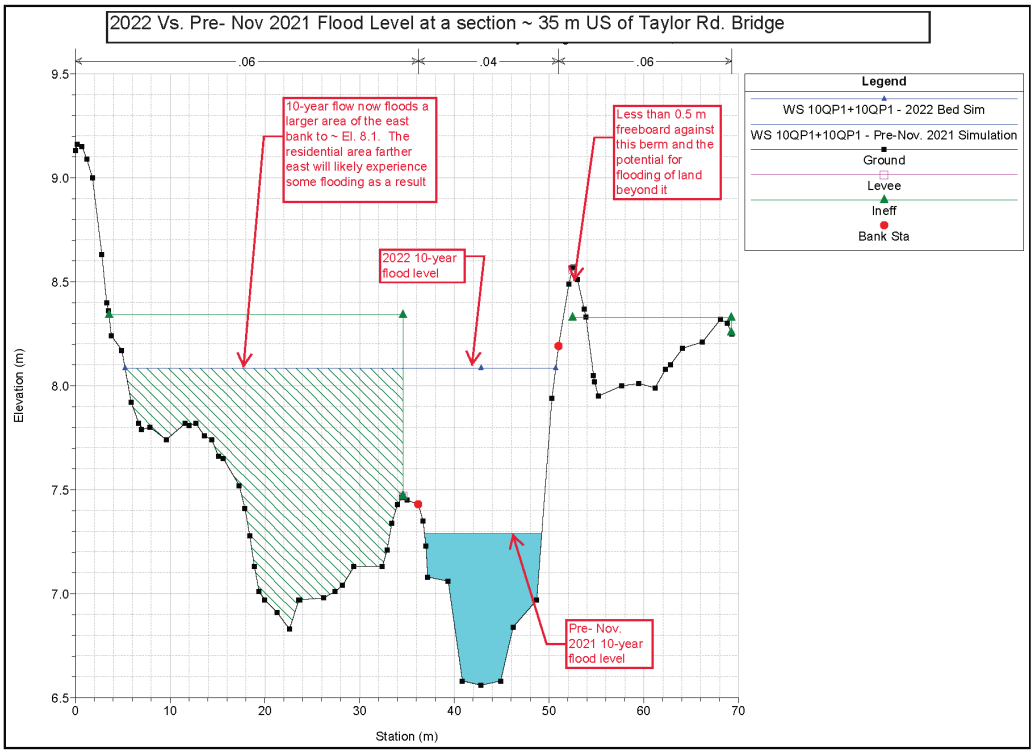

Figure 5. Simulated 10-year peak flood levels at a section about 35 m upstream of MoTI's Taylor Rd. (Kelly-Deroche) Bridge: Pre-Nov. 2021 Vs. September 30, 2022. Note the east (left) bank has a larger flooded area from the 2022 modelling, which may affect adjacent properties (see Figure 5), and on the right bank the flood level exceeds the ground level on the landside of the berm.

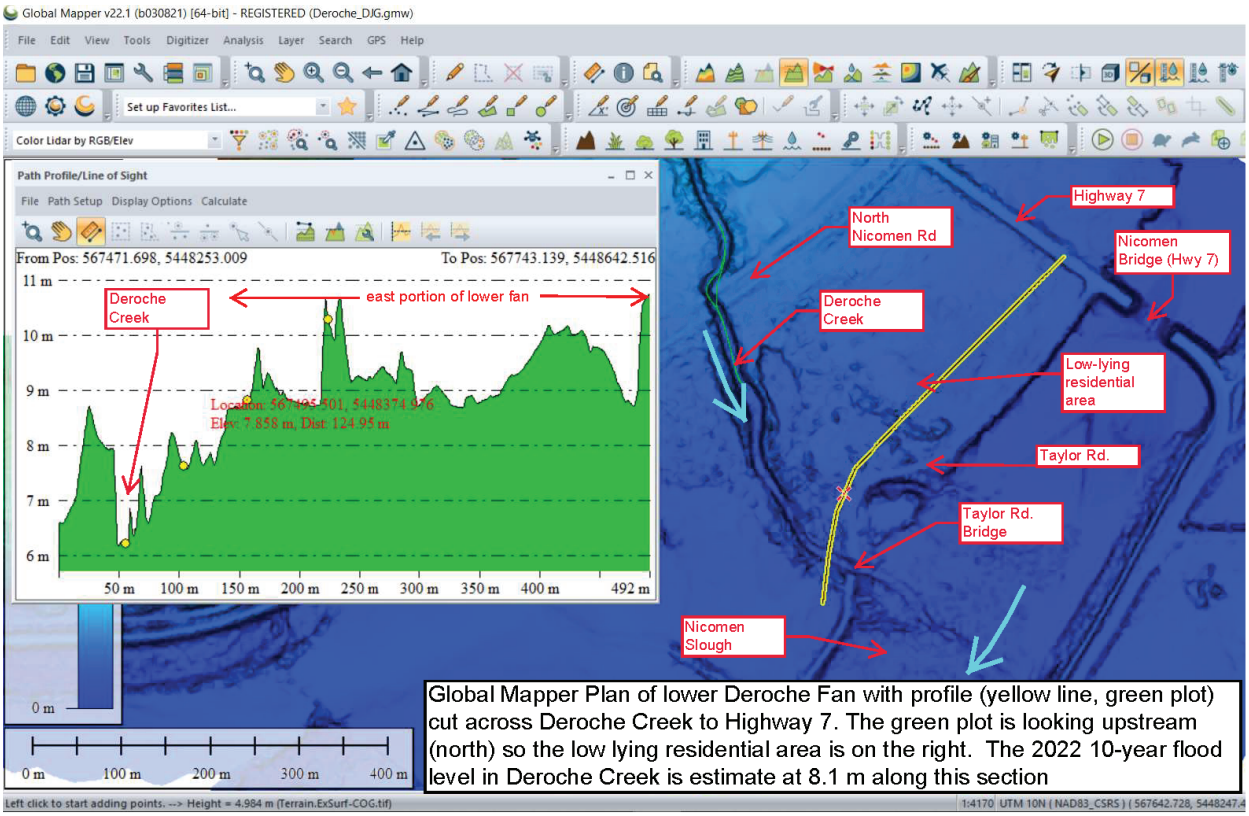

Figure 6. Screenshot from Global Mapper™, showing the ground profile across lower Deroche Fan north of Taylor Rd. The September 30, 2022 simulated 10-year peak flood level in this area is El. 8.1, so there are properties close to the creek that may be affected by surface water flooding, and others farther east that may be affected due to high flood levels in the creek farther upstream.

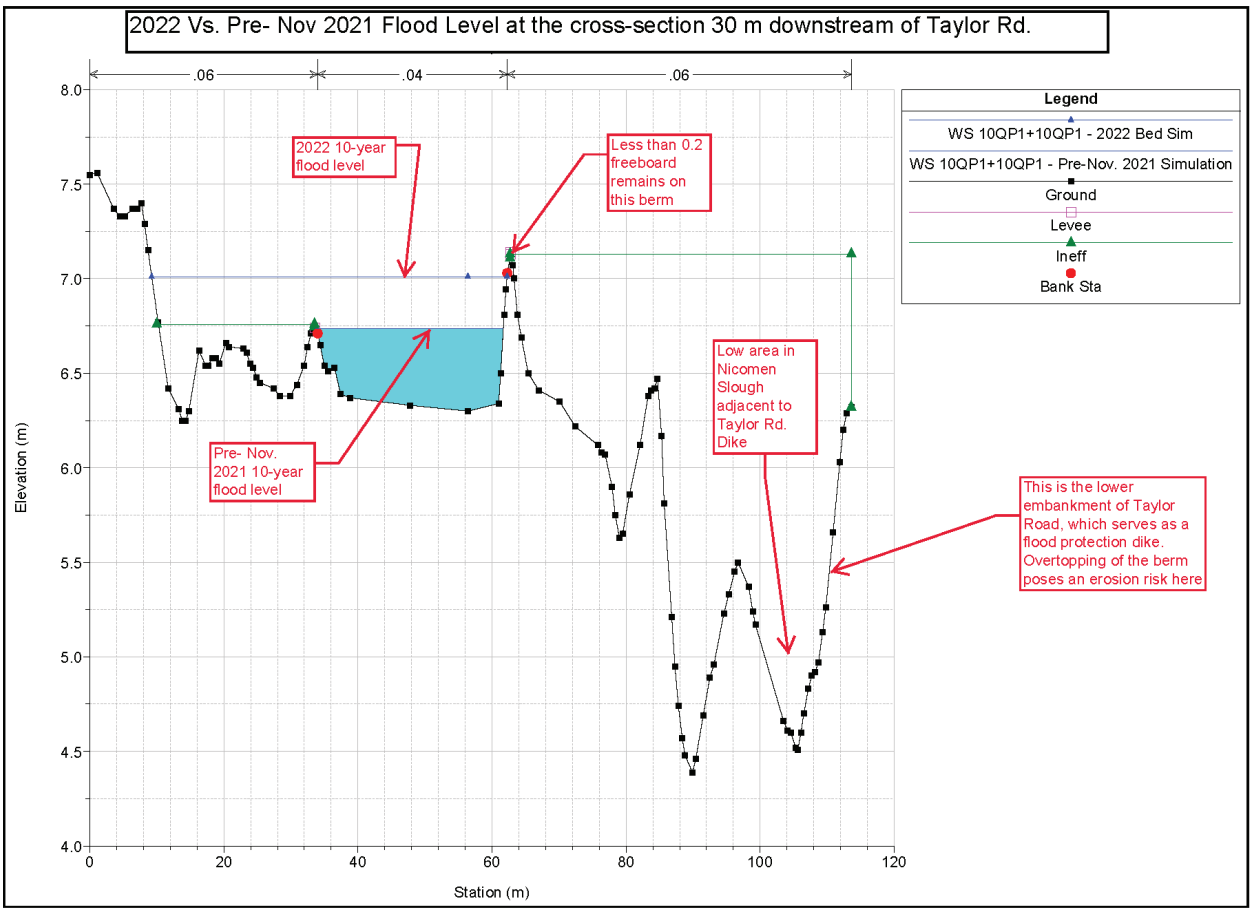

Figure 7. Simulated 10-year peak flood levels at a section 35 to 40 m downstream of MoTI's Taylor Road (Kelly-Deroche) Bridge: Pre-Nov. 2021 Vs. September 30, 2022. Note there is very little freeboard on the right bank berm that acts to confine the creek. Overtopping/ breaching of the berm would send flood waters into the deep slough channel to the west where it would erode the embankment of Taylor Road, which serves as a flood protection dike for properties north of Nicomen Slough.

KERR WOOD LEIDAL
consulting engineers

Greater Vancouver
200 - 4185A Still Creek Drive
Burnaby, BC V5C 6G9
T 604 294 2088
F 604 294 2090

Technical Memorandum

DATE: January 26, 2024

TO: Stephanie Major, A/ Watershed Operations Regulatory Manager
Fish and Fish Habitat Protection Program
Ecosystems Management Branch
Fisheries and Oceans Canada

CC: Amy Vallarino, Project Sponsor
Ministry of Environment and Climate Change Strategy

FROM: Patrick Lilley, RPBio

RE: **Sediment Control, Deroche Creek, Deroche**
Request for Early Tree Clearing for Sediment Basin Construction
Our File 2838.003-300

1. Introduction

The Ministry of Environment and Climate Change Strategy (ENV) and Leq'a:mel First Nation (LFN) are working to address the impacts of sedimentation in Deroche Creek that resulted from significant precipitation and flooding during the November 2021 Atmospheric River Event (ARE) and have proposed recovery works on Lower Deroche Creek. The works include:

- Construction of a sediment basin with a low-flow channel to increase area available for sediment deposition and reduce infilling of the lower channel and fan;
- Installation of bed armouring at Ministry of Transportation & Infrastructure's Taylor Road Bridge, downstream of the proposed sediment basin, to prevent degradation due the reduction in sediment supply;
- Construction of two timber pile deflectors on the Deroche Creek alluvial fan perpendicular to the Taylor Road to prevent high flows from eroding the embankment of Taylor Road;
- Construction of rearing habitat channels in the Deroche Creek alluvial fan;
- Installation of a large woody debris reef along the Highway 7 embankment to improve habitat complexity and stabilize the bank; and
- Enhancement of riparian habitat of Deroche Creek through invasive species removal and native planting.

An Application for Authorization for the proposed project was submitted to Fisheries and Oceans Canada on December 18, 2023. The DFO file no. is 23-HPAC-00945. Project construction is anticipated to begin in June 2024 or as soon as the necessary approvals, including the *Fisheries Act* Authorization for the project, is received.

The purpose of the technical memorandum is to request and provide a rationale for permission for early clearing of 99 of the 154 total trees to be cleared for the project in February and early March 2024, prior

to the receipt of the Authorization. The 99 trees are located between 10 m and 30 m from the left bank of Deroche Creek and lie within the footprint of the future sediment basin. Early clearing is needed to minimize the risk of migratory birds nesting in the area that would impede the start of construction in June 2024.

2. Proposed Early Tree Clearing Area

The proposed early clearing area is shown in Enclosure 1. The locations of individual trees to be cleared early are shown in red. Trees to be preserved and cleared only after the Authorization has been received are shown in green.

3. Rationale

The primary purpose of the early tree clearing is to avoid a conflict between the protection of migratory birds and schedule of the project, which is optimized to protect fish and fish habitat and is proposed to begin construction in June 2024.

If nesting birds are present in the project area at the start of construction, clearing would not be able to commence until after nesting has stopped, which would delay the project and has the potential to create additional risk to fish and fish habitat by altering the overall schedule of the project.

The following points provide a rationale for the early tree clearing request:

- Due to the vegetation conditions and connectivity of the area, migratory bird nesting in the area is likely to occur during the general nesting period, which starts in early March and extends until the end of August.
- Migratory birds, their eggs, and nests are protected by the *Migratory Birds Convention Act*. Causing harm to migratory birds, their eggs, and nests is prohibited.
- It is not possible to clear trees containing the nests of migratory birds or their eggs or young until after the young have fledged and nesting has been completed.
- Ideally, construction on the left bank portion of the sediment basin can begin in June 2024. This would allow much of the excavation and construction of the left bank to occur in full isolation from flow in Deroche Creek with connection to the creek then occurring during the least risk work window, between August 1 and September 15.
- Construction of the left bank of the sediment basin not in isolation has the potential to result in additional risk to downstream fish and fish habitat from the project. Construction extending into the wet season will result in a higher risk of erosion and sedimentation issues.
- Only trees more than 10 m away from Deroche Creek will be cleared early. Any trees growing on or directly adjacent to Deroche Creek will be left in place to maintain the ecological features and functions of the riparian zone in this area prior to the receipt of the *Fisheries Act* Authorization for the project.
- Bulk excavation will not commence prior to receiving the *Fisheries Act* Authorization and all other regulatory approvals for the project. Some minor test pits may be dug to assess sediment composition for future use of the spoiled material from the project.

4. Review of Impacts

Based on a review of the existing riparian habitat in the area, the following features have been noted:

- The existing riparian forest consisting of mixed age stands of primarily red alder (*Alnus rubra*), black cottonwood (*Populus trichocarpa*), western redcedar (*Thuja plicata*), bigleaf maple (*Acer macrophyllum*) trees. Some of the large cedar trees exceed 95 cm diameter at breast height (DBH) (Photos 1 and 2).
- Understory vegetation is limited to some small tree saplings and sparse Himalayan blackberry. Most of the Himalayan blackberry is located more than 30 m from the high water mark of the creek. Other understory vegetation has been previously removed to facilitate an archaeological investigation of the area but was previously sparse due to disturbance from previous sedimentation events and emergency response.
- There is an existing gravel berm along the left bank of Deroche Creek that acts as a physical barrier between the proposed tree clearing area. The berm is approximately 6–15 m wide from toe to toe and varies from 2–6 m tall along the length the proposed sediment basin footprint (Photos 3 and 4).
- The berm provides a physical separation between the proposed early clearing area and Deroche Creek. Food and nutrient delivery, shading, and large wood recruitment from the trees to be removed are expected to be low to nil because of the physical separation between the trees and the creek created by the berm.
- Lands in the proposed clearing area generally slopes away from the creek or is lower than the creek channel and thus does not contribute surface runoff to the creek.



Photo 1: Representative Photo of Trees Within Early Clearing Area Near Downstream End of Proposed Sediment Basin Footprint



Photo 2: Representative Photo of Trees in Early Clearing Area Near Upstream End of Proposed Sediment Basin Footprint



Photo 3: Existing Gravel Berm Looking from Early Clearing Area Towards Deroche Creek



Photo 4: Deroche Creek Looking Downstream at Proposed Sediment Basin Location with Existing Gravel Berm on Left Bank

5. Proposed Mitigation Measures

The following mitigation measures are proposed to avoid and minimize potential impacts on fish and fish habitat:

- An existing 10–15 m wide buffer between the high water mark of Deroche Creek and the early clearing area will be maintained until all project approvals are received and full clearing and bulk excavation begins.
- No grubbing or bulk excavation will occur in the early clearing area until June 2024 or until the *Fisheries Act* Authorization is received. Only tree removal will occur prior to the start of the main construction window.
- The early clearing will be overseen by an Environmental Monitor (EM) who is a Qualified Environmental Professional (QEP), or working under the direction of a QEP. The EM will be on-site at the project start-up and during any sensitive activity. The EM will provide advice on environmental protection measures and work with the contractor to ensure protection of the environment is maintained throughout the project.
- All other construction-related measures within the Construction Environmental Management Plan will apply to the early clearing component.

Finally, the majority of the logs and root wads from the any cleared conifer trees will be stockpiled and used to construct the habitat offsetting and enhancement components of the project. The largest cedars, those 95 cm+ DBH, will be used by LFN for cultural purposes. Deciduous trees will be provided to LFN for use for firewood, carving projects, or other cultural uses.

6. Conclusion

Based on our review, it is our professional opinion that early tree clearing is unlikely to cause the death of fish or the harmful alteration, disruption, or destruction of fish habitat if the above-mentioned mitigation measures are fully implemented. The approach outlined above is intended to balance the competing interests of minimizing potential impacts to birds with potential impacts to fish and fish habitat present in terms of the preferred timelines for construction activities.

7. Closure

We trust that this memorandum explains this issue and the rationale for this request. However, should you have any questions or clarifications, please contact Patrick Lilley at 604-812-2578 or plilley@kwl.ca.

KERR WOOD LEIDAL ASSOCIATES LTD.

Prepared by:

COLLEGE OF APPLIED BIOLOGY
Patrick Lilley
January 26, 2024
R.P. Bio #1969
CAB

Patrick Lilley, M.Sc., RPBio, BC-CESCL
Senior Biologist

Reviewed by:

Christy Juteau, RPBio
Technical Reviewer

PL

Encl.: Map of Proposed Early Tree Clearing for Sediment Basin Construction

Statement of Limitations

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This document represents KWL's best professional judgement based on the information available at the time of its completion and as appropriate for the project scope of work. Services performed in developing the content of this document have been conducted in a manner consistent with that level and skill ordinarily exercised by members of the engineering profession currently practising under similar conditions. No warranty, express or implied, is made.

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Revision History

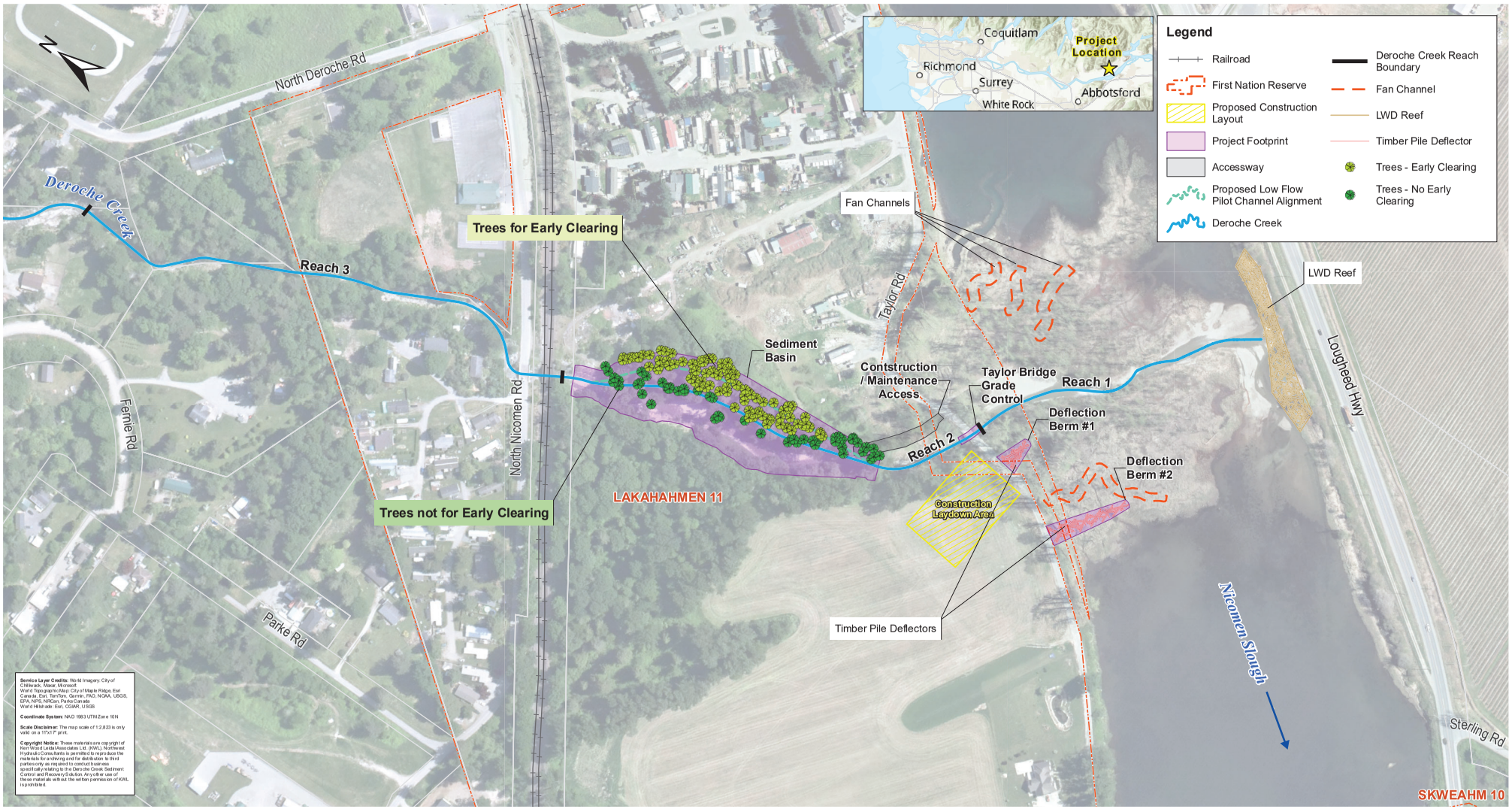
Revision #	Date	Status	Revision Description	Author
0	January 26, 2024	Final	For submission to DFO	PL

Path: P:\2800-2899\2838-003\430-GIS\Pro Projects\2838003_Figures\2838003_Figures.aprx\2838003_ProposedWorks_EarlyClearing | Date Saved: 2024-01-26 1:58 PM | Author: TSoh

Northwest Hydraulic Consultants

Deroche Creek Sediment Control and Recovery Solution

KERR WOOD LEIDAL consulting engineers



Service Layer Credits: World Imagery: City of Chilliwack, Maxar, Microsoft
World Topographic Map: City of Maple Ridge, Esri Canada, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, NRCan, Parks Canada
World Hillshade: Esri, CGIAR, USGS

Coordinate System: NAD 1983 UTM Zone 10N

Scale Disclaimer: The map scale of 1:2,823 is only valid on a 11"x17" print.

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Project No.	2838.003
Date	January 2024
Scale	1:2,823

0 10 20 40 Metres

Proposed Early Tree Clearing for Sediment Basin Construction

From:	Major, Stephanie (she, her / elle) (DFO/MPO)
To:	Patrick Lilley; Vallarino, Amy ENV:EX
Cc:	McNaught, Carter; Des Goold; Runtas, Jason (DFO/MPO); Rick McKamey; Tina Pederson; stephen@leqamel.ca; Jacobs, Thyren ENV:EX; Janice Kwo; Mckenzie, Arainn
Subject:	RE: 23-HPAC-00945 Sediment Control, Deroche Creek, Deroche - Request for Early Tree Clearing for Sediment Basin Construction
Date:	February 2, 2024 12:12:39 PM
Attachments:	image001.png image002.png image003.png image004.png image005.png image006.png image007.png

[EXTERNAL] This email came from an external source. Only open attachments or links that you are expecting from a known sender.

Good afternoon Patrick and Amy,

Provided there are no in-water works nor works, including tree-clearing, within 10m of Deroche Creek occurring prior to the issuance of the *Fisheries Act* authorization **23-HPAC-01232 Sediment Removal, Deroche Creek, Lakahahmen IR 11**, Fisheries and Oceans Canada (DFO) has no objections to the work as described in the Technical Memorandum written by KWL, dated January 26, 2024.

In addition to the works described in the above memorandum, when I was on site last week there was a discussion about the utility of removing the small tree saplings (particularly conifers) with their root systems so they could be relocated - DFO supports this approach.

Thank you,

Stephanie Major
(she/her | elle/la)
A/ Watershed Operations Regulatory Manager, Fish and Fish Habitat Protection Program
Ecosystems Management Branch
Fisheries and Oceans Canada / Government of Canada
Stephanie.Major@dfo-mpo.gc.ca / Cell: 604-418-9438

a/ Manager, Programme de protection du poisson et de l'habitat du poisson
Programme de protection du poisson et de son habitat
Direction des écosystèmes
Pêches et Océans Canada / Gouvernement du Canada
Stephanie.Major@dfo-mpo.gc.ca / céll 604-418-9438

From: Patrick Lilley <PLilley@kwl.ca>
Sent: Friday, January 26, 2024 5:39 PM
To: Major, Stephanie (she, her / elle) (DFO/MPO) <Stephanie.Major@dfo-mpo.gc.ca>; PAC FPP / PPP PAC (DFO/MPO) <DFO.PACFPP.PPPPAC.MPO@dfo-mpo.gc.ca>; PAC FPP / PPP PAC (DFO/MPO) <DFO.PACFPP.PPPPAC.MPO@dfo-mpo.gc.ca>
Cc: Vallarino, Amy FOR:EX <Amy.Vallarino@gov.bc.ca>; McNaught, Carter <carter.mcnaught@wsp.com>; Des Goold <DGoold@nhcweb.com>; Runtas, Jason (DFO/MPO)

<Jason.Runtas@dfo-mpo.gc.ca>; Rick McKamey <rick@leqamel.ca>; Tina Pederson <tina@leqamel.ca>; stephen@leqamel.ca; Jacobs, Thyren ENV:EX <Thyren.Jacobs@gov.bc.ca>; Janice Kwo <JKwo@kwl.ca>; File <File@kwl.ca>
Subject: 23-HPAC-00945 Sediment Control, Deroche Creek, Deroche - Request for Early Tree Clearing for Sediment Basin Construction

Hi Stephanie,

As discussed at the field visit earlier this week, please see the attached a technical memorandum for addendum to the Application for Authorization for the Deroche Creek Recovery Solution Project submitted on December 18, 2023 (DFO File No. 23-HPAC-00945). The purpose of the memo is to request and provide a rationale for permission for early tree clearing for a portion of the project, to be undertaken in February and early March 2024.

Please let me know if you have questions about the request.

Thank you,

Patrick

KWL File # 2838.003

Patrick Lilley MSc, RPBio, BC-CESCL (He/Him) | Sector Leader
+1 (604) 293-3121 | +1 (604) 812-2578 | Burnaby

Sent from the unceded traditional territory of the xʷməθkʷəy̓əm (Musqueam), Sḵwx̱wú7mesh (Squamish), and səlilwətaɬ (Tsleil-Waututh) Nations. We are grateful for the opportunity to work from this land.

Greater Vancouver
A300 – 4185 Still Creek Drive
Burnaby, BC V5C 6G9
T 604 294 2088

Innovation. Integrity. Employee-Owned.

Deroche Creek Emergency Sediment Removal - 2022

Final Report
January 26, 2026
KWL Project No. 2838.002

Prepared for:
BC Ministry of Environment and Parks
and
Northwest Hydraulic Consultants Ltd.

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Appendices

Appendix A: AIC Site Assessment Tech Memo

Appendix B: Design Drawings

Appendix C: Environmental Approval Documents

Appendix D: Archaeological Permits – (Not required for this report.)

Appendix E: Contractor Assessment – (Not required for this report.)

Appendix F: Contract Documents – (Refer to complete EMP in Appendix N.)

Appendix G: Access Agreement – (Not required for this report.)

Appendix H: Field Review Reports

Appendix I: Substantial Performance
- Certificate of Substantial Performance
- BLA Certificate of Completion
- Notice of BLA Certificate of Completion

Appendix J: Final Progress Payment and Closeout Documents
- Recommendation of Payment
- Release of Builders' Lien
- **Certificate of Total Performance – (Not required for this report.)**

Appendix K: Contractor Payment Support Information

Appendix L: Before and After Construction Photographs & Paragraph of Works for ENV

Appendix M: Record Drawings

Appendix N: Environmental Monitoring Report

Appendix O: Archaeological Report

1. Introduction

1.1 Purpose of Report

This report documents the completion of emergency sediment removal works conducted in October 2022 on Deroche Creek at Reaches 1 and 2 on the lower alluvial fan.

Leq'a:mel First Nation (LFN) is the Owner of the Project. Funding was provided jointly by the Province represented by Emergency Management and Climate Resiliency (EMCR), and the Federal Government represented by Indigenous Services Canada (ISC). Project coordination and management was provided by BC Ministry of Environment and Parks (ENV; formerly the BC Ministry of Environment and Climate Change Strategy) and their agent Price Waterhouse Coopers LLP (PwC).

Northwest Hydraulics (NHC) was the prime consultant and engineer-of-record, responsible for the technical aspects, under contract with ENV. Kerr Wood Leidal Associates Ltd. (KWL) was retained by NHC to lead the contract administration between LFN and the Contractor, Summit Earthworks Inc. (Summit), for the construction of the emergency works project. KWL also undertook coordination of professional services for civil works and provided environmental monitoring services.

1.2 Background

The November 2021 atmospheric river event (ARE) triggered sediment aggradation and large trees on the bank to be undermined in lower Deroche Creek. Flood levels threatened to overtop a containment berm on the west bank of creek and could cause additional flood and erosion risks.

LFN identified the sedimentation in the lower reaches of the Deroche Creek alluvial fan after the ARE. NHC assessed sedimentation concerns in October 2022 and documented their findings and recommendations in a technical memorandum entitled: *Site Assessment of Potential Areas of Concern for Fall-Winter 2022, PwC Site CR-30 Deroche Creek, Fall-Winter, Final R0, Oct 5, 2023*. The site was identified as a having high public health and safety, infrastructure, and environmental risk, and the Deroche Creek Emergency Sediment Removal Project (the Project) was initiated.

1.3 Location

Site ID	**S-CR-30**
Site Description	Deroche Creek at Lakahahmen IR 11 from North Nicomen Rd. (Lucy-Harris) Bridge downstream to Taylor Rd (Reach 2) and from Taylor Rd to the mouth of the Creek at Nicomen Slough (Reach 1)
Location	Upstream end of Site CR-30 at Lucy-Harris Bridge: 49.186513° N, -122.075816° W
Local Government Agency	Leq'a:mel First Nation
Waterbody	Deroche Creek (alluvial fan) and Nicomen Slough

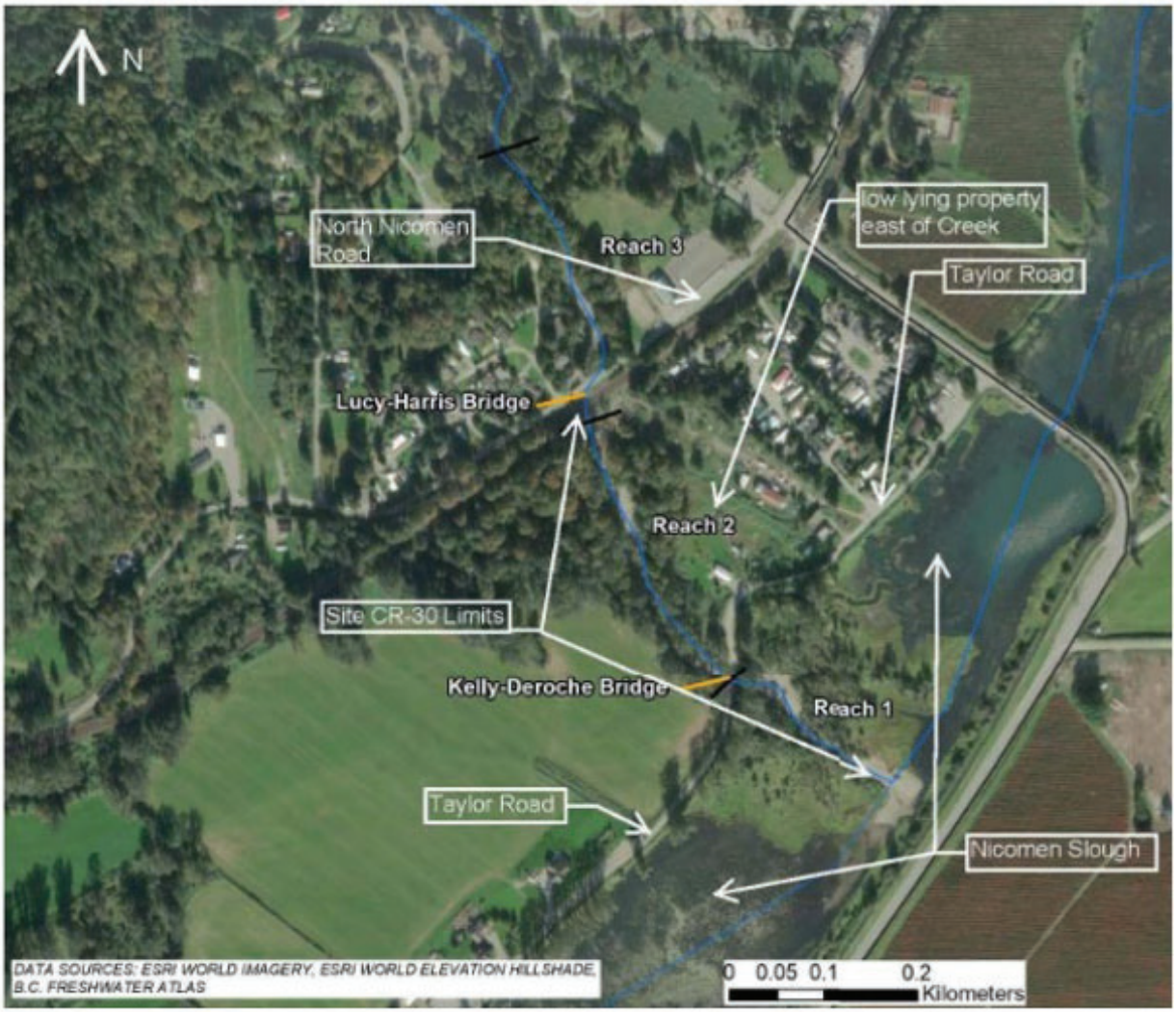

Figure 1: Location Map for Deroche Creek Site CR-30

The Project limits of construction are shown on drawings and generally described as follows:

- Upstream limit (Stage 4): UTM Zone 10U 567395.14E, 5448476.46N
- Downstream limit (Stage 1): UTM Zone 10U 567695.48E, 5448156.27N

1.4 Consultants Scope of Services

The consultant's scope of services for the Project is generally described as follows:

All Phases

- Internal project management, quality management, invoicing, task force meetings and progress reporting) (NHC and KWL)
- First Nations engagement (ENV, PwC, NHC, KWL)
- Hydrologic and Hydraulic Analysis (NHC)

Detailed Design

- Design and drawing preparation (NHC)
- WSA Section 11 permitting application (NHC)
- Participation in Taskforce meetings (NHC, KWL)
- Provide environmental input to planning, design and staging of the Project (KWL)
- Provide environmental assessment services (KWL)
- Prepare a Construction Environmental Management Plan (KWL)
- Prepare the construction contract and assist with contractor procurement (KWL)

Emergency Construction

- Construction contract administration (KWL)
- Construction management and weekly reporting (KWL, NHC)
- Coordination of professionals (KWL)
- Construction environmental monitoring (KWL)
- Construction archaeological monitoring (LFN)
- Coordination of Construction field reviews, RFI responses, FDC reviews etc. (KWL, NHC)
- Record survey (Summit)
- Completion report (KWL)
- Final project sign-off and record drawings (NHC)

The scope of services specifically provided by KWL can be summarized as follows:

- Assistance with project management services during the procurement and implementation phases of the Project; this includes participation in task-force meetings.
- Contracting and management of an archaeological sub-consultant for the Project.
- Environmental QP and monitoring services for the Project.
- Construction contract preparation and administration for the Project on behalf of Leq'a:mel First Nation.
- Construction management for the Project on behalf of Leq'a:mel First Nation, including all liaison with the contractor, daily reporting of labour, equipment, and materials (LEMs) etc.
- Management and coordination of professional field duties (engineering, environmental and archeological field review and daily reporting) during the Project.
- Quality Assurance and review of record survey provided by Summit.
- Completion reporting for Emergency Sediment Removals and related work at S-CR-30 Deroche Creek.

1.5 Project Team

The Owner of the project is LFN, with the following key staff:

- Stephen McGlenn (formerly) and John Tao (now) - Director of Lands and Natural Resources Governance / EOC Director
- Rick McKamey – Willow Creek Environmental, Leq'á:mel First Nation, Environmental Assessments & Permitting Officer

The Prime Consultant and project direction was provided by NHC, with the following key staff:

- Des Goold, P.Eng. - Engineer-of-record

KWL's project team as a subconsultant to NHC included the following key staff:

- Crystal Campbell, P.Eng. - Program Manager
- Mike Currie, P.Eng. - Senior Technical Advisor
- Kristjan Sundberg, AScT - Contract Administrator
- Santiago Paredes, EIT - Field Engineer/CAD
- Peter Tapp - Survey and Mapping Coordinator
- Patrick Lilley, MSc, RPBio, BC-CESCL - Environmental Lead/Senior Biologist
- Jaime Dimillo, B.Sc., Oskar Von Wahl, BIT, Andrew Baylis, M.Sc. - Enviro. Monitor/Jr. Biologist

Archaeological support, as subconsultant to KWL, was provided by Willow Creek Environmental, with the following staff:

- Rick McKamey - Willow Creek Environmental, Leq'á:mel First Nation, Environmental Assessments & Permitting Officer

The general contractor for the work was Summit Earthworks Inc., with the following key staff:

- Ed Jones, Operations Manager
- Jamie Degroot, Project Manager
- Jim Conley, Estimator
- Dale Fulton, Superintendent
- Averi Diguistini, Project Supervision

Summit engaged Apex Surveying Solutions Ltd. as a sub-contractor for the pre and post construction topographic surveys, and layout and grade control of the work during construction.

2. Design

2.1 Site Condition – Post 2021 ARE

During the 2021 AR events Site S-CR-30 experienced sediment aggradation that elevated the streambed by 0.5 m to 1.5 m along its length. The depth of aggradation was confirmed by comparing a pre-construction survey conducted in November 2022 with a pre-AR surface that had been developed in October 2020.

The aggradation reduced the flow capacity of the channel and bridge openings, specifically at the BC Ministry of Transportation and Transit's Taylor Rd Bridge, increasing the likelihood of inundation in overbank areas, road and bridge overtopping, and erosion damage. Such impacts would be most severe during fall and winter flood events. There are inhabited properties on lower lying ground east of Creek within S-CR-30 that may be temporarily impacted by flooding. The banks of the Creek in this reach tend to have loose soils, having been constructed of side-cast material from past sediment removals, making them susceptible to erosion and loss of riparian trees. The aggradation also degrades habitat values in Nicomen Slough (at the mouth of the Creek), which have already been in decline for decades. Floods may cause erosion damage to Taylor Rd that may force the closure of both road and bridge several days.

Refer also to the Site Assessment Report in Appendix A.

2.2 Design Objective

The design objective was to restore the site to pre-ARE conditions as nearly as practical; this involved the following:

- Remove accumulated sediment as much as practical using the October 2020 bed levels as a target level.
- Protect large trees along the right (west) bank in Reach 2 that were left vulnerable to collapse as a result of the AR sediment accumulation.
- Remove small trees within Reach 2 that had been undermined and considered a risk during construction.
- Raise a small length of the right (west) bank in reach that was considered vulnerable to increase overbank flooding as a result of the sediment accumulation.
- Create new channels on the lowest part of the alluvial fan (Reach 1) to allow the creek to deposit gravel over a wider area. The realignment has collateral benefits of improving access for fish and reducing the erosion risk to Highway 7 at the southern edge of the Project site.

Refer to the Design Drawings in Appendix B.

3. Permitting & Approvals

3.1 First Nations Consultation

LFN is the Owner of the Project and has been involved with and instrumental in planning and design since the initial site assessments were completed in the spring of 2022.

LFN was in support of this project.

3.2 Environmental

As all institutional projects are not subject to the Riparian Areas Protection Regulation (RAPR), an RAPR assessment was not required for the Project. Work within a regulatory riparian setback cannot be avoided as the sediment to be removed was within the creek bed. Therefore, this Project was submitted to the Ministry of Forests (*Water Sustainability Act* Change Approval for Works In and About a Stream) for review.

- *Water Sustainability Act* Notification for Changes in and About a Stream (WSA Change Approval #: 2009983) (Appendix C)

A DFO Request for Review was not submitted as it was determined that the project could avoid prohibited effects to fish and fish habitats and species at risk through consistent monitoring by a QEP. The ability to continue to avoid these effects was monitored throughout the duration of the project by the QEP.

A *Species at Risk Act* permit is not required as no critical habitat for listed species is found on site.

3.3 Archaeological

Archaeological monitoring was conducted by Willow Creek Environmental of Leq'a:mel First Nation, as a sub consultant to KWL. A Chance Find Archaeological process was deployed for Deroche Creek as the sensitive area of LFN's AIA was outside of the stream bed footprint. The AIA footprint outside of the bank top was concentrated on the west bank of the waterway thus cultural sensitivities allowed for a Chance Find procedure as well.

In 2023, Summit Earthworks completed a LFN Permit Report – Archaeological Assessment Deroche Creek, Phase 1 (LFNIUP#2023-003, October 2, 2023). It is appended in Appendix O.

3.4 Other Approvals

None.

4. Construction

4.1 Construction Phase Scope

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

- Mobilize of civil contractor and equipment to site.
- Pre-construction layout survey by the Contractor.
- Preparation of equipment access into Reaches 1 and 2.
- Protection of two groupings of large trees in Reach 2 (Stage 4 area), using a mix of large riprap and in-situ streambed material.
- Excavation and grading within Stage 4 limits to fill depressions in the channel and re-establish pre-Atmospheric River Event (ARE) bed levels. Excavate materials and haul off site to Zaitscullachan (Zaits) or on site for the construction of equipment access east of and adjacent to the Stage 1/ 3 areas.
- Select tree felling in Reach 2 (Stage 4 area). Trees considered a hazard from a construction and flooding perspective will be cut at breast height. Roots and stem left in place. Bucked pieces of timber will be placed above the west overbank.
- Excavation and grading within Stage 3 limits to re-establish pre ARE bed levels. Excavated materials to be hauled off site to Zaits or on site to build construction access in Reach 1.
- Construction of equipment access out to Stage 1/ Stage 2 areas, including provision for a temporary crossing of the Stage 1 channel.
- Wood debris cleared from the access will be hauled to Zaits.
- Knotweed exists on site but will be avoided.
- Excavation and grading within Stage 1 and Stage 3 area to re-establish a fish access channel primarily and ultimately return bed elevations to pre-ARE bed levels. Excavated materials to be hauled off site to Zaits.
- Tree removal, excavation and grading within Stage 2 to re-establish a pilot channel west into Nicomen Slough. Wood debris and excavated materials to be hauled off site to Zaits. The Stage 2 excavation will be isolated by berms are both ends until it is complete.
- Construction of a 30 to 35 m long, 1 m high cut-off berm above the west bank of Deroche Creek as noted on the Drawings.
- Clearing for access: 0.1 hectares.
- Total volume of sediment to be excavated from the creek: 3,825 m3, broken down as follows:
  - Stage 1: 520 m3
  - Stage 2: 1085 m3
  - Stage 3: 925 m3
  - Stage 4: 1295 m3
- Approximate 60% of the sediment excavated went to offsite disposal at Zaits, with approximately 40% of the sediment excavated used on-site for benches, banks and berm construction.

4.2 Contract Award

Due to the short time frame for procurement, the urgency to initiate and complete the project within the remaining fish window, a local, reputable contractor familiar both with in-stream works and Deroche Creek, with a good repour and history with LFN, was directly engaged for this project.

Summit Earthworks Inc. (Summit) was engaged early and immediately committed appropriate administrative, management and field resources to the project. The construction contract was direct awarded to Summit following field review and recognisance with the consulting team, discussions on design intent and priority of works that were subject to potential raising creek waters, and agreement on contract type.

The Canadian Construction Documents Committee CCDC 4 Unit Price Contract was used. This contract type was determined to be the most favorable in terms of flexibility for change of work scope due to weather conditions, reduced financial risk to both parties, provided easy mechanism for accelerating resources to the project or terminating as necessary, and a reliable means of accurately tracking resources committed to the project.

A CCDC 4 contract was executed between the LFN as the Owner, and Summit as the Contractor.

Summit performed the work as the General Contractor, and responsible for site safety as the Prime Contractor as it applies to the Workers Compensation Act of BC.

See Section 4.8 Summary of Key Dates for key dates.

A copy of the executed contract in included in Appendix F.

4.3 Approach to Construction

Sediment removal was completed by using various machinery in tandem to remove and reshape the channel per the design drawings.

Stage 1, 3 and 4

Excavator to remove and reshape the side slopes of the creek and load the sediment into articulated dump trucks, or road trucks. Trucks haul off existing bed material to an off-site location approximately 2.4 km from site.

Stage 2

Stage 2 tie-in location is in close proximity to the Nicomen Slough and the ground was comprised of soft organics and unsuitable soils. To allow for a safe working environment the Contractor used swamp matts to the excavators and constructed and temporary access road for the road trucks to dispose of material off-site.

Combination of imported riprap and existing bed material used to armour transition from stage 3 to stages 1 and 2.

4.4 Quality Control / Quality Assurance

The Contractor used a third-party surveying company to layout the proposed works. The third-party surveying company used cut-fill stakes along the proposed bottom of bank of the channel section. After construction was completed the third-party surveying company was used to provide an as-built survey for quantities. The Contractor also provided truck slips for all imported and exported material.

KWL performed daily site visits to Deroche Creek beginning with part-time visits and transitioning to full time inspection services as there were many field fit alterations to the original design proposed by NHC or as a result of site conditions. Summit, KWL, and NHC staff worked together to field fit, calculate and layout the new horizontal and vertical changes of the Stage 2 channel.

4.5 Changes During Construction

The following changes from design were implemented during construction:

- Stage 2 channel alignment moved west to follow natural flow path from previous rain event. Grades and elevations derived from NHC comments and field fit.
- Stage 1 channel alignment moved west to follow natural flow path from previous rain event and to ease pressure from dike along Highway 7.
- Transition bank between stages 3, 2, 1 armoured with cobble and small boulder material excavated from stage 4.
- Stage 1 upstream end of creek bed armoured with cobble and small boulder material excavated from stage 4.
- Small channel block constructed approximately 5.0 m west of STA 0+130 along stage 3 alignment. Channel block constructed of riprap and stream gravel to discourage the creek from making the adjacent small channel and a primary flow path.
- North bank at stage 4 from approximately STA 0+265 to STA 0+300 backfilled with existing creek bed material to an approximate elevation of 8.0 m – based of as-built survey.
- Transition from existing invert upstream to start of stage 4 at approximately STA 0+470 grades adjusted on site to tie-in to design grade adjacent to riprap structure.

As the contract was unit priced, with labour and equipment hourly rates applied, no Change Orders were necessary.

4.6 Construction Monitoring

Archaeological

Archaeological monitoring was conducted by Willow Creek Environmental, as a sub consultant to KWL. A Chance Find Archaeological process was deployed for Deroche Creek as the sensitive area of LFN's AIA was outside of the stream bed footprint. The AIA footprint outside of the bank top was concentrated on the west bank of the waterway thus cultural sensitivities allowed for a Chance Find procedure as well.

No items of interest were found. As such no archaeological report was issued.

In 2023, Summit Earthworks completed a LFN Permit Report – Archaeological Assessment Deroche Creek, Phase 1 (LFNIUP#2023-003, October 2, 2023). It is appended in Appendix O.

Environmental

Environmental monitoring was conducted to ensure appropriate measures were being taken to avoid, minimize, and mitigate any potential adverse environmental impacts of the Project. The Environmental Monitor (EM) was an appropriately Qualified Environmental Professional (QEP) that regularly inspected the work site for compliance within environmental permits, construction environmental management plant (CEMP) and best management practices. The EM was familiar with the regulatory requirements of the Project and had the responsibility to report all non-compliance events and stop work if necessary. The EM was on-site at project start-up, during instream works and during any sensitive activities.

A detailed environmental monitoring summary report as well as the CEMP can be found in Appendix N.

Responsibilities of the EM included, but were not limited to, the following:

- Review all permits, best management practices, and the CEMP.
- Be on-site for Project start-up and critical works (i.e., works adjacent to sensitive areas).
- Meet with the Contractor before construction to explain all mitigation and environmental protection measures.
- Monitor project compliance with the CEMP, address changes to the Contractor, and Contract Administrator to ensure CEMP is continuously updated, as needed.
- Inspect all mitigation and ESC measures to ensure they are appropriate and working properly and recommend modifications and repairs when necessary.
- Have written authority to halt any construction activity if it is deemed necessary to protect fish, wildlife, and their habitat.
- Identify, monitor, and promptly report any situations of ongoing or potential damage to the environment.
- Report to the Contract Administrator and relevant regulatory agencies on environmental issues encountered during construction.
- Prepare a monitoring report within 60 days of the Project's completion and submit to any agencies if required.

Construction

Construction monitoring was regularly conducted over the duration of the Deroche Creek Emergency Sediment Removal Project to document and verify contractual deliverables were being completed as per design by the Contractor, and to provide informed decision-making up to the completion of the construction works. The Construction Monitor (CM) was a qualified engineer-in-training (EIT) and a Civil Technologist. The CM regularly inspected the work site for compliance in accordance with the design requirements of the Project and directly reported findings to the Project Team including the Engineer of Record and Contract Administrator. The CM was on-site at Project mobilization and conducted regular construction monitoring up until the Contractor's demobilization.

The Contractor's mobilization to site began the morning of November 07, 2022.

Detailed field inspection reports, including the equipment used on-site can be found in Appendix H. A summary of key activities and issues requiring specific attention in the field are summarized below:

November 08, 2022:

- Deroche creek diverted at STA 0+405 to STA 0+345 to allow the creek bed to dry to commence excavating for the riprap placement along the western bank.
- Excavation below 2020 bed elevation started to allow for riprap installation along undermined tree location. First layers of riprap secured and keyed into western bank.

November 09, 2022:

- Tree protection structure completed from access road along adjacent property to the upstream end of the cut-off berm.
- Cut-off berm partially completed on western side of bank.

November 10, 2022:

- Imported material placed adjacent to Taylor Rd bridge to create access road to creek bed.
- Existing material excavated from creek bed (approx. STA 0+160 to STA 0+180) and placed along stage 2 upstream boundary (approx. STA 10+115) to create access road for equipment.

November 11, 2022:

- Riprap placed on tree protection structure to meet design slope. Bank tied into to structure with side slopes. Riprap covered with existing material and sloped towards bottom of bank.
- Stage 4 creek bed widened to meet 5.0 m design cross section. Banks sloped at approximately design slope to meet existing banks.
- Field fit stage 2 alignment stakes placed with new grades and elevations. NHC provided new grades and elevations based on KWL horizontal adjustment.
- Stage 1 alignment staked out based on original design up to natural diversion created by the previous flow.

November 12, 2022:

- Stage 4 channel construction to design grades and elevation.
- Stage 2 channel excavation continues along field fit alignment. Existing material exported to off site location approximately 2.4 km from Deroche Creek.
- Contractor advised that bed elevation was approximately 1.2 m higher than design (2020 bed level) at stage 4 adjacent to the riprap tree protection structure. KWL advised contractor to follow design elevation and prioritize achieving the design side slopes.

November 13, 2022:

- Stage 4 channel construction done from Section 3 to Section 9.
- Stage 2 channel excavation continues along field fit alignment. Existing material continues to be exported off site approximately 2.4 km from Deroche Creek. Work is being done to elevations of Des Goold email dated Nov 11, 2022. Since excavation of Stage 2 at the slough is near the same as slough water level, water follows the excavated Stage 2 excavation as the work proceeds upstream.

November 14, 2022:

- Stage 2 channel excavation continues along field fit alignment.
- Stage 1 – additional extended silt fence installed at outlet of Stage 1. No other work on Stage 1 done.

November 15, 2022:

- Banks adjacent to Taylor Rd Bridge sloped to achieve design slope.
- Stage 3 channel widened per design. Existing bed material exported offsite 2.4 km from site.
- Stage 3,2,1 transition preparation commenced and creek bed elevations finalized.
- Contractor lowered design elevation upstream of transition zone to achieve a lesser grade change from stage 3 to stage 4. Elevation changes to vary from 4.81 to 4.40m at approximately 2.5% to tie in upstream at stage 3.

November 16, 2022:

- Stage 1 channel graded to final field fit grade.
- Existing bed creek material placed on slopes and bed to provide some rigidity at stage 2.

November 17, 2022:

- North bank adjacent to Taylor Rd bridge reshaped to shallow slopes to achieve design slope.
- Excavator with rotating knuckle used to remove existing material from underneath bridge - more material hand excavated to create a smaller berm approximately half the height of the adjacent bank.
- Transition between stages 3, 2 and 1 bank armoured with coble, and small boulders from stage 4.

November 18, 2022:

- Existing bed creek material underneath Taylor Rd bridge removed to design invert with near vertical side slopes.
- Filter fabric sited on east bank of stage 2 channel at approximately STA 10+060.
- Demobilization started.

4.7 Project Completion

The field construction was officially considered complete on November 21, 2022. A final walk thru was completed by Summit, KWL, and LFN staff. All deficiencies were noted complete at that time.

A topographic survey of the as constructed works was completed by Apex on December 12, 2022.

Original conditions were documented by a pre-construction topographic survey completed by Apex on October 31, 2022 to November 3, 2022.

Apex provide survey layout and grade control to Summit based on the issued for construction design drawings provided by NHC. The surveys and layout were completed in project datum, as identified on the lead sheet of the construction drawing set.

The information from both topographic surveys was provided to NHC and KWL.

Based on the pre and post construction topographic surveys, NHC determined the volume of excavated sediment, and prepared the final record drawings. Refer to Section 4.1 for addition information on sediment removal volumes.

The record drawings are enclosed in Appendix M.

4.8 Summary of Key Dates

The following key dates of significance include:

October 27, 2022	Initial Site Recognisance with LFN, NHC, Summit, and KWL
November 7, 2022	Contract Execution
November 7, 2022	Mobilization of Equipment to Site
November 8, 2022	Pre-Construction Field Meeting and Construction Start
November 15, 2022	Stage 3 Complete
November 15, 2022	Stage 2 Complete
November 16, 2022	Stage 1 Complete
November 17, 2022	Stage 4 Complete
November 21, 2022	Deficiencies Completed
November 21, 2022	Demobilization
December 6, 2022	Certificate of Substantial Performance, BLA Certificate of Completion
December 16, 2022	Progress Payment No.1
February 3, 2023	Progress Payment No.2
February 3, 2023	Final Payment - BLA Holdback Release

5. Project Costs

5.1 Construction Cost

Details of construction budget, actual cost and allocation to the funding partners is included below. Goods and Services Tax (GST) is not applicable; costs shown exclude GST.

Construction funding is provided through ENV by EMBC and ISC. LFN's payment to Summit is reimbursed by ENV through their partner agreement.

The construction costs are generally prorated and proportioned to 65% on-reserve work (ISC) and 35% off-reserve work (EMBC). Actual costs and proportions are provided in table below based on construction level of effort within the funding boundaries.

A construction budget of $500,000.00 was initially allocated to this project, as an upset limit. Prior to contract execution, Summit provided an estimate of unit priced effort for equipment, labour, and materials based on this initial budget. The actual total construction cost to complete this phase of the project total to $357,670.54. Consolidated high level details of the project costs for equipment, labour, and materials, and Summit invoice summary is provided in the tables below.

Table 5-1: Project Costs

Construction Cost Allocation	Cost	
General Requirements	$37,238.69	
Labour (Project Management, Supervision, Operators, Labour)	$148,067.70	
Equipment (Equipment Bare Rate Only)	$138,351.56	
Materials (Material Supply Only)	$34,012.60	
Total Cost	**$357,670.54**	
Funding Allocation	**Cost**	**Percentage**
EMBC (Non IR Billing)	$101,804.46	28.5%
ISC (IR Billing)	$255,866.08	71.5%
Totals	**$357,670.54**	**100%**

Table 5-2: Invoice Summary

Inv. #	Date	IR Billing	Non IR Billing	Combined	Comment
5421	20221125	$253.147.08	-	$253,147.08	Effort allocated to on reserve (IR Billing) works.
5449	20221125	-	$100,548.77	$100,548.77	Effort allocated to off reserve (Non IR Billing) works.
5520	20221215	-	$1,255.69	$1,255.69	Adjustment for GST removal, addl Apex invoice added.
5732	20230115	$2,719.00	-	$2,719.00	Effort allocated to on reserve (IR Billing) works. No HB retained.
Total	**-**	**$255,866.08**	**$101,804.46**	**$357,670.54**	Separated & combined Billings for Funding Purposes.
Less 10%	-	$25,314.71	$10,180.45	$35,495.15	BLA holdback.
5755	20230120	$25,314.71	$10,180.45	$35,495.15	Release of the BLA holdback.

Specific details, invoices, daily labour logs, and other supporting documentation is provided in the monthly progress payment documentation, enclosed in Appendix K.

6. Future Considerations

6.1 Operation & Maintenance

Operation and maintenance is not required for the emergency works. The long-term solution for Deroche Creek includes a sediment basin, and that infrastructure will have an operation and maintenance plan.

6.2 Monitoring

There is no specific monitoring required for the project between now and the construction of the long-term solution. LFN keeps a close watch over Deroche Creek and can advise NHC and KWL if any issues or hazards develop in the interim.

7. Report Submission

Prepared by:

KERR WOOD LEIDAL ASSOCIATES LTD.

Kristjan Sundberg
Contract Administrator

Reviewed by:

Crystal Campbell, P.Eng.
Project Manager

NORTHWEST HYDRAULIC CONSULTANTS

Reviewed by:

Des Goold, P.Eng.
Engineer-of-Record

Statement of Limitations

This document has been prepared by Kerr Wood Leidal Associates Ltd. (KWL) for the exclusive use and benefit of ENV/ NHC for the Deroche Creek Emergency Sediment Removal - 2022. No other party is entitled to rely on any of the conclusions, data, opinions, or any other information contained in this document.

This document represents KWL's best professional judgement based on the information available at the time of its completion and as appropriate for the project scope of work. Services performed in developing the content of this document have been conducted in a manner consistent with that level and skill ordinarily exercised by members of the engineering profession currently practising under similar conditions. No warranty, express or implied, is made.

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Revision History

Revision #	Date	Status	Revision	Author
0	January 26, 2026	Final		KRS/DG

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Appendix A

AIC Tech Memo

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NHC Reference 3007346-10
October 5, 2022

PricewaterhouseCoopers
250 Howe Street, Suite 1400
Vancouver, BC V6C 3S7

Attention: **Fred Bjork, MSc, P.Eng., LEED AP, Project Manager**
MJ Siahdashti, MBA, P.Eng., Senior Manager

Via email: fred.bjork@pwc.com
Mj.siahdashti@pwc.com

Re: **Site Assessment of Potential Areas of Concern for Fall-Winter 2022**
PwC Site CR-30 Deroche Creek, Fall-Winter Final, Rev. 0

1 Introduction

The purpose of this high level and preliminary assessment of identified Potential Areas of 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 fall and winter flood season, 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.

The assessment of this potential Area of Concern follows this general approach:

1. High level review: senior engineering review of available, relevant information, site inspections, and communication with stakeholders.
2. Hazard and risk assessment: identification of flood threat to the safety of people, property, infrastructure, and the environment.
3. Flood mitigation: identification and prioritization of potential mitigation measures, including consideration of need and timing of further validation work as well as implementation of mitigation measures.

NHC first visited Site CR-30 on May 19, 2022 accompanied by Mr. Yogan Reddy of PwC and Jason Thompson and Rick McKamey of the Leq'a mel First Nation (LFN). The purpose of that visit was to assess the risks associated with spring flooding in Deroche Creek, which are comparatively small. At the time of that assessment, emergency sediment removal was not recommended but further assessment, design and implementation of long-term holistic solutions, including sediment management in the lower reaches of the creek were recommended (NHC, 2022).

As the 2022 fall and winter season approaches, flooding will be more intense in Deroche Creek and the risks to people, property, infrastructure, and the environment are elevated.

2 Site Information

Table 2-1 Summary of site Information

Site ID	CR-30
Site Description	Deroche Creek from North Nicomen Rd. (Lucy-Harris) Bridge downstream to Taylor Road (Reach 2) and from Taylor Road to the mouth of the Creek at Nicomen Slough (Reach 1) (see Figure 1, attached)
Location	Upstream end of Site CR-30 at Lucy-Harris Bridge: 49.186513° N, -122.075816° W
Local Authority	Leq'a mel FN; CP Rail; MoTI
Waterbody	Deroche Creek (alluvial fan) and Nicomen Slough

3 Site Hazard

3.1 Hazard Assessment Methodology

NHC re-visited Site CR-30 on September 30, 2022 accompanied by Rick McKamey of the Leq'a mel First Nation (LFN). There were no representatives present from the BC Ministry of Transportation and Infrastructure (MoTI) or Canadian Pacific Railway (CPR). Representatives from PwC and the BC Government had met with members of LFN the day prior. Discussion with Mr. McKamey, NHC's observations, measurements and photos from the site visit, and an update of hydraulic modelling from a previous study (NHC, 2021) form the basis for this hazard and risk assessment.

3.2 Hazard Assessment Summary

Site CR-30 has experienced aggradation (sediment build-up) that has elevated the streambed by 0.2 m to 1.0 m in Reach 2 (Photos 1 and 2; Figure 2) and by 1.0 m to 1.2 m in Reach 1 (Photos 5 and 6; Figure 2). The estimated depths of build-up are based on select measurements made using the Theodolite Application for iPhone, and a tape measure at the bridges. The level of build-up elsewhere has been either interpolated or extrapolated based on those measurements.

The estimates of sediment build-up have been used to update a 1D hydraulic model of the creek that was developed for previous assessment of Deroche Creek for the BC Ministry of Transportation and Infrastructure (NHC, 2021). The updated model results for 10-year peak instantaneous flow in the creek are shown in Figure 3. The results show that estimated 10-year flood levels in the creek have risen by up to 0.8 m, most notably upstream of Taylor Rd. (Kelly-Deroche) Bridge, and downstream of Taylor Rd as the creek approaches Nicomen Slough. A 10-year return period is considered an appropriate index flood on which to base assessed risk for a single flood season.

The model results in Figure 3 assume unobstructed flow conditions in the creek (i.e. no debris blockages or further sediment accumulation). Both these assumptions are weak, but preferable to guessing at the degree of obstruction that might occur. There are several large trees within Reach 2 that will be

outflanked by flood waters or are undermined (Photos 3 and 4). While these large trees will not likely float downstream if they fall, they will induce considerable bank erosion and introduce a lot of smaller debris to the channel. This smaller debris could easily obstruct flow at Kelly-Deroche Bridge. Even without further obstruction, the 10-year flood peak currently surcharges against the girders of Kelly-Deroche Bridge. An obstruction could lead to overtopping of the bridge and washout of its approach roads (Figure 4).

The elevated flood levels pose some flood risk to residential properties east of the creek and rural properties to the west (Figure 5 and Figure 6). They also threaten to overtop a containment berm on the right (west) bank of the creek downstream of Taylor Rd. (Figure 7). Overtopping of the berm could then pose an erosion risk to the downstream embankment of Taylor Rd., which serves as a flood protection dike.

The banks of the creek in this reach have loose soils, having been constructed of side-cast material from past sediment removals, making them susceptible to erosion and loss of riparian vegetation. The sediment build-up also degrades habitat values in the creek and Nicomen Slough, which have been in decline for decades.

4 Preliminary Risk Evaluation

The preliminary risk evaluation is prepared to assess the flood risks associated with fall and winter flooding. The risk ratings associated with public safety, river capacity, environmental and infrastructure for site are shown in Table 4-1. The risk matrices are appended to this memo for reference.

Table 4-1 Consequence and preliminary risk rating for fall and winter floods at Site CR-30

Indices	Preliminary Risk Rating	Anticipated Consequence
Public Health and Safety	High	Aggradation (sediment build-up) along the lower reaches of Deroche Creek results in a high potential for overbank flow upstream of Taylor Rd. (Kelly-Deroche) Bridge, which may result in flooding around residential properties east of the Creek and a rural property to the west. Trees may also be undermined, contributing to obstruction at the bridge, overtopping of Taylor Rd. and washout of the approach roads, or damage to an adjacent dike. It is anticipated that the worst of these effects could result from winter and fall floods with recurrence intervals of 2- to 10-years and higher.
River Capacity	Very High	
Environmental	High	The bank soils along the lower reaches of Deroche Creek are loose and highly erodible. The flooding in November 2021 left the banks and several large trees vulnerable to erosion and loss. A few large trees have had to be felled already but others that pose a risk remain. The loss of cover from these trees, and the loss of resting, rearing and spawning habitat due to sediment build-up further degrades habitat values in the creek and Nicomen Slough, which have been in decline for decades.
Infrastructure	High	Sediment build-up results in a high potential for flooding and erosion damage along Taylor Rd. and at Kelly-Deroche Bridge,

Indices	Preliminary Risk Rating	Anticipated Consequence
		from fall or winter floods with recurrence intervals of 5- to 10-years. Potential damages to the road or bridge may force the closure of both for several days. The capacity of the CP Rail and North Nicomen Rd. Bridges will also be negatively impacted, although overtopping of those structures would occur at higher recurrence intervals and erosion damage is less likely due to more robust armouring there.

5 Site Opinion and Advice

Based on the hazard and risk assessment, it is our opinion that Site CR-30 is an Area of Concern (AC), requiring sediment removal prior to the 2022 fall and winter flood season and long-term holistic solutions as follows:

Emergency Works (asap):

- Removal of sediment in Reaches 1 and 2, to re-establish pre-November 2021 creek bed levels (as shown in Figure 2).
- LFN indicates that they have the equipment and resources to have this work carried out.

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

- Design and construction of a sediment basin downstream of North Nicomen Rd. to continuously manage sedimentation and flood risk in the lower reaches of the creek.

6 Closure

Please contact Des Goold at 604 837-8289 or dgoold@nhcweb.com if there are additional questions or concerns.

Report prepared by:



2022-10-05

Des Goold, P.Eng.
Principal

Report reviewed by:



2022-10-04

Meg Broswick, P.Eng.
Associate

Permit to Practice #: 1003221

References:

NHC (2022). *Preliminary Site Assessment of Potential Areas of Immediate Concern; PwC Site CR-30 Deroche Creek (Final, R1).* Report prepared for PricewaterhouseCoopers and the BC Ministry of Environment and Climate Change Strategy.

NHC (2021). *Deroche Creek Geomorphological Assessment and Hydrotechnical Scoping.* Report prepared for Mott MacDonald Canada Ltd. and the BC Ministry of Transportation and Infrastructure.

Attachments:

Risk Matrices: Public Safety, River Capacity, Environment, Infrastructure (4)
Photos and Figures

DISCLAIMER

This report has been prepared by **Northwest Hydraulic Consultants Ltd.** for the benefit of **PricewaterhouseCoopers** for specific application to the **Site Assessment of Potential Areas of Concern for Fall-Winter 2022 Site CR-30 Deroche Creek.** The information and data contained herein represent **Northwest Hydraulic Consultants Ltd.** best professional judgment in light of the knowledge and information available to **Northwest Hydraulic Consultants Ltd.** at the time of preparation and was prepared in accordance with generally accepted engineering and geoscience practices.

Except as required by law, this report and the information and data contained herein are to be treated as confidential and may be used and relied upon only by **PricewaterhouseCoopers**, its officers and employees. **Northwest Hydraulic Consultants Ltd.** denies any liability whatsoever to other parties who may obtain access to this report for any injury, loss or damage suffered by such parties arising from their use of, or reliance upon, this report or any of its contents.

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Public Health and Safety

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.
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

Notes: Sediment build-up along the lower reaches of Deroche Creek results in a high potential for overbank flow upstream of Taylor Rd. (Kelly-Deroche) Bridge, which may result in flooding around residential properties east of the creek and a rural property to the west. Trees may also be undermined, contributing to obstruction at the bridge, overtopping of Taylor Rd. and possible washout of the approach roads, or damage to an adjacent dike. It is anticipated that the worst of these effects could result from winter and fall floods with recurrence intervals of 2- to 10-years and higher.

Selected consequence and risk rating

River Capacity

Risk Evaluation and Response						
	Consequence Rating	Very Low	Low	Medium	High	Very High
Indices	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
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
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Notes: Sediment build-up along the lower reaches of Deroche Creek results in a high potential for overbank flow upstream of Taylor Rd. (Kelly-Deroche) Bridge, which may result in flooding around residential properties east of the creek and a rural property to the west. Trees may also be undermined, contributing to obstruction at the bridge, overtopping of Taylor Rd. and possible washout of the approach roads, or damage to an adjacent dike. It is anticipated that the worst of these effects could result from winter and fall floods with recurrence intervals of 2- to 10-years and higher.

Selected consequence and risk rating

Environmental

Risk Evaluation and Response						
	Consequence Rating	Very Low	Low	Medium	High	Very High
Indices	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.
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

Notes: The bank soils along the lower reaches of Deroche Creek are loose and highly erodible. The flooding in November 2021 left the banks and several large trees vulnerable to erosion and loss. A few large trees have had to be felled already but others that pose a risk still remain. The loss of cover from these trees, and the loss of resting, rearing and spawning habitat due to aggradation (sediment build-up) further degrades habitat values in the creek and Nicomen Slough, which have been in decline for decades.

Selected consequence and risk rating

nhc

Infrastructure

Risk Evaluation and Response						
	Consequence Rating	Very Low	Low	Medium	High	Very High
Indices	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.) will require immediate repair.	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

Notes: Sediment build-up results in a high potential for flooding and erosion damage along Taylor Rd. and at Kelly Deroche Bridge, from fall or winter floods with recurrence intervals of 5- to 10-years. Potential damages to the road or bridge may force the closure of both for several days. The capacity of the CP Rail and North Nicomen Rd. Bridges will also be negatively impacted, although overtopping of those structures would occur at higher recurrence intervals and erosion damage is less likely due to more robust armouring there.

Selected consequence and risk rating

Site CR-30 Deroche Creek Site Photos and Images (September 30, 2022)

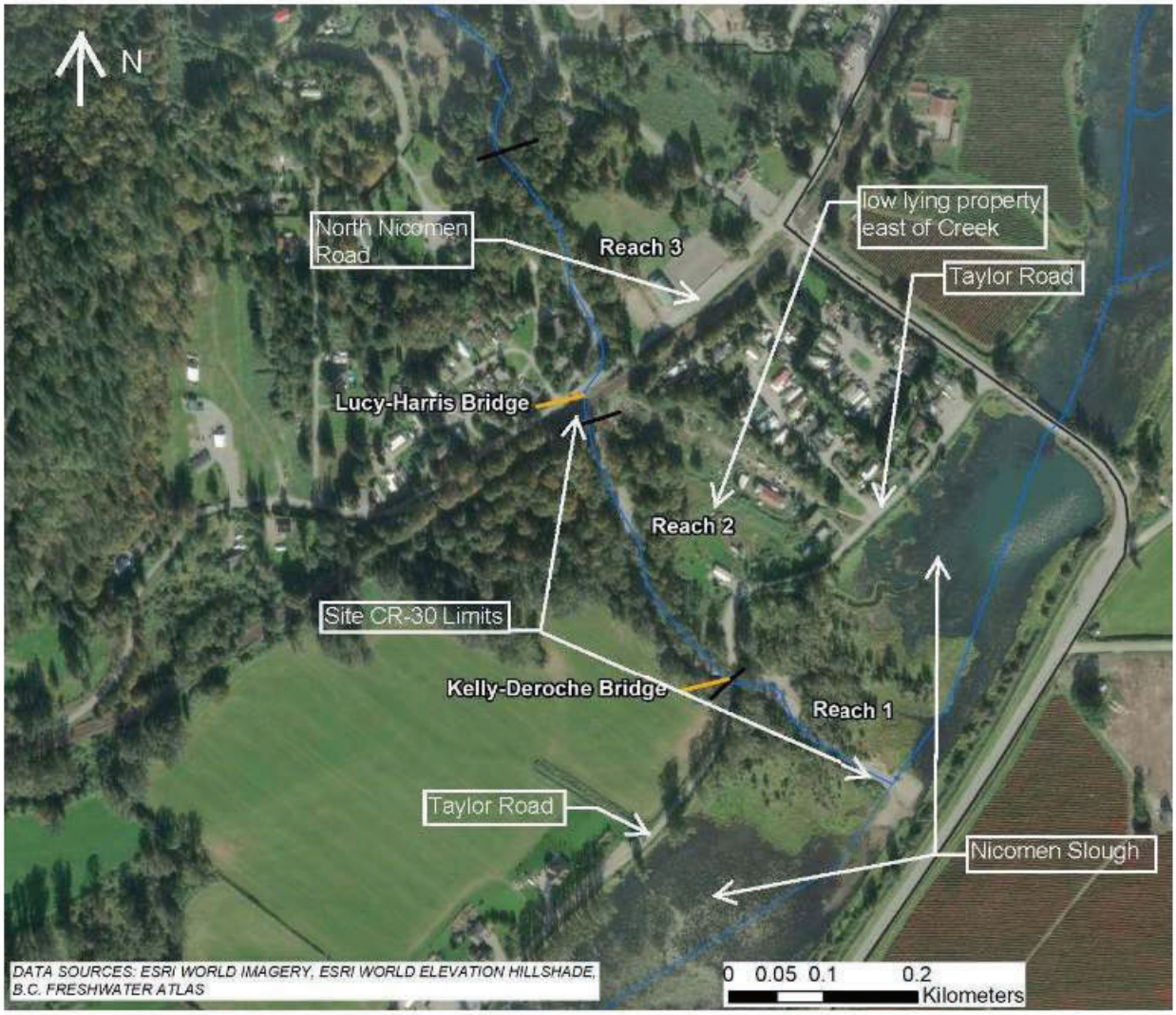

Figure 1. Location map showing the lower reaches of Deroche Creek on the Deroche Creek alluvial fan.



Photo 1. Looking upstream to the MoTI Bridge (Lucy Harris) at North Deroche Rd., the upstream extent of sediment build-up from November 2021. The creek bed has risen between 0.5 m and 1 m at the MoTI and CPR bridges, respectively. (September 30, 2022).



Photo 2. Looking upstream to the CPR Bridge from about 50 m downstream. The creek bed is about 0.2 m higher at this location (September 30, 2022).



Photo 3. Large cottonwood tree outflanked due to erosion in the reach between the CPR Bridge and Taylor Rd. (September 30, 2022).



Photo 4. Large cedar trees undermined due to erosion in the reach between the CPR Bridge and Taylor Rd. (September 30, 2022).



Photo 5. Looking upstream to the MoTI Bridge (Kelly-Deroche) and sediment build-up in the channel downstream of Taylor Rd. (September 30, 2022).



Photo 6. Looking downstream at the sediment build-up in the channel 50+ m downstream of Taylor Rd. (September 30, 2022).

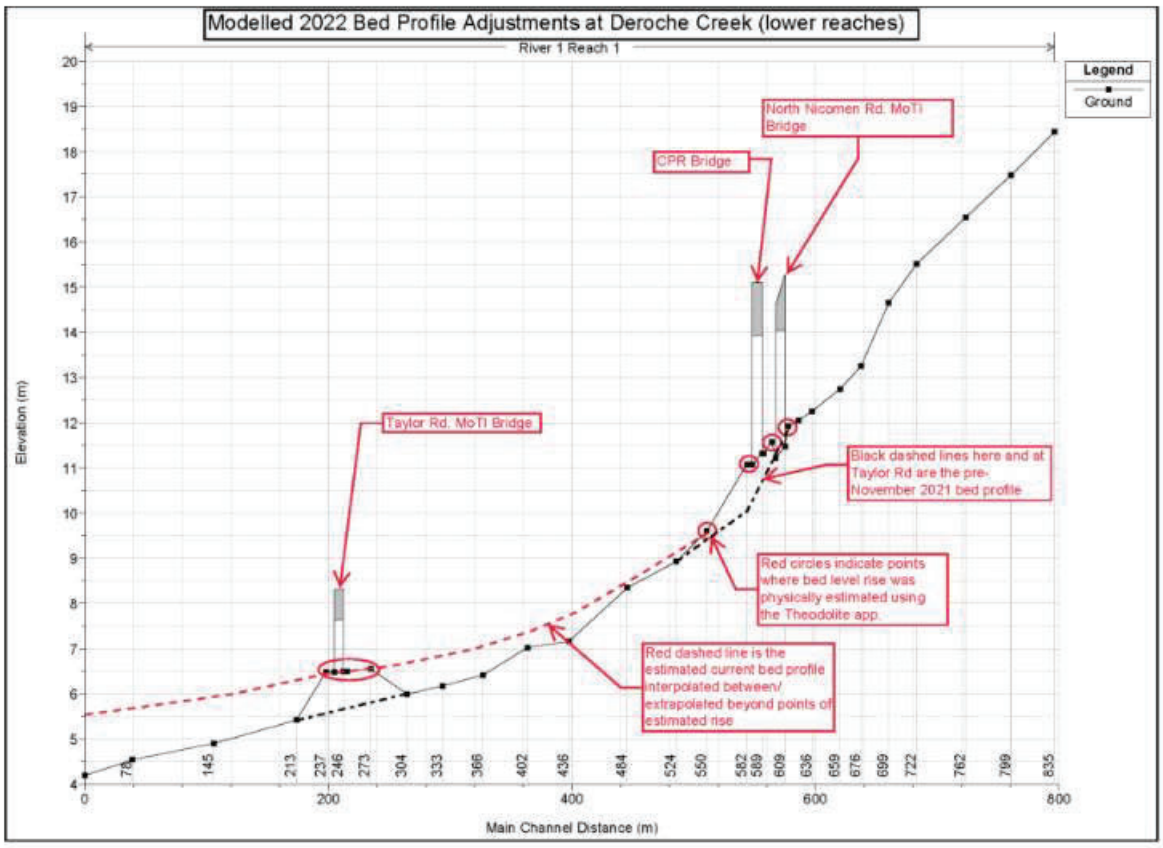

Figure 2. Streambed profile of Lower Deroche Creek showing estimated, observed and interpolated/ extrapolated bed levels as of September 30, 2022.

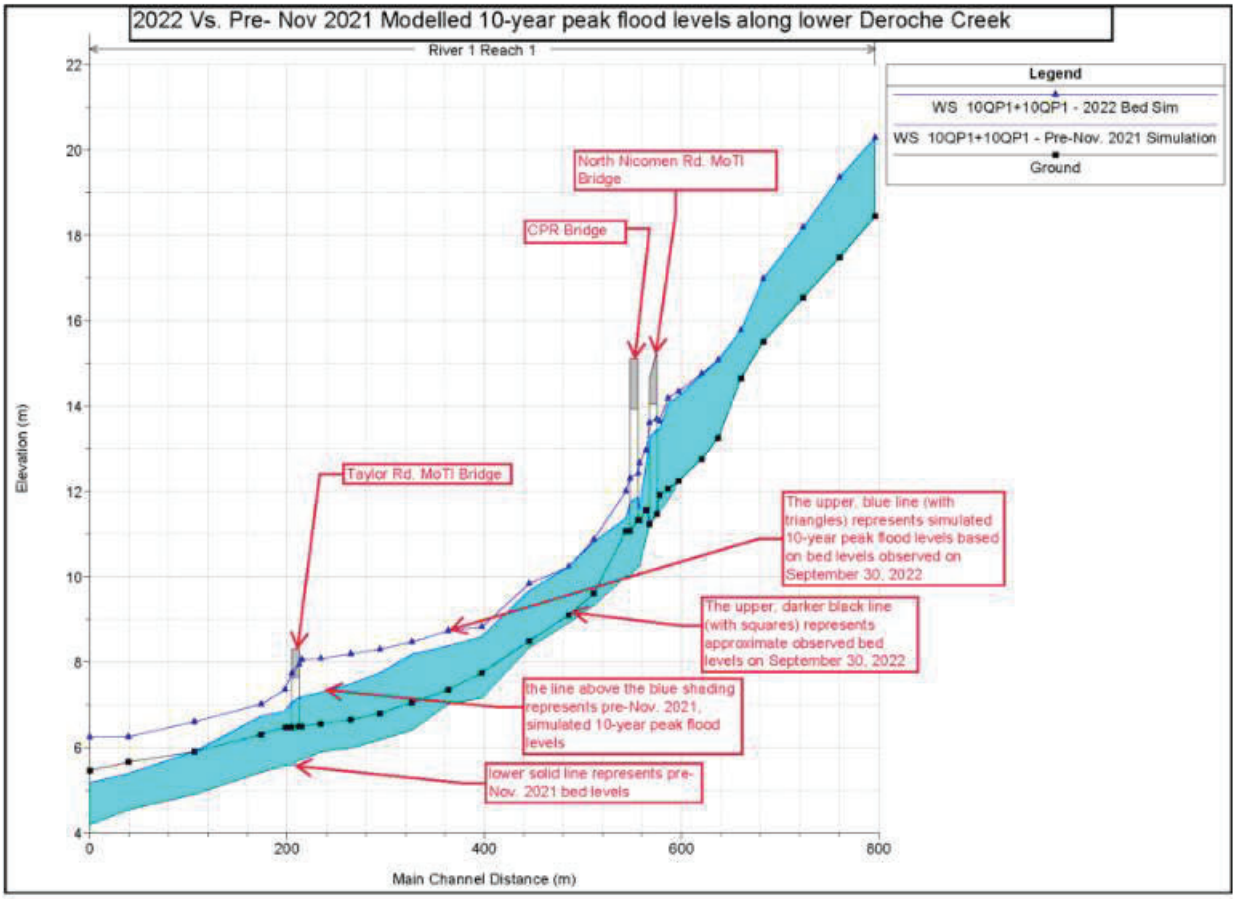

Figure 3. Simulated 10-year peak flood levels along lower Deroche Creek: Pre-Nov. 2021 Vs. September 30, 2022.

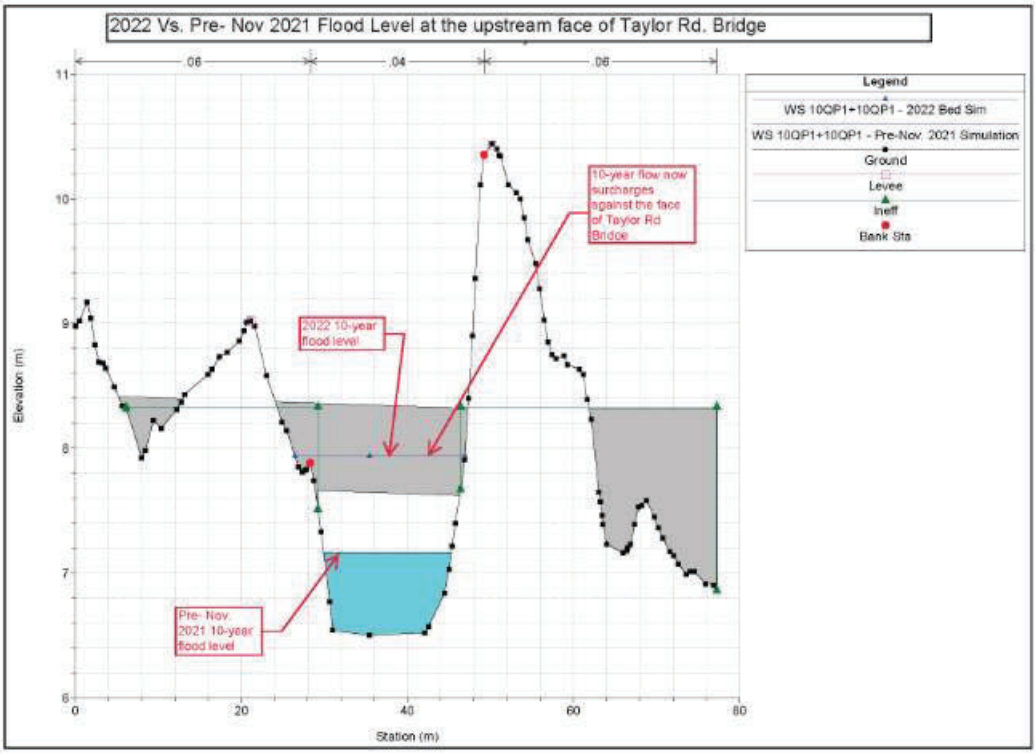

Figure 4. Simulated 10-year peak flood levels at the upstream face of MoTI's Taylor Rd. (Kelly-Deroche) Bridge: Pre-Nov. 2021 Vs. September 30, 2022.

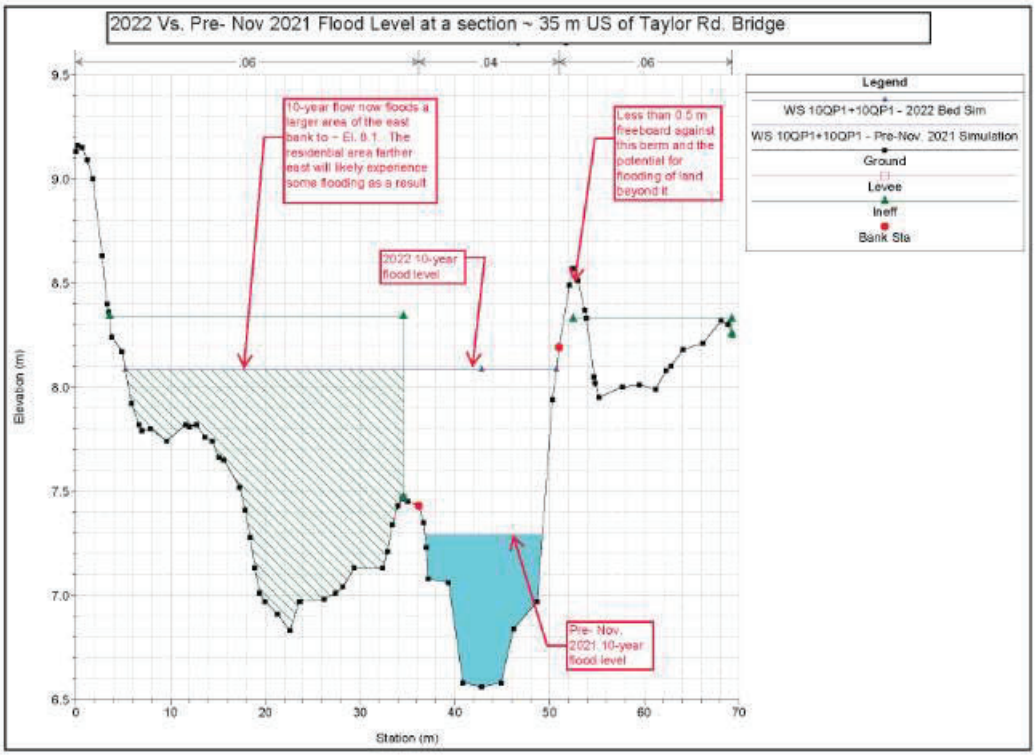

Figure 5. Simulated 10-year peak flood levels at a section about 35 m upstream of MoTI's Taylor Rd. (Kelly-Deroche) Bridge: Pre-Nov. 2021 Vs. September 30, 2022. Note the east (left) bank has a larger flooded area from the 2022 modelling, which may affect adjacent properties (see Figure 5), and on the right bank the flood level exceeds the ground level on the landside of the berm.

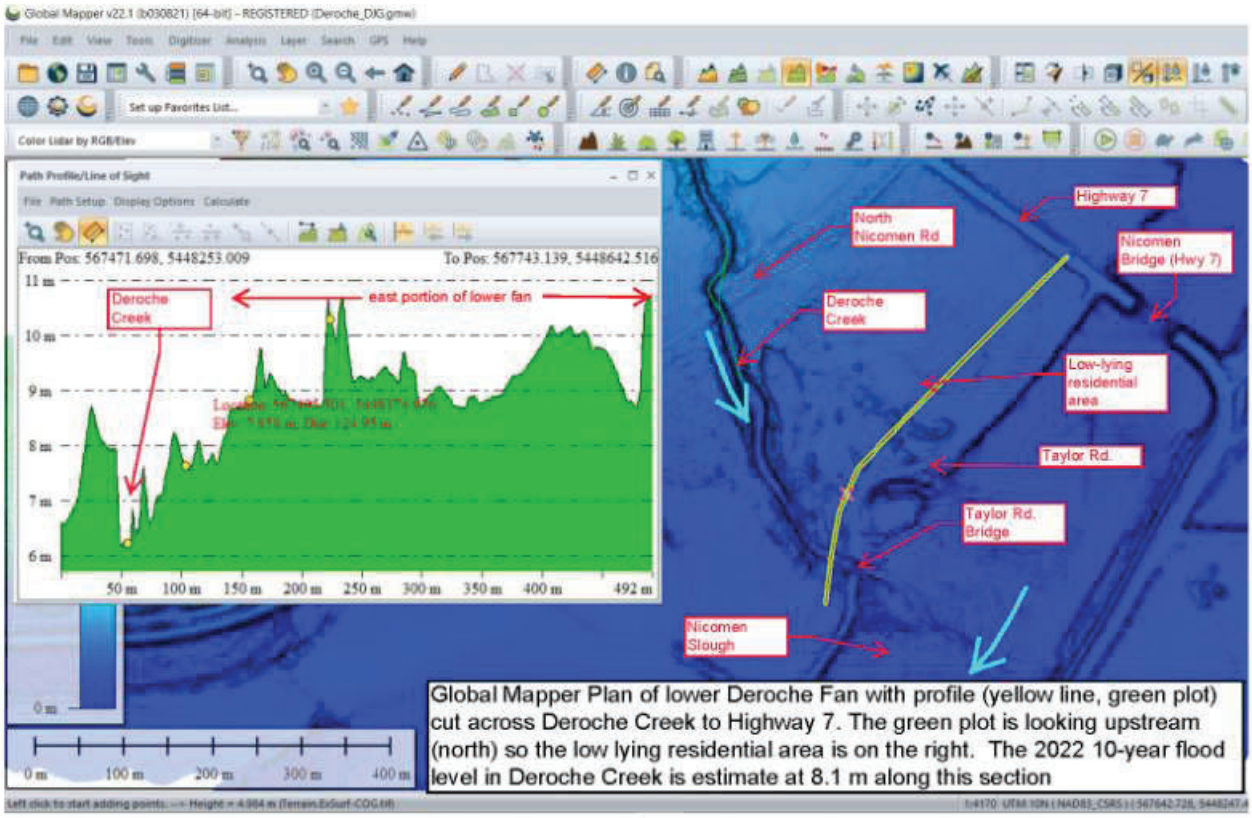

Figure 6. Screenshot from Global Mapper™, showing the ground profile across lower Deroche Fan north of Taylor Rd. The September 30, 2022 simulated 10-year peak flood level in this area is El. 8.1, so there are properties close to the creek that may be affected by surface water flooding, and others farther east that may be affected due to high flood levels in the creek farther upstream.

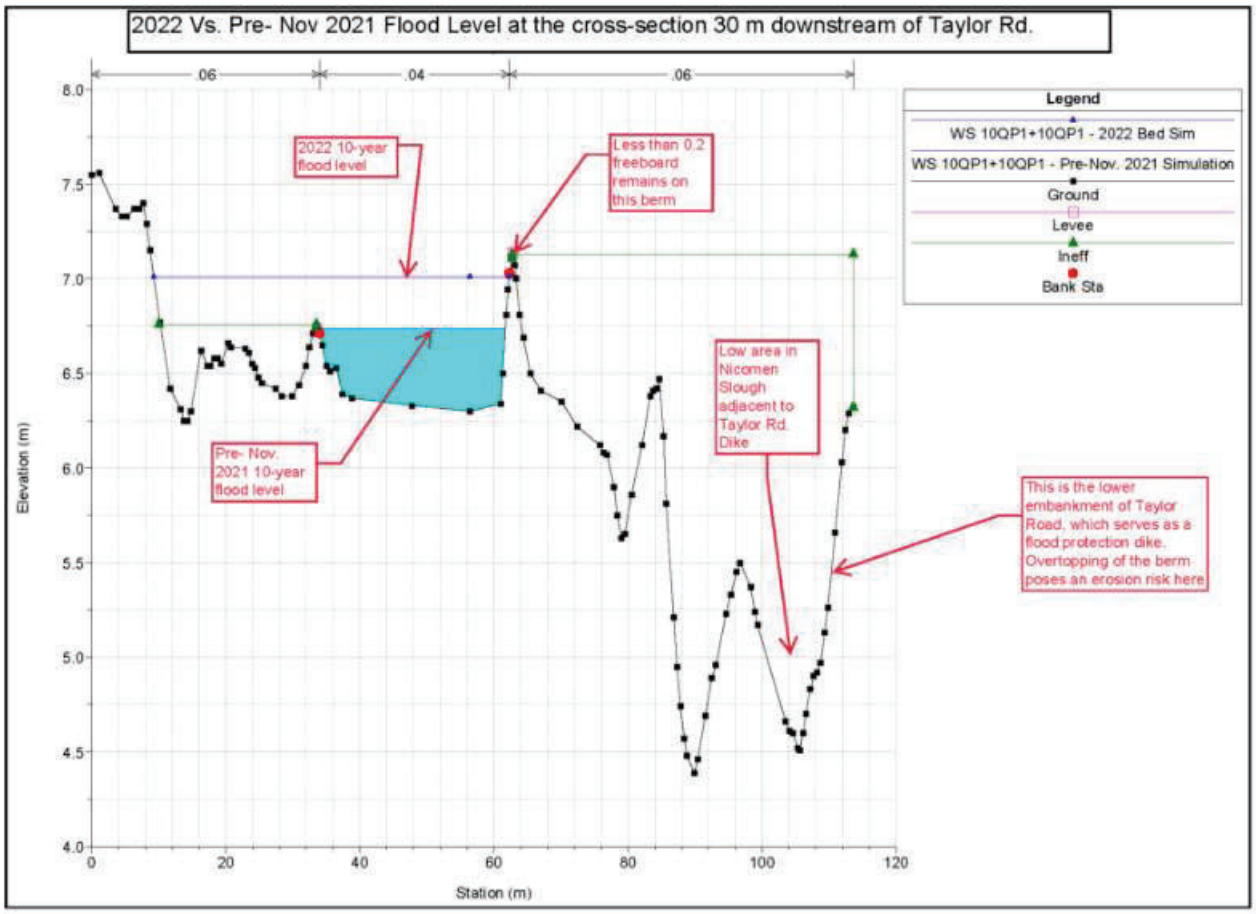

Figure 7. Simulated 10-year peak flood levels at a section 35 to 40 m downstream of MoTI's Taylor Road (Kelly-Deroche) Bridge: Pre-Nov. 2021 Vs. September 30, 2022. Note there is very little freeboard on the right bank berm that acts to confine the creek. Overtopping/ breaching of the berm would send flood waters into the deep slough channel to the west where it would erode the embankment of Taylor Road, which serves as a flood protection dike for properties north of Nicomen Slough.

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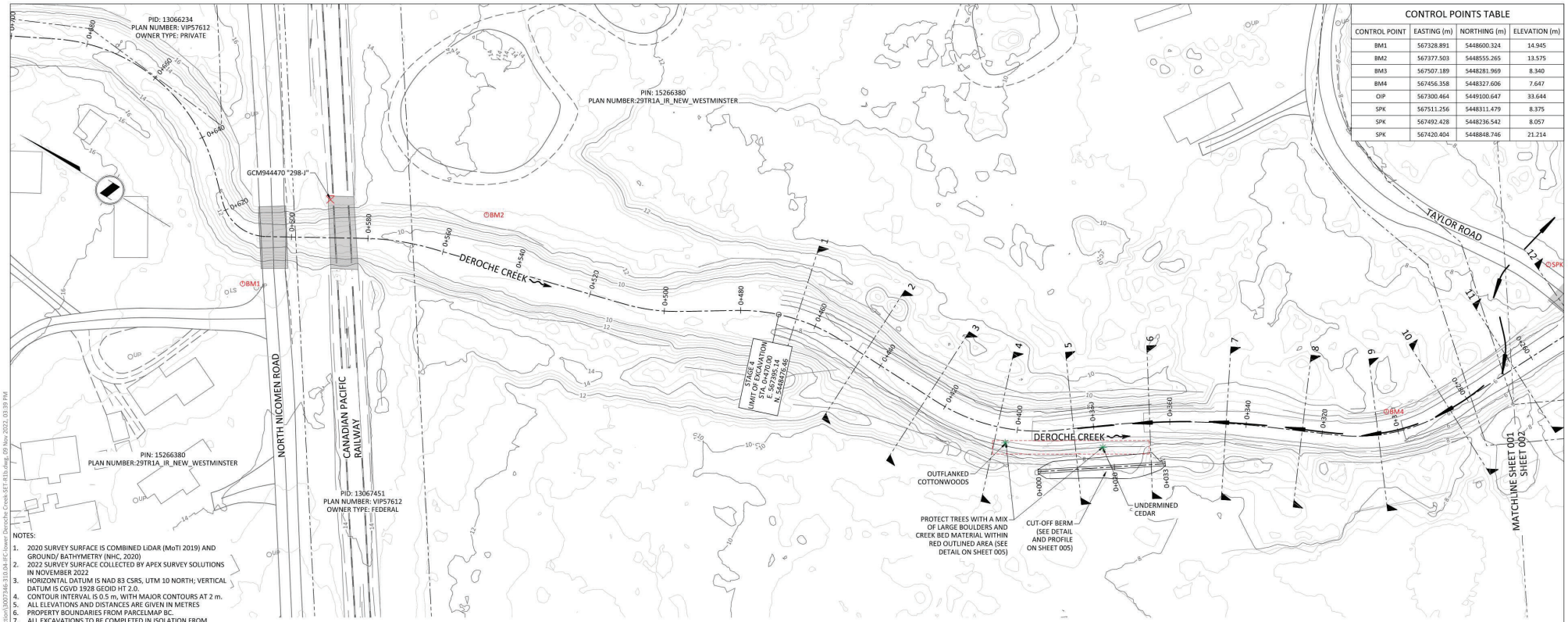
Appendix B

Design Drawings



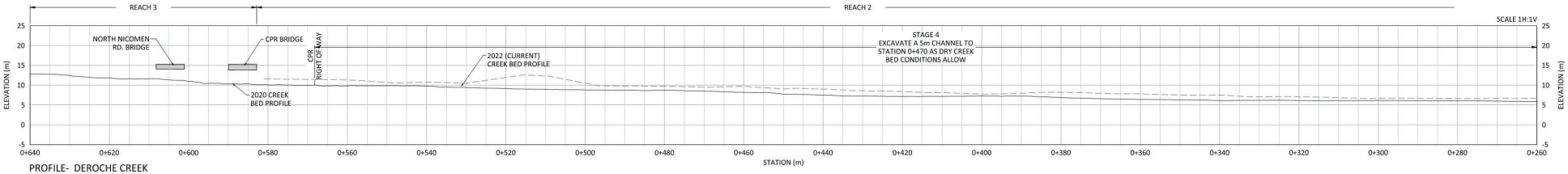
CONTROL POINTS TABLE

CONTROL POINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
BM1	567328.891	5448600.324	14.945
BM2	567377.503	5448555.265	13.575
BM3	567507.189	5448281.969	8.340
BM4	567456.358	5448327.606	7.647
OIP	567300.464	5449100.647	33.644
SPK	567511.256	5448311.479	8.375
SPK	567492.428	5448236.542	8.057
SPK	567420.404	5448848.746	21.214

NOTES:

1. 2020 SURVEY SURFACE IS COMBINED LiDAR (MoTI 2019) AND GROUND/ BATHYMETRY (NHC, 2020)
2. 2022 SURVEY SURFACE COLLECTED BY APEX SURVEY SOLUTIONS IN NOVEMBER 2022
3. HORIZONTAL DATUM IS NAD 83 CSRS, UTM 10 NORTH; VERTICAL DATUM IS CGVD 1928 GEOID HT 2.0.
4. CONTOUR INTERVAL IS 0.5 m, WITH MAJOR CONTOURS AT 2 m.
5. ALL ELEVATIONS AND DISTANCES ARE GIVEN IN METRES
6. PROPERTY BOUNDARIES FROM PARCELMAP BC.
7. ALL EXCAVATIONS TO BE COMPLETED IN ISOLATION FROM FLOWING WATER.

PLAN VIEW
1:500



PROFILE- DEROCHE CREEK
1:500

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
0	22-10-19	ISSUED FOR REVIEW
1	22-11-01	ISSUED FOR CONSTRUCTION
2	22-11-08	RE-ISSUED FOR CONSTRUCTION (STAGE 2 REMOVED)

nhc northwest hydraulic consultants

SEAL:

PROFESSIONAL ENGINEER D. J. GOOLD # 28281 BRITISH COLUMBIA

2022-11-11

LEGEND

2022 BED LEVEL	
2020 GROUND SURFACE	
PROPOSED EXCAVATION	
EQUIPMENT ACCESS	

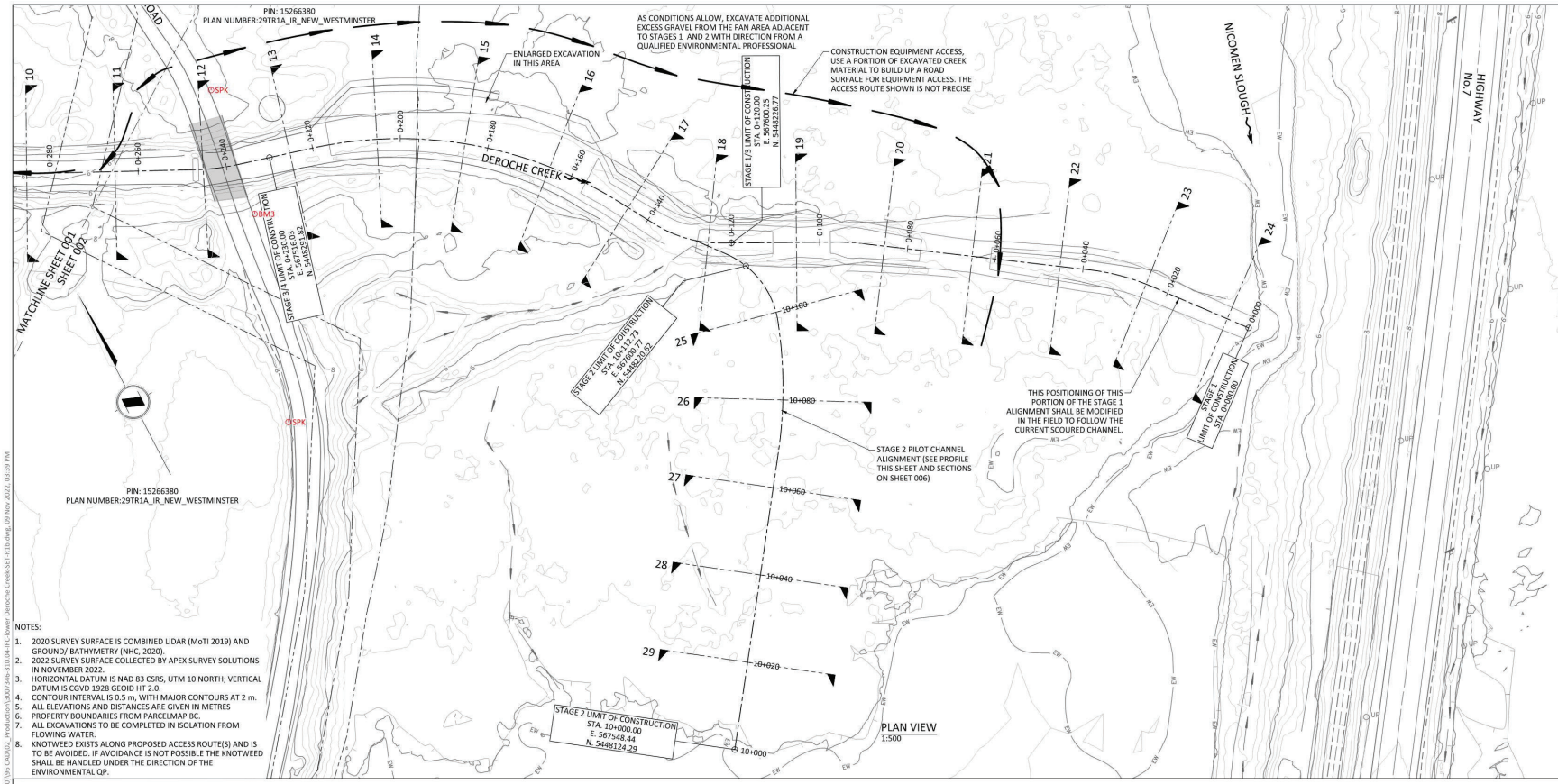
EMERGENCY SEDIMENT REMOVAL
DEROCHE CREEK - REACHES 1 AND 2

PLAN AND PROFILE VIEWS

DESIGNED:	DJG	SHEET ID:	3007346-310.04-001 R2	SHEET No:
DRAFTED:	CZZ	STATUS:	ISSUED FOR CONSTRUCTION	001
CHECKED:	DJG	SCALE:	AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE:	9 NOV 2022	REV No: R2

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\mainfile-van\Projects\Active\3007346 2021 AR Sediment Assessment\310 Deroche Ck LFN (CR-30)\96 CAD\02_Production\3007346-310.04-IFC-lower Deroche Creek-SET-R1b.dwg, 09 Nov 2022, 03:39 PM



CONTROL POINTS TABLE

CONTROL POINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
BM1	567328.891	5448600.324	14.945
BM2	567377.503	5448555.265	13.575
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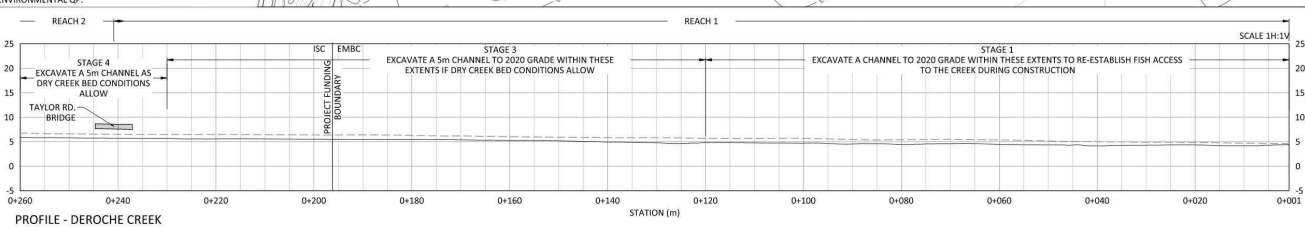
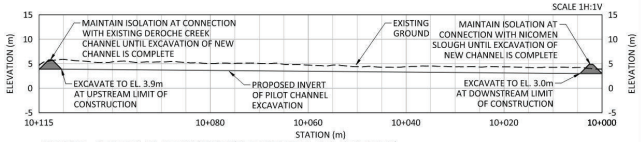
4. CONTOUR INTERVAL IS 0.5 m, WITH MAJOR CONTOURS AT 2 m.
5. ALL ELEVATIONS AND DISTANCES ARE GIVEN IN METRES
6. PROPERTY BOUNDARIES FROM PARCELMAP BC.
7. ALL EXCAVATIONS TO BE COMPLETED IN ISOLATION FROM FLOWING WATER.
8. KNOTWEED EXISTS ALONG PROPOSED ACCESS ROUTE(S) AND IS TO BE AVOIDED. IF AVOIDANCE IS NOT POSSIBLE THE KNOTWEED SHALL BE HANDLED UNDER THE DIRECTION OF THE ENVIRONMENTAL QP.



PROFILE - DEROCHE CREEK
1:500



PROFILE - STAGE 2 PILOT CHANNEL(SEE DWG 006 FOR SECTIONS)
1:500

CLIENT:

BRITISH COLUMBIA — Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
0	22-10-19	ISSUED FOR REVIEW
1	22-11-01	ISSUED FOR CONSTRUCTION
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nhc northwest hydraulic consultants

SEAL:

LEGEND
2022 BED LEVEL
2020 GROUND SURFACE
PROPOSED EXCAVATION
EQUIPMENT ACCESS

EMERGENCY SEDIMENT REMOVAL DEROCHE CREEK - REACHES 1 AND 2

PLAN AND PROFILE VIEWS

DESIGNED: DJG	SHEET ID: 3007346-310.4-002 R2	SHEET No:	002
DRAFTED: CZZ	STATUS: ISSUED FOR CONSTRUCTION		
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 9 NOV 2022	REV No:	R2

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\manitfile-van\Projects\Active\3007346 2021 49 Sediment Assessment\310 Deroche Ck LFN (CR-30)\06 CAD\02_Production\3007346-310.4-HFC lower Deroche Creek SET R1b.dwg, 09 Nov 2022, 03:39 PM

SECTION 18, STA. 0+125

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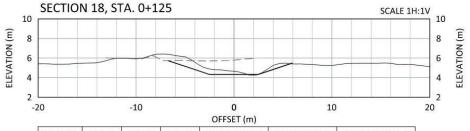
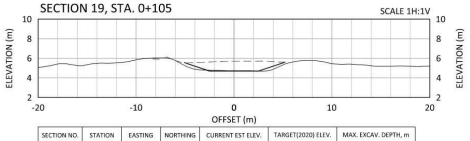


SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
18	0+125	567595.62	5448229.28	5.96	4.26	1.70

SECTION 19, STA. 0+105

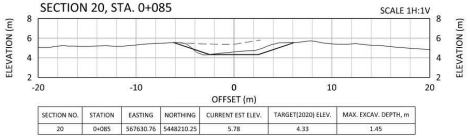
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
19	0+105	567613.41	5448220.13	5.71	4.70	1.01

SECTION 20, STA. 0+085

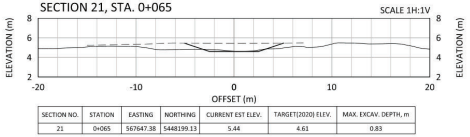
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
20	0+085	567630.76	5448210.25	5.78	4.33	1.45

SECTION 21, STA. 0+065

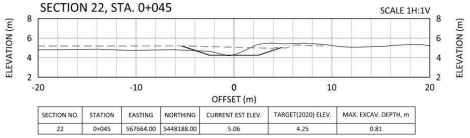
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
21	0+065	567647.38	5448199.13	5.44	4.61	0.83

SECTION 22, STA. 0+045

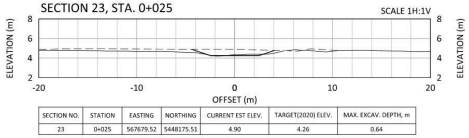
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
22	0+045	567664.00	5448188.00	5.06	4.25	0.81

SECTION 23, STA. 0+025

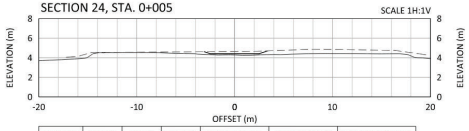
SCALE 1H:1V



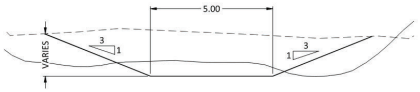
SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
23	0+025	567679.52	5448175.51	4.90	4.26	0.64

SECTION 24, STA. 0+005

SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
24	0+005	567692.29	5448160.12	4.67	4.41	0.26



TYPICAL SECTION
SCALE 1:100

NOTES:

1. ALL ELEVATIONS AND DISTANCES ARE GIVEN IN METRES
2. CROSS-SECTIONS ARE PLOTTED LOOKING DOWNSTREAM.
3. ALL EXCAVATIONS TO BE COMPLETED IN ISOLATION FROM FLOWING WATER.
4. AN ENVIRONMENTAL QP AND ARCH QP SHALL BE PRESENT THROUGHOUT CONSTRUCTION.
5. PORTIONS OF STAGE 3 AND ALL OF STAGE 4 EXCAVATIONS MAY NOT BE FEASIBLE IF SURFACE FLOWS IN DEROCHE CREEK PERSIST

0 5 10 15m
SCALE = 1:250

CLIENT:

BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
0	22-10-19	ISSUED FOR REVIEW
1	22-11-01	ISSUED FOR CONSTRUCTION
2	22-11-08	RE-ISSUED FOR CONSTRUCTION (STAGE 2 REMOVED)

nhc northwest hydraulic consultants

SEAL:

LEGEND	
2022 BED LEVEL	
2020 GROUND SURFACE	
PROPOSED EXCAVATION	
EQUIPMENT ACCESS	

EMERGENCY SEDIMENT REMOVAL DEROCHE CREEK - REACHES 1 AND 2

SECTIONS STAGE 1

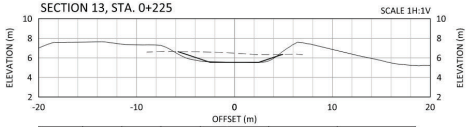
DESIGNED: DJG	SHEET ID: 3007346-310.4-003 R2	SHEET No:	
DRAFTED: CZZ	STATUS: ISSUED FOR CONSTRUCTION	003	
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 9 NOV 2022	REV No: R2	

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\manitoba-van\Projects\Active\3007346 2021 Sediment Assessment\310 Deroche Ck LFN (CR-30)\06 CAD\02_Production\3007346-310.04-IFC-lower Deroche Creek-SET-R1b.dwg, 09 Nov 2022, 03:39 PM

SECTION 13, STA. 0+225

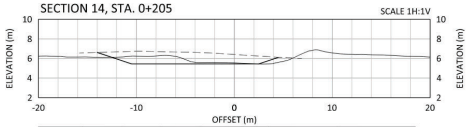
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
13	0+225	567520.61	5448290.62	6.57	5.55	1.02

SECTION 14, STA. 0+205

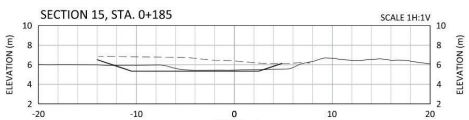
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
14	0+205	567539.58	5448284.37	6.74	5.45	1.29

SECTION 15, STA. 0+185

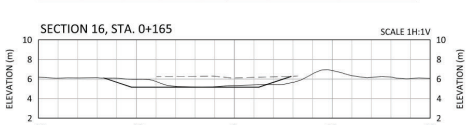
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
15	0+185	567556.84	5448274.34	6.77	5.34	1.43

SECTION 16, STA. 0+165

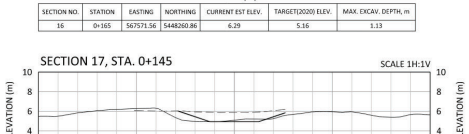
SCALE 1H:1V



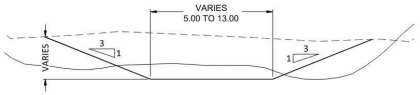
SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
16	0+165	567571.56	5448260.86	6.29	5.16	1.13

SECTION 17, STA. 0+145

SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
17	0+145	567583.11	5448244.57	5.89	4.94	0.95



TYPICAL SECTION
SCALE 1:100

NOTES:

1. ALL ELEVATIONS AND DISTANCES ARE GIVEN IN METRES
2. CROSS-SECTIONS ARE PLOTTED LOOKING DOWNSTREAM.
3. ALL EXCAVATIONS TO BE COMPLETED IN ISOLATION FROM FLOWING WATER.
4. AN ENVIRONMENTAL QP AND ARCH QP SHALL BE PRESENT THROUGHOUT CONSTRUCTION.
5. PORTIONS OF STAGE 3 AND ALL OF STAGE 4 EXCAVATIONS MAY NOT BE FEASIBLE IF SURFACE FLOWS IN DEROCHE CREEK PERSIST

0 5 10 15m
SCALE = 1:250

CLIENT:

BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
0	22-10-19	ISSUED FOR REVIEW
1	22-11-01	ISSUED FOR CONSTRUCTION
2	22-11-08	RE-ISSUED FOR CONSTRUCTION (STAGE 2 REMOVED)

nhc northwest hydraulic consultants

SEAL:

LEGEND	
2022 BED LEVEL	
2020 GROUND SURFACE	
PROPOSED EXCAVATION	
EQUIPMENT ACCESS	

EMERGENCY SEDIMENT REMOVAL
DEROCHE CREEK - REACHES 1 AND 2

SECTIONS STAGE 3

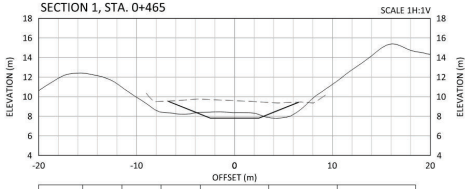
DESIGNED: DJG	SHEET ID: 3007346-310.4-004 R2		SHEET No: 004
DRAFTED: CZZ	STATUS: ISSUED FOR CONSTRUCTION		
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 9 NOV 2022		REV No: R2

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\manffile-van\Projects\Active\3007346 2021 AR Sediment Assessment\310 Deroche Ck LFN (CR-30)\06 CAD\02_Production\3007346-310.04-IFC-lower Deroche Creek-SET-R1b.dwg, 09 Nov 2022, 03:39 PM

SECTION 1, STA. 0+465

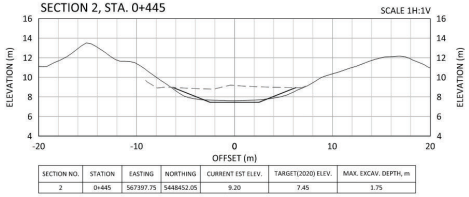
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
1	0+465	567396.49	5448471.93	9.59	7.82	1.77

SECTION 2, STA. 0+445

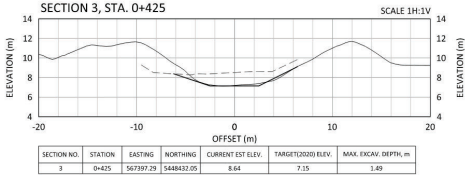
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
2	0+445	567397.75	5448452.05	9.20	7.45	1.75

SECTION 3, STA. 0+425

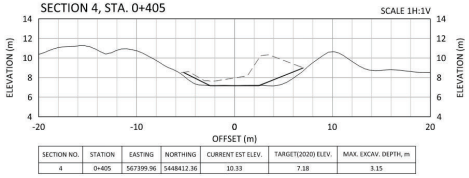
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
3	0+425	567397.29	5448432.05	8.64	7.15	1.49

SECTION 4, STA. 0+405

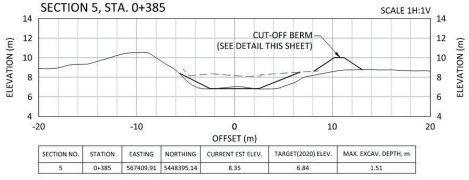
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
4	0+405	567399.96	5448412.36	10.33	7.18	3.15

SECTION 5, STA. 0+385

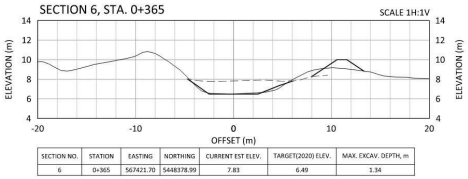
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
5	0+385	567409.91	5448395.14	8.35	6.84	1.51

SECTION 6, STA. 0+365

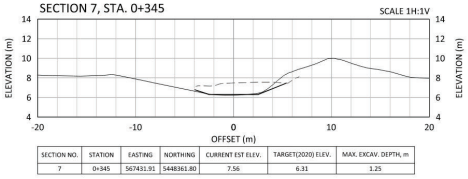
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
6	0+365	567421.70	5448378.99	7.83	6.49	1.34

SECTION 7, STA. 0+345

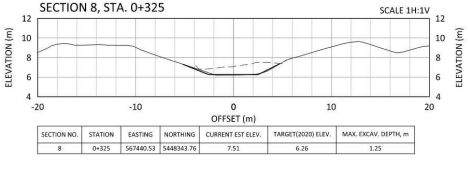
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
7	0+345	567431.91	5448361.80	7.56	6.31	1.25

SECTION 8, STA. 0+325

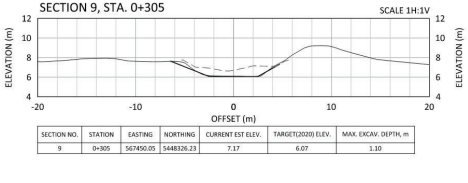
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
8	0+325	567440.53	5448343.76	7.51	6.26	1.25

SECTION 9, STA. 0+305

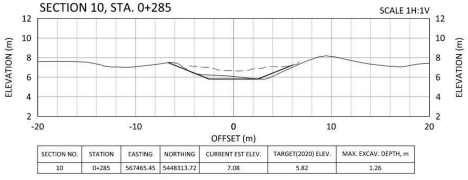
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
9	0+305	567450.05	5448326.23	7.17	6.07	1.10

SECTION 10, STA. 0+285

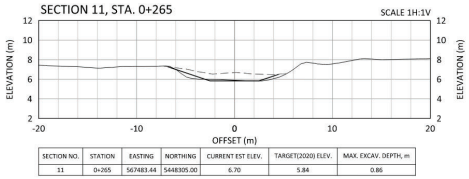
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
10	0+285	567465.45	5448313.72	7.08	5.82	1.26

SECTION 11, STA. 0+265

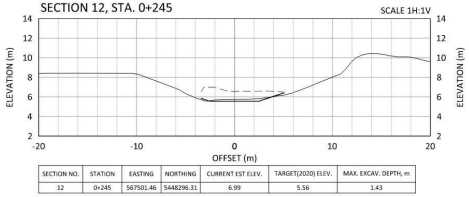
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
11	0+265	567483.44	5448305.00	6.70	5.84	0.86

SECTION 12, STA. 0+245

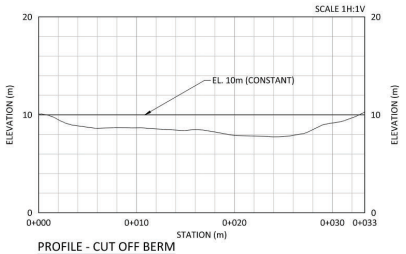
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
12	0+245	567501.46	5448296.31	6.99	5.56	1.43

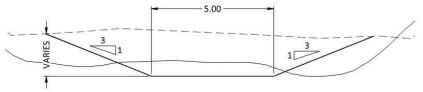
PROFILE - CUT OFF BERM

1:250



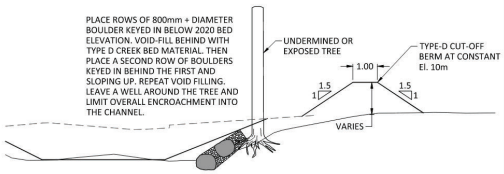
TYPICAL SECTION

SCALE 1:100



DETAIL - TREE PROTECTION AND CUT-OFF BERM

SCALE 1:100



NOTES:

1. ALL ELEVATIONS AND DISTANCES ARE GIVEN IN METRES
2. CROSS-SECTIONS ARE PLOTTED LOOKING DOWNSTREAM.
3. ALL EXCAVATIONS TO BE COMPLETED IN ISOLATION FROM FLOWING WATER.
4. AN ENVIRONMENTAL QP AND ARCH QP SHALL BE PRESENT THROUGHOUT CONSTRUCTION.
5. PORTIONS OF STAGE 3 AND ALL OF STAGE 4 EXCAVATIONS MAY NOT BE FEASIBLE IF SURFACE FLOWS IN DEROCHE CREEK PERSIST.
6. IF CREEK BED MATERIAL INDICATED FOR VOID-FILLING IS NOT AVAILABLE IT SHALL BE REPLACED WITH CLEAN 6-INCH MINUS ROCK.
7. THE CUT-OFF BERM SHALL BE CONSTRUCTED OF CREEK BED MATERIAL WITH NO STONES LARGER THAN 150mm, AND SHALL BE BUCKET-COMPACTED.
8. THE CUT-OFF BERM SHALL BE CONSTRUCTED OF IN-SITU CREEK BED TYPE-D OR IMPORTED TYPE-D, AND SHALL BE BUCKET-COMPACTED.

0 5 10 15m

SCALE = 1:250

CLIENT:

BRITISH COLUMBIA — Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
0	22-10-19	ISSUED FOR REVIEW
1	22-11-01	ISSUED FOR CONSTRUCTION
2	22-11-08	RE-ISSUED FOR CONSTRUCTION (STAGE 2 REMOVED)

nhc northwest hydraulic consultants

SEAL:

LEGEND	
2022 BED LEVEL	
2020 GROUND SURFACE	
PROPOSED EXCAVATION	
EQUIPMENT ACCESS	

EMERGENCY SEDIMENT REMOVAL
DEROCHE CREEK - REACHES 1 AND 2

SECTIONS STAGE 4

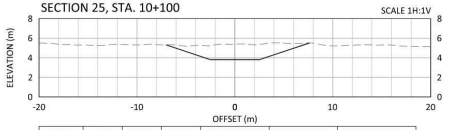
DESIGNED: DJG	SHEET ID: 3007346-310.4-005 R2	SHEET No:	
DRAFTED: CZZ	STATUS: ISSUED FOR CONSTRUCTION	005	
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 9 NOV 2022	REV No: R2	

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\manitfile-van\Projects\Active\3007346 2021 Sediment Assessment\310 Deroche Ck LFN (CR-30)\06 CAD\02_Production\3007346-310.04-IFC-lower Deroche Creek-SET-R1b.dwg, 09 Nov 2022, 03:39 PM

SECTION 25, STA. 10+100

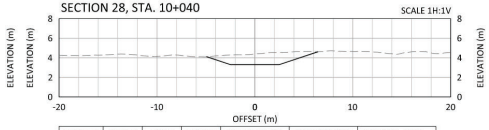
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
25	101+00	567602.07	5448208.18	5.19	3.81	1.38

SECTION 28, STA. 10+040

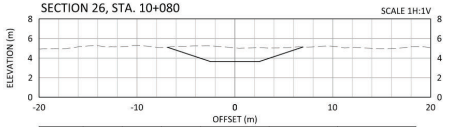
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
28	100+40	567571.69	5448156.84	4.09	3.30	0.79

SECTION 26, STA. 10+080

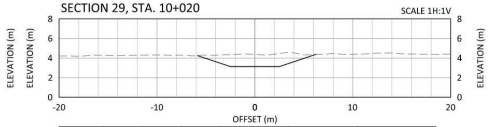
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
26	100+80	567594.35	5448189.78	5.03	3.64	1.39

SECTION 29, STA. 10+020

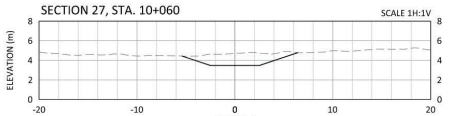
SCALE 1H:1V



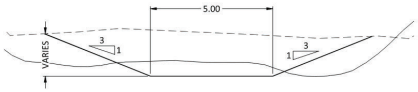
SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
29	100+20	567560.06	5448140.57	4.23	3.13	1.10

SECTION 27, STA. 10+060

SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
27	100+60	567563.32	5448173.11	4.44	3.47	0.97



TYPICAL SECTION
SCALE 1:100

NOTES:

1. ALL ELEVATIONS AND DISTANCES ARE GIVEN IN METRES
2. CROSS-SECTIONS ARE PLOTTED LOOKING DOWNSTREAM.
3. ALL EXCAVATIONS TO BE COMPLETED IN ISOLATION FROM FLOWING WATER.
4. AN ENVIRONMENTAL QP AND ARCH QP SHALL BE PRESENT THROUGHOUT CONSTRUCTION.
5. PORTIONS OF STAGE 3 AND ALL OF STAGE 4 EXCAVATIONS MAY NOT BE FEASIBLE IF SURFACE FLOWS IN DEROCHE CREEK PERSIST.
6. IF CREEK BED MATERIAL INDICATED FOR VOID-FILLING IS NOT AVAILABLE IT SHALL BE REPLACED WITH CLEAN 6-INCH MINUS ROCK.
7. THE CUT-OFF BERM SHALL BE CONSTRUCTED OF CREEK BED MATERIAL WITH NO STONES LARGER THAN 150mm, AND SHALL BE BUCKET-COMPACTED.
8. THE CUT-OFF BERM SHALL BE CONSTRUCTED OF IN-SITU CREEK BED TYPE-D OR IMPORTED TYPE-D, AND SHALL BE BUCKET-COMPACTED.

0 5 10 15m
SCALE = 1:250

CLIENT:

BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
0	22-10-19	ISSUED FOR REVIEW
1	22-11-01	ISSUED FOR CONSTRUCTION
2	22-11-08	RE-ISSUED FOR CONSTRUCTION (STAGE 2 REMOVED)

nhc northwest hydraulic consultants

SEAL:

LEGEND	
2022 BED LEVEL	
2020 GROUND SURFACE	
PROPOSED EXCAVATION	
EQUIPMENT ACCESS	

EMERGENCY SEDIMENT REMOVAL
DEROCHE CREEK - REACHES 1 AND 2

SECTIONS STAGE 2

DESIGNED: DJG	SHEET ID: 3007346-310.4-006 R2	SHEET No:	
DRAFTED: CZZ	STATUS: ISSUED FOR CONSTRUCTION	006	
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 9 NOV 2022	REV No: R2	

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nanaimo\Projects\Active\3007346 2021 Sediment Assessment\310 Deroche Ck LFN (CR-307)\06 CAD\02_Production\3007346-310.04-IFC-lower Deroche Creek-SET-R1b.dwg, 09 Nov 2022, 03:39 PM

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Appendix C

Environmental Approval Documents

20 October 2022

Ministry of Forests, Lands, Natural Resource Operations & Rural Development
c/o Front Counter BC Surrey
Suite 200, 10428 153rd Street
V3R 1E1

LETTER OF APPOINTMENT

To Whom It May Concern:

Please be advised that Ministry of Environment and Climate Change Strategy has appointed the following company as its agent:

Agent:
Kerr Wood Leidal Associates Ltd.
200 – 4185A Still Creek Drive
Burnaby, BC V5C 6G9 >>

Purpose of Appointment:
To submit a Section 11 Change Approval Application for Works In and About a Stream on behalf of Ministry of Environment and Climate Change Strategy for the Deroche Creek Emergency Sediment Removal project.

The length of this appointment shall be in effect for the duration of the Project.

Sincerely,

Thyren Jacobs
Debris Management Team Lead
ENV Flood Debris Management Secretariat
Cell: (778) 678-7359

October 21, 2022 Approval Number: 2010056

Ministry of Environment - Flood Debris Management Secretariat,
Environmental Emergencies and Land Remediation
PO Box 9342 Stn Prov Govt
Victoria, BC V8W 9M1
Sent via email: thyren.jacobs@gov.bc.ca

Leq'a mel First Nation
43101 Leq'a:mel Way Way
Deroche BC V0M1G0
Sent via email: rick@leqamel.ca

Dear All,

RE: Change Approval - Changes In and About a Stream on Deroche Creek

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

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

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

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

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

Ministry of Forests
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

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.

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,

Barbara Sutherland

Assistant Water Manager

Cc: Desmond Goold | Northwest Hydraulic Consultants Ltd. | dgoold@nhcweb.com
Kristen Endacott | Ministry of Forests | kristen.endacott@gov.bc.ca

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October 21, 2022 Approval Number: 2010056

APPROVAL

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

MINISTRY OF ENVIRONMENT - FLOOD DEBRIS MANAGEMENT SECRETARIAT, ENVIRONMENTAL EMERGENCIES AND LAND REMEDIATION and LEQ'A MEL FIRST NATION

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

(a) The name of the stream is Deroche Creek.

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

1. Removal of gravel and sediment in Reaches 1 and 2 to re-establish creek bed to 2020 levels to restore hydraulic capacity in the channel.

All works shall occur within Part of Primary: I.R. NO. 11, being Lakahahmen, New Westminster District.

(c) The location of the works are at the following coordinates, as provided by the applicant: 49.1848040, -122.0748330.

(d) The works authorized in this Approval shall be completed on or before September 15, 2023.

(e) 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

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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 to the holder of this Approval, 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.

(f) All works shall be completed within the designed project footprint and in accordance with the following documents. Any major changes to the design must be submitted to the Water Manager for written authorization.

1. "Site Assessment of Potential Areas of Concern for Fall-Winter 2022 PwC Site CR-30 Deroche Creek, Fall-Winter Final, Rev. 0", dated October 5, 2022, prepared by Northwest Hydraulic Consultants Ltd.

(g) 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

(h) 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:

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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 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.

Ministry of Forests

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

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

(k) All equipment and machinery used in or near the stream channel:

1. Must be in good operating condition and free of leaks, excess oil, and grease;
2. Must have a spill containment kit readily accessible on-site. All staff must be trained in handling and applying a spill kit appropriately to any spills/incidents;
3. Refueling must occur a minimum of 30 metres away from all streams; and
4. Must use environmentally sensitive hydraulic fluids which are non-toxic to aquatic life and are readily or inherently biodegradable.

(l) 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.

(m) 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 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.

(n) All excavated material and debris shall be removed from the site or placed in a stable area above the high water mark of the stream.

Mitigative measures must be applied to protect the excavated material and debris from erosion and reintroduction into the watercourse. These measures may include covering the material with erosion blankets, seeding and planting with native vegetation, or as otherwise directed by a Qualified Professional.

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(o) 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.

(p) The Creek alignment should be maintained and in no case should the excavation increase the overall width of the channel. No over excavation of the channel is permitted.

(q) A pre-construction and post-construction survey shall be conducted, and elevations should be verified during sediment removal.

(r) The finished channel should have a gentle U or V shape in the cross section with the stream bed left in a reasonably smooth state with no depressions that could strand fish.

(s) Large boulders and large woody debris should be retained in the channel for fish habitat as per advice from a Qualified Professional.

(t) In the unlikely event that flows are encountered during the work the contractor will stop working and commence excavation only when the channel is dry, or the site isolated and appropriate erosion and sediment control measures are put in place.

(u) The holder of this Approval must provide a detailed post-construction report no later than December 1 of the year works are completed. The report must be submitted to SouthCoastWSAReporting@gov.bc.ca. The subject line of the email and the report must be labelled with this Approval file number 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;
5. The frequency of monitoring, including the name(s) of the designated monitor(s);
6. Representative site photographs;
7. Whether or not they observed or were otherwise aware of any non-compliance with the terms and conditions of this Approval; and
8. A description of any environmental incidents, non-compliance, or other difficulties, and how these were addressed and reported.
9. Post-construction survey of the streambed.

Ministry of Forests

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Barbara Sutherland.

Assistant Water Manager

Ministry of Forests

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Web: https://www2.gov.bc.ca/gov/content/environment/air-land-water/water

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Appendix D

Archaeological Permits

(Not applicable for this report.)

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Appendix E

Contractor Assessment

(Not applicable for this report.)

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Appendix F

Contract Documents

(Refer to complete EMP in Appendix N.)

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Appendix G

Access Agreement

(Not applicable for this report.)

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Appendix H

Field Review Reports

Weekly Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: DEROCHE CREEK EMERGENCY SEDIMENT REMOVAL
Client: Northwest Hydraulic Consultants
Contractor: Summit Earthworks
Contract No.: 2838-002

PREPARED BY	Santiago Paredes M.	**ON SITE**	1115	**OFF SITE**	1440
DATE	2022-11-08				
WEATHER	Sunny, clear, windy, 3-4 °C				

TAILGATE MEETING NOTES

*This area may be used in lieu of KWL "Appendix B11-Tailgate Meeting"

KWL Staff: **Must be *signed* by field staff

Patrick Lilley
Oskar Van Wohl
Santiago Paredes M.

KWL Activities:

Field review, initial meeting with contractor

Site Activities:

Creek diverted to allow for tree protection riprap to be placed along eroded bank.

Tree protection riprap placed along eroded bank.

Site walkthrough with KWL, PwC, Rick McKamey (RM) to delineate works to be completed downstream of Deroche Creek

Identified Hazards:

Refer to PSP

Contractor Tailgate Meeting Notes Reviewed?

(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address

7324 Hurd St
Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services: 911
Hospital (non-emergency): (604) 826-6261
Police (non-emergency): (604) 826-7161
Fire (non-emergency): (604) 820-3793
Other: n/a
Client Health and Safety Officer:
On-site First Aid Attendant: TBC

EQUIPMENT AND WORKFORCE ON SITE

Workforce:

- 2 – Excavator operators
- 2 – Articulated dump trucks operators
- 2 – Laborers
- 1 – Safety Officer

Equipment:

- 2 – Excavator - Doosan DX300LC
- 2 - Articulated dump trucks - Doosan DA30
- 1 – Dozer – Case 2050M – **not in use**

CONSTRUCTION PROGRESS

- Deroche creek diverted at STA 0+405 to STA 0+345 to allow the creek bed to dry to commence excavating for the riprap placement along the western bank. (Photo 1)
- Excavation below 2020 bed elevation started to allow for riprap installation along undermined tree locations. Riprap stoked pile at access road along RM property. (Photo 2)
- Riprap placed around undermined trees and at keyed location to delineate boundary of tree protection structure. (Photo 3)
- First layers of riprap placed keyed in bank.

REVIEWER'S OBSERVATIONS

- Access road created on RM property to access creek for berm and riprap structure
- Stagging area created on RM property to house construction equipment and riprap stockpile
- Riprap was placed in between tree roots without a buffer zone for the native material.
- Creek bed with waterflow downstream of Taylor Rd's bridge

Weekly Field Review Report

KERR WOOD LEIDAL
consulting engineers

DISCUSSIONS WITH CONTRACTOR

- Advised contractor to stay clear from the tree roots and place native material to create a buffer between the riprap and the tree bulb. (Photo 4)
- Contractor will bring an excavator with a rotating bucket to facilitate sediment removal underneath Taylor Road bridge. The excavator has a 14-foot reach, other removal may be done by manual excavation.
- Six more loads of riprap will be delivered on 2022-11-09 to complete tree protection structure.
- Stage 1 aligment from approximately STA 0+000 to STA 0+060 moved westward to prevent heavy discharge from eroding the existing dike along Highway No. 7. Contractor to follow a scoured channel and smoothly transition with a large turning radius to the west side of the Nicomen Slough.
- Contractor will mobilize an extra crew to commence work on stage 1 downstream of the Deroche creek.

DISCUSSIONS WITH OTHERS

- n/a

ACTION REQUIRED

- Contractor to mobilize new crew to commence work for Stage 1 at STA0+000 to approximately STA 0+060.

PHOTOGRAPHS



Photo 1: Facing north – Deroche Creek new aligment to allow for tree protection structure

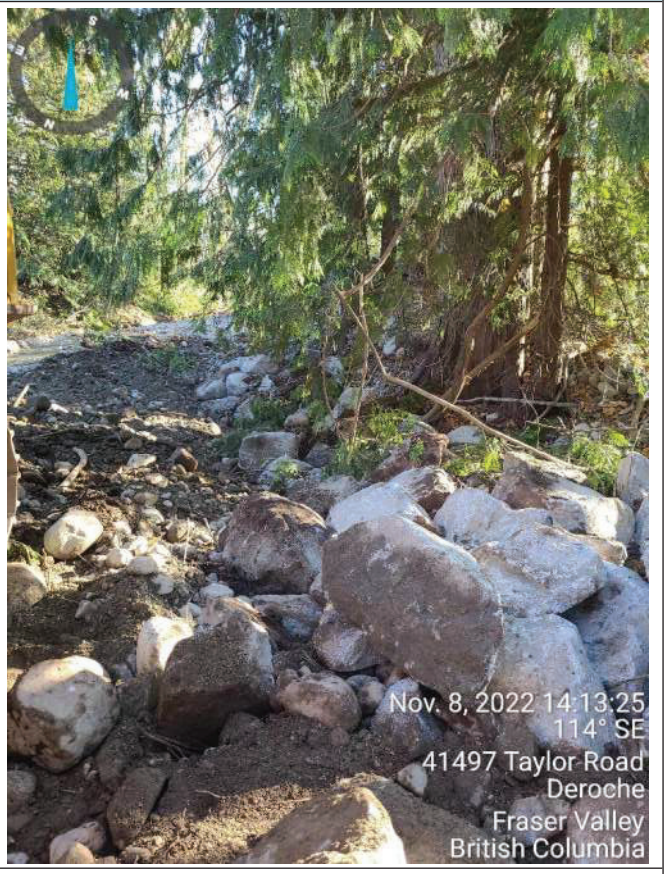


Photo 2: Facing south – riprap stockpile along access created along RM property

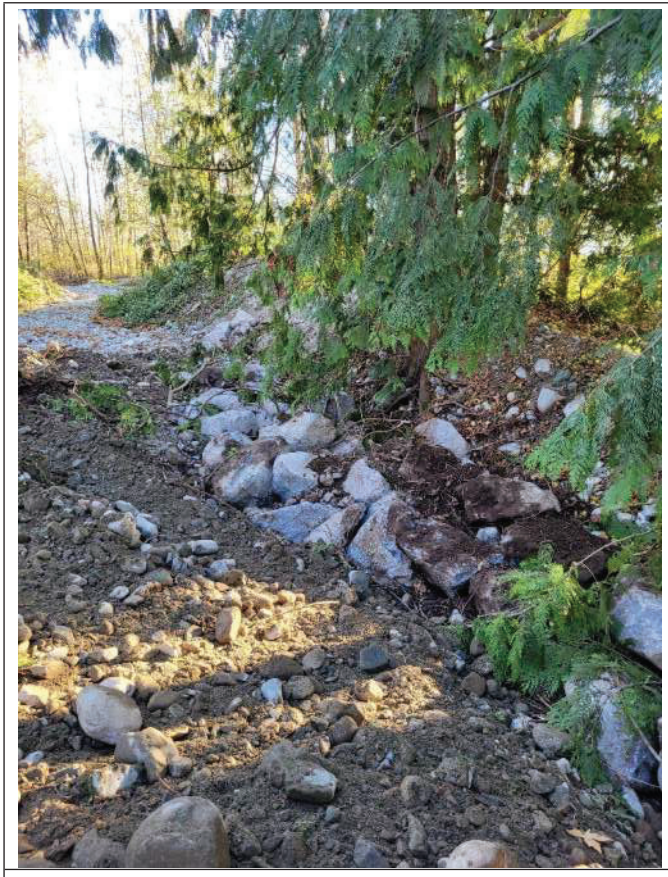


Photo 3: Facing south – first layers of keyed-in riprap along Deroche Creek



Photo 4: Facing south – riprap placed away from tree to create well for native material placement

Daily Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: DEROCHE CREEK EMERGENCY SEDIMENT REMOVAL
Client: Northwest Hydraulic Consultants
Owner: Leq'a:mel First Nation
Contractor: Summit Earthworks
Contract No.: 2838-002

PREPARED BY	Santiago Paredes M.	**ON SITE**	0900	**OFF SITE**	1115
DATE	2022-11-09				
WEATHER	Sunny, clear, windy, 0-3 °C				

TAILGATE MEETING NOTES

*This area may be used in lieu of KWL "Appendix B11-Tailgate Meeting"

KWL Staff: **Must be *signed* by field staff

Jamie Dimillio
Santiago Paredes M.

KWL Activities:
Field review

Site Activities:
Riprap structure and cut-off berm construction

Identified Hazards:
Vehicle traffic, construction vehicles, slips trips and falls from uneven terrain, cold weather

Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☒ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
7324 Hurd St
Mission, BC V2V 3H5

Emergency Phone Numbers
Emergency Services: 911
Hospital (non-emergency): (604) 826-6261
Police (non-emergency): (604) 826-7161
Fire (non-emergency): (604) 820-3793
Other: n/a
Client Health and Safety Officer: TBC
On-site First Aid Attendant:
Ashley from Medix BC
(250)-893-3418

EQUIPMENT AND WORKFORCE ON SITE

Workforce:
- 2 – Excavator operators
- 2 – Articulated dump trucks operators
- 2 – Laborers
- 1 – Safety Officer

Equipment:
- 2 – Excavator – Doosan DX300LC
- 1 – Excavator – Case CX245D – **not in use**
- 2 - Articulated dump trucks - Doosan DA30
- 1 – Dozer – Case 2050M – **not in use**

CONSTRUCTION PROGRESS
- Tree protection structure completed from access road along adjacent property to the upstream end of the cut-off berm. (Photo 1)
- Cut-off berm partially completed on western side of bank.
- Creek scour channel filled with native material to divert flow to linear section to prevent future bank erosion. (Photo 2)

Daily Field Review Report

KERR WOOD LEIDAL
consulting engineers

REVIEWER'S OBSERVATIONS

- Deficient riprap placement on the structure, does not follow a constant slope. (Photo 3)
- Creek bed flow has receded over night approximately 15 meters upstream of Taylor Rd's Bridge. (Photo 4)
- Riprap placement in close proximity to trees - KWL environmental team to comment.
- Cut-off berm not graded and does not meet design elevation according to design drawings.

DISCUSSIONS WITH CONTRACTOR

- Advised contractor to place more riprap in the northern side of the structure to allow a smoother transition, constant slope from the toe of the structure to the side slope of the western bank.
- Contractor to complete works at the cut-off berm and the riprap structure by mid-day and mobilize downstream past Taylor Rd's bridge at the creek to commence work at stage 2.

DISCUSSIONS WITH OTHERS

- n/a

ACTION REQUIRED

- Contractor to return to upstream to the cut-off berm location to grade out and flatten the crest of the Cut-off berm per NHC design drawings.

PHOTOGRAPHS

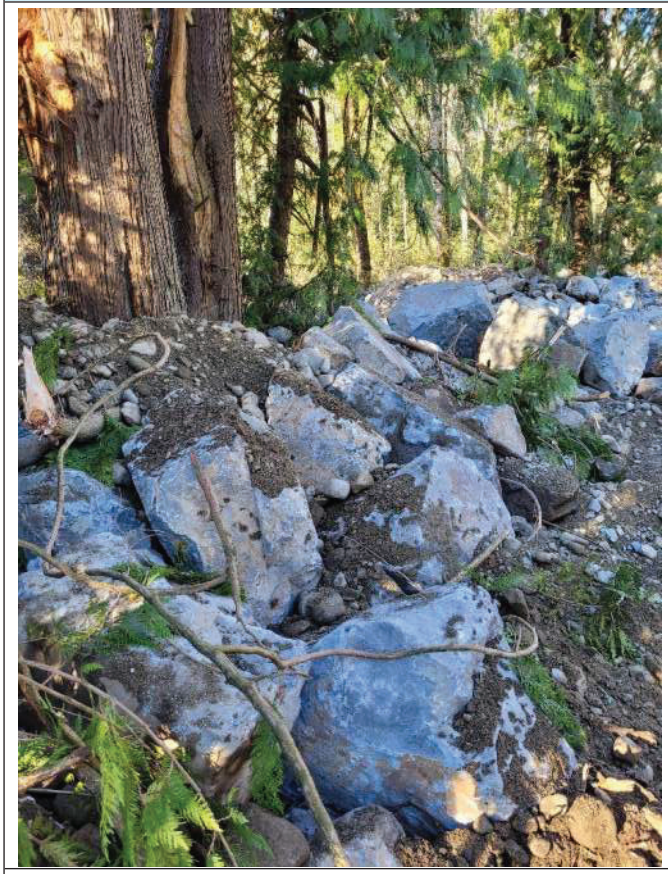


Photo 1: Facing northwest – riprap structure around trees infilled with native material

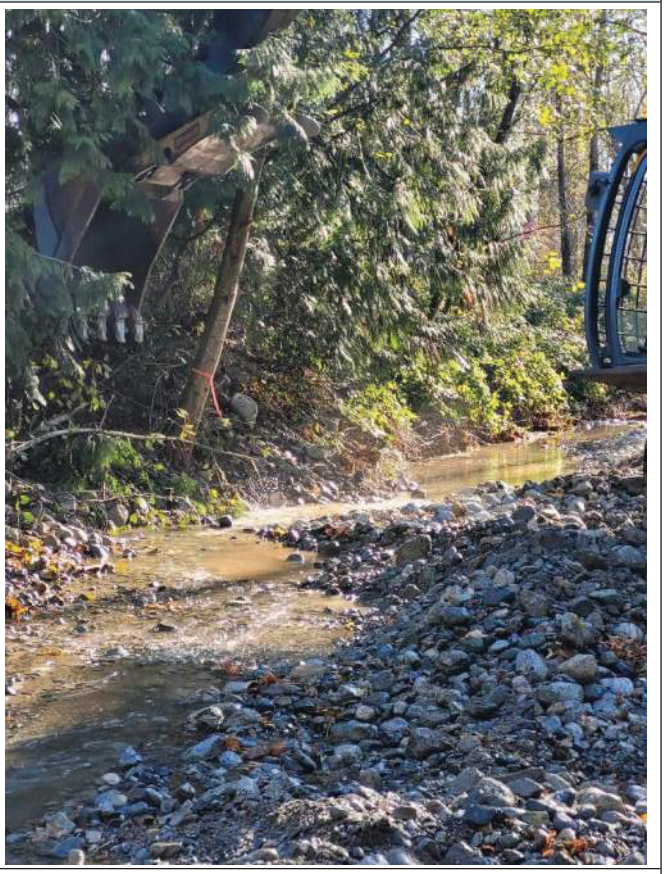


Photo 2: Facing south – native material placed into scour channel to divert flow to a linear section of the creek

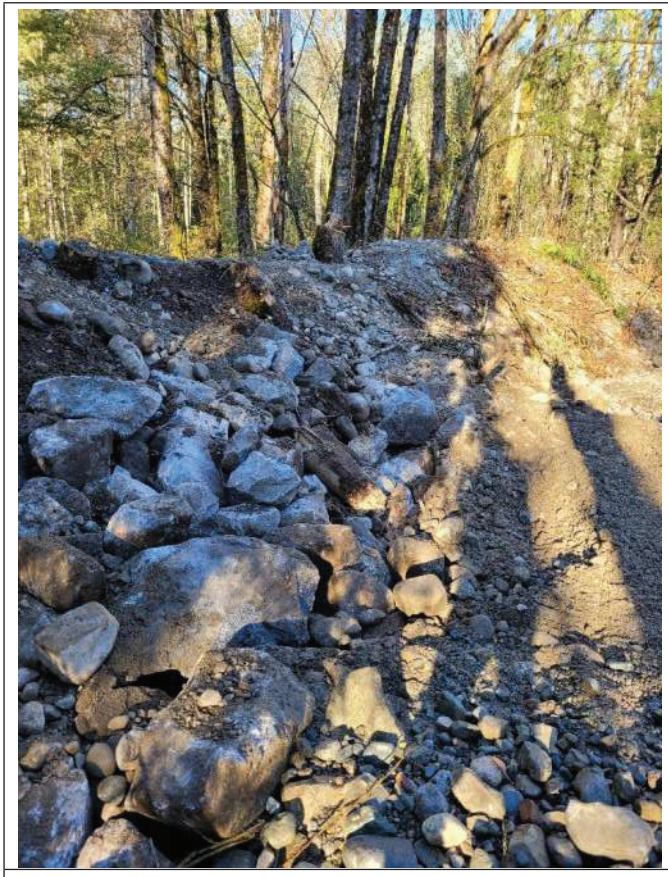


Photo 3: Facing North – Deficient riprap structure with irregular slope

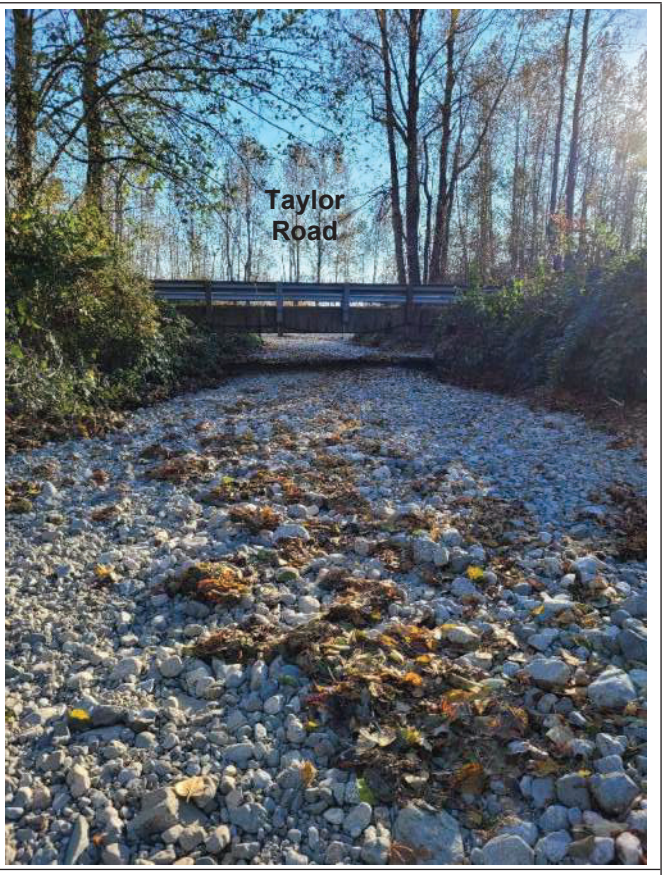


Photo 4: Facing north – Deroche Creek bed with no flow.

Daily Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: DEROCHE CREEK EMERGENCY SEDIMENT REMOVAL
Client: Northwest Hydraulic Consultants
Owner: Leq'a:mel First Nation
Contractor: Summit Earthworks
Contract No.: 2838-002

PREPARED BY	Santiago Paredes M.	**ON SITE**	0930	**OFF SITE**	1645
DATE	2022-11-10				
WEATHER	Cloudy, windy, 0-3 °C				

TAILGATE MEETING NOTES

*This area may be used in lieu of KWL "Appendix B11-Tailgate Meeting"

KWL Staff: **Must be *signed* by field staff

Andrew Baylis
David Sanders
Santiago Paredes M.

KWL Activities:

Field review

Site Activities:

Access roads to stage 3 and 2 constructed.
Field fit aligment with contractor

Identified Hazards:

Vehicle traffic, construction vehicles, slips trips and falls from uneven terrain, cold weather

Contractor Tailgate Meeting Notes Reviewed?

(check one) Yes ☒ No ☒ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address

7324 Hurd St
Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services: 911
Hospital (non-emergency): (604) 826-6261
Police (non-emergency): (604) 826-7161
Fire (non-emergency): (604) 820-3793
Other: n/a
Client Health and Safety Officer: TBC
On-site First Aid Attendant:
Ashley from Medix BC
(250)-893-3418

EQUIPMENT AND WORKFORCE ON SITE

Workforce:

- 3 – Excavator operators
- 2 – Articulated dump trucks operators
- 3 – Laborers
- 1 – Safety Officer
- 1 – Surveyor (Alexa from Apex Geomatics – subcontracted to Summit)

Equipment:

- 2 – Excavator – Doosan DX300LC
- 1 – Excavator – Case CX245D
- 2 - Articulated dump trucks - Doosan DA30
- 1 – Dozer – Case 2050M – **not in use**

Daily Field Review Report

KERR WOOD LEIDAL
consulting engineers

CONSTRUCTION PROGRESS

- Riprap stockpile moved from cut-off berm site to downstream of Taylor Rd's bridge. (Photo 1)
- Cleared woody debris at transition between stage 2 and stage 3 (approx. STA 10+115) to allow access road construction.
- Imported material placed adjacent to Taylor Rd's bridge to create access road to creek bed. (Photo2)
- Existing material excavated from creek bed (approx. STA 0+160 to STA 0+180) and placed along stage 2 upstream boundary (approx. STA 10+115) to create access road for equipment.(Photo 3 and Photo 4)
- Swamp matts placed at end of stage 2 to allow for safe passage for excavator.
- Surveyed stakes placed along field fit alignment with existing ground elevations.

REVIEWER'S OBSERVATIONS

- Access road constructed with imported material adjacent to Taylor Rd's bridge (NW).
- Cut-off berm doesn't not meet design elevation or top width – surveyor to confirm design elevation.
- Stage 2 clearing started before Summits surveyor on site.
- Stage 4 channel constructed until approximately STA 0+360.

DISCUSSIONS WITH CONTRACTOR

- Construction at stage 4 stopped per KWL environmental team decision – refer to KWL environmental report. Construction will resume on 2022-11-11 or once water on creek bed has receded.
- Riprap maybe used to armour creeks transition curve between stage 3 and stage 2 to prevent bank erosion – NHC to comment.
- Advised contractor to stake out design elevation for cut-off berm once surveyor onsite and to place more fill to allow for a 1.0m top width.
- Surveyor to arrive to site at mid-day to layout field fit alignment along stage 2 channel. Clearing and grubbing to start before layout by Apex.
- Surveyor to be present on site all day on 2022-11-10 to layout field fit alignment for stage 2.
- Field fit alignment to have same design inverts at transition point from stage 3 to stage 2 of 3.9 m and tie-in to Nicomen Slough at an invert elevation of 3.0 m. Grade to be field fit as directed by engineer on site based on tie-in elevations – NHC to comment.

DISCUSSIONS WITH OTHERS

- n/a

ACTION REQUIRED

- Field engineer to provide marked up design drawings with approximate location of field fit aligment c/w with approximate grades - NHC to comment.
- Surveyor to layout field fit aligment as directed by field engineer and contractor.

PHOTOGRAPHS

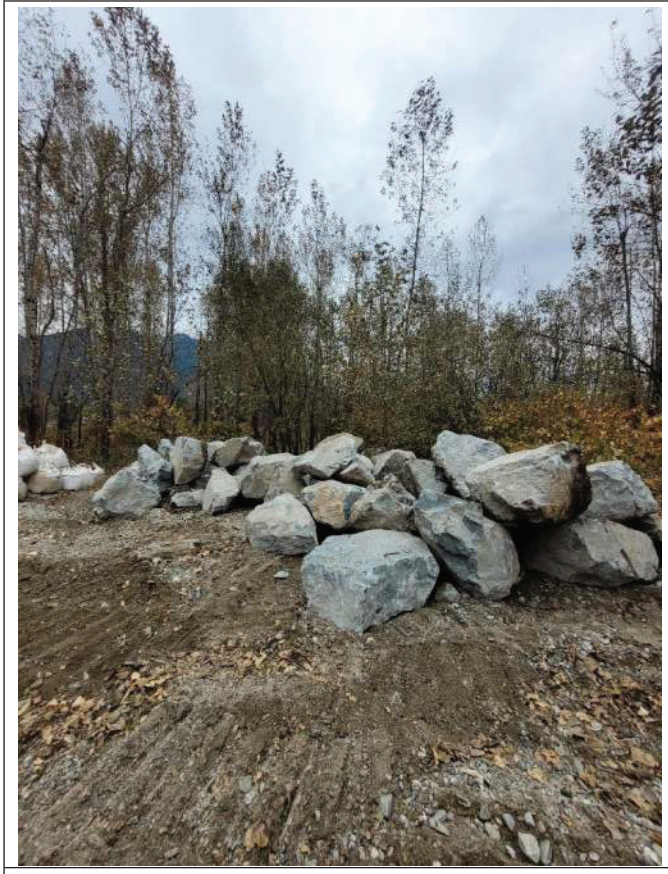


Photo 1: Facing – Riprap stockpile moved from cut-off berm location to downstream of Taylor Rd's bridge



Photo 2: Facing east – access road from Taylor Rd to creek bed, bridge located to right of the photo.



Photo 3: Facing east – existing material excavated for access road into stage 2.



Photo 4: Facing south – access road to stage 2 constructed out of existing material

Daily Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: DEROCHE CREEK EMERGENCY SEDIMENT REMOVAL
Client: Northwest Hydraulic Consultants
Owner: Leq'a:mel First Nation
Contractor: Summit Earthworks
Contract No.: 2838-002

PREPARED BY	Santiago Paredes M.	**ON SITE**	745	**OFF SITE**	1645
DATE	2022-11-11				
WEATHER	Cloudy, windy, 0-3 °C in the morning, partly sunny in the afternoon 7 °C				

TAILGATE MEETING NOTES

*This area may be used in lieu of KWL "Appendix B11-Tailgate Meeting"

KWL Staff: **Must be *signed* by field staff

Andrew Baylis
Santiago Paredes M.

KWL Activities:

Field review

Site Activities:

Access roads to stage 3 and 2 constructed.
Field fit aligment with contractor
Stage 4 construction

Identified Hazards:

Vehicle traffic, construction vehicles, slips trips and falls from uneven terrain, cold weather

Contractor Tailgate Meeting Notes Reviewed?

(check one) Yes ☒ No ☒ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address

7324 Hurd St
Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services: 911
Hospital (non-emergency): (604) 826-6261
Police (non-emergency): (604) 826-7161
Fire (non-emergency): (604) 820-3793
Other: n/a
Client Health and Safety Officer: TBC
On-site First Aid Attendant:
Ashley from Medix BC
(250)-893-3418

EQUIPMENT AND WORKFORCE ON SITE

Workforce:

- 3 – Excavator operators
  - Steven, Larry
- 2 – Articulated dump trucks operators
- 3 – Laborers
- 3 – Truck drivers
- 1 – Safety Officer
  - Ashley
- 1 – Surveyor (Alexa from Apex Geomatics – subcontracted to Summit)

Equipment:

- 2 – Excavator – Doosan DX300LC
- 1 – Excavator – Case CX245D
- 2 - Articulated dump trucks - Doosan DA30
- 1 – Dozer – Case 2050M – **not in use**
- 3 – Trucks – parked in Taylor Rd – **not in use**

CONSTRUCTION PROGRESS

Upstream Taylor Rd's Bridge

- Riprap placed on tree protection structure to meet design slope. Bank tied into to structure with side slopes. Riprap covered with existing material and sloped towards bottom of bank.
- Stage 4 creek bed widened to meet 5.0 m design. Banks sloped at approximately design slope to meet existing banks.
- Surveyor placed stakes at top of berm with existing elevations and fill depths.

Downstream Taylor Rd Bridge

- Advised contractor not to excavate to design depth close to Taylor Rd bridge as NHC will be providing technical direction on 2011-11-14 regarding the transition from upstream under the Taylor Rd's bridge from stage 4 to stage 3. Approximately STA 0+260 to STA 0+230.
- Creek bed material excavated to use as temporary road access to stage 2 channel section. Depth of exaction is lesser than design elevation – Summit will widen, construct side slopes once stage 1 and 2 are completed. (Photo 1)
- Filter fabric placed on stage 2 channel to provide barrier between existing ground and material excavated from creek bed. (Photo2)
- Silt fence placed in eastern side of stage 2 alignment as directed by KWL environmental monitor.
- Field fit stage 2 alignment stakes placed with new grades and elevations. NHC provided new grades and elevations based on KWL horizontal adjustment.
- Stage 1 aligment staked out based on original desing up to natural diversion created by the previous flow.

REVIEWER'S OBSERVATIONS

Upstream Taylor Rd's Bridge

- Placement of riprap along protection structure has reached design intent – contractor to proceed with design slope from the bottom of bank.
- Creek bed widened to meet 5.0 m design – some creek bed areas present wider areas and doesn't seem to meet invert elevation.
- Creek side slopes seem to be steeper than prescribed in NHC design drawings. (Photo 3 and Photo 4)
- Surveyor placed stakes with existing elevations along cut-off berm. Elevation varies between 9.3 m and 9.7m.

Downstream Taylor Rd Bridge

- Minor suspect petroleum based liquid spill found at end of stage 1 construction limits – KWL environmental to comment.
- Silt fence installed along easter side of stage 2 alignment.

DISCUSSIONS WITH CONTRACTOR

Upstream Taylor Rd's Bridge

- Advised contractor to check elevation on newly graded creek bed and that it may require more exaction to reach design elevation.
- Advised contactor to tie-in to northern bank of creek at design slope.
- Advised contractor to meet design elevation for cut-off berm based on placed stakes.

Downstream Taylor Rd Bridge

- Advised contractor to follow revised alignment with field fit design grades.
- Access road to be completed in the early morning and ready to start hauling off existing material of site.
- Contractor proposed to construct a cut-off berm along the eastern side of stage 2 to provide a higher bank than design. Advised contractor to stay construct as designed – NHC to comment in regards construction of a cut-off berm along stage 2.
- Temporary road material and filter cloth to be removed as construction of stage 2 channel progresses.

DISCUSSIONS WITH OTHERS

- Install silt fence along limits of stage 1 to cut off existing flow from exaction site. Flow well outside limits of construction.

Daily Field Review Report

KERR WOOD LEIDAL
consulting engineers

ACTION REQUIRED

Upstream Taylor Rd's Bridge

- Contractor to confirm stage 4 creek invert elevations – may require more excavation to meet design elevations.
- Contractor to ensure side slopes meet design grade.
- Contractor to bring laser level to confirm elevations and grades.

Downstream Taylor Rd Bridge

- Contractor to install silt fence within stage 1 construction limits – KWL to confirm location on site.
- Contractor to use spill kit to clean up minor suspect petroleum-based liquid – KWL to indicate location of minor suspect spill.

PHOTOGRAPHS



Photo 1: Facing north towards Taylor Rd's bridge – excavation lesser than design elevation.



Photo 2: Facing north – existing creek material placed on filter fabric from temporary access road into stage 2.



Photo 3: Facing southwest – slopes daylight to existing bank.

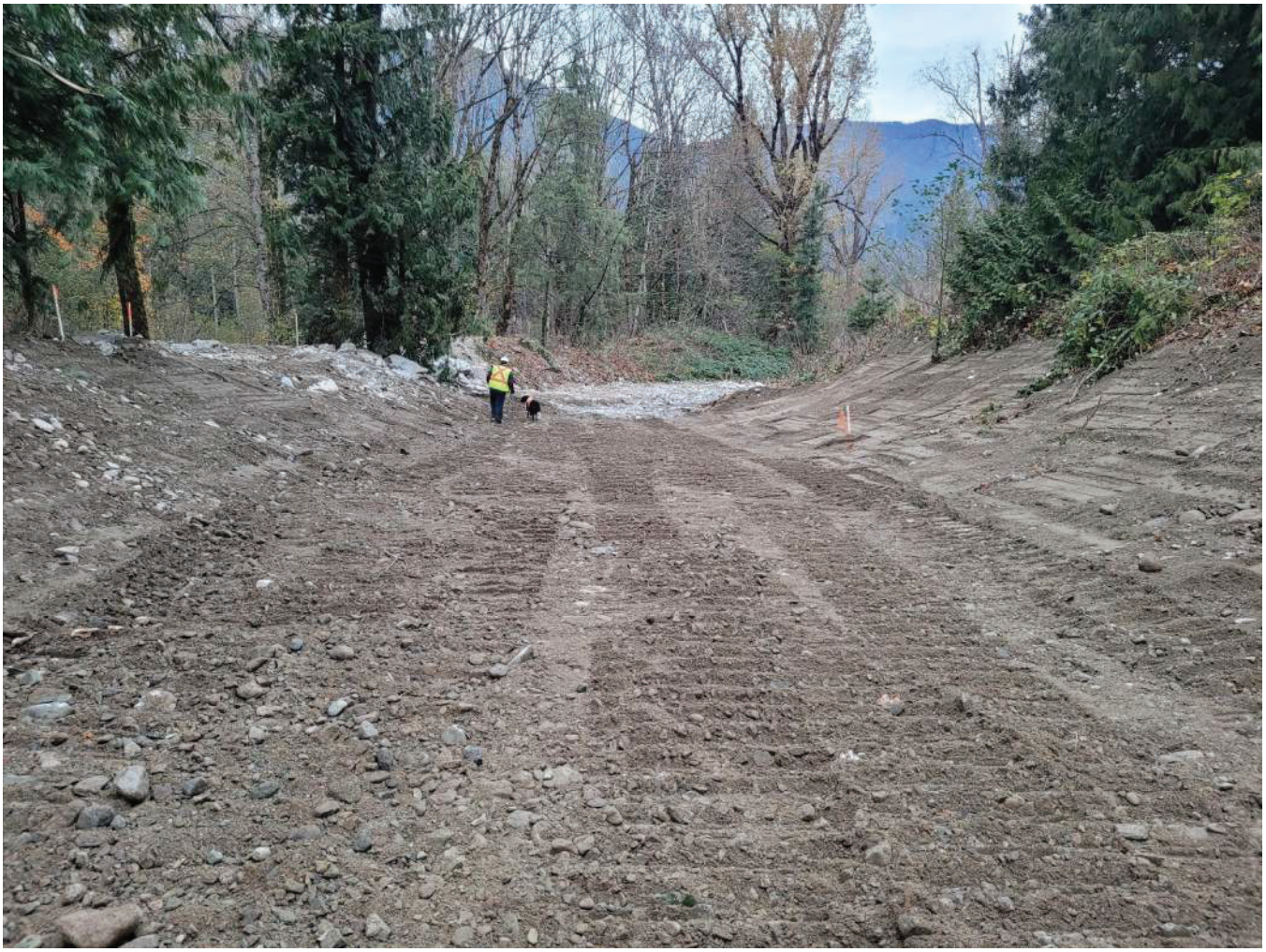


Photo 4: Facing north – eastern slopes daylight to existing bank at approximately design slope. Western slopes at approximately design slope.

Daily Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: DEROCHE CREEK EMERGENCY SEDIMENT REMOVAL
Client: Northwest Hydraulic Consultants
Owner: Leq'a:mel First Nation
Contractor: Summit Earthworks
Contract No.: 2838-002

PREPARED BY	Santiago Paredes M.	**ON SITE**	745	**OFF SITE**	1645
DATE	2022-11-12				
WEATHER	Partly sunny 3-7 °C				

TAILGATE MEETING NOTES

*This area may be used in lieu of KWL "Appendix B11-Tailgate Meeting"

KWL Staff: **Must be *signed* by field staff

Santiago Paredes M.

KWL Activities:

Field review

Site Activities:

Access roads to stage 3 and 2 constructed.
Field fit aligment with contractor
Stage 4 construction

Identified Hazards:

Vehicle traffic, construction vehicles, slips trips and falls from uneven terrain, cold weather

Contractor Tailgate Meeting Notes Reviewed?

(check one) Yes ☒ No ☒ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address

7324 Hurd St
Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services: 911
Hospital (non-emergency): (604) 826-6261
Police (non-emergency): (604) 826-7161
Fire (non-emergency): (604) 820-3793
Other: n/a
Client Health and Safety Officer: TBC
On-site First Aid Attendant:
Ashley from Medix BC
(250)-893-3418

EQUIPMENT AND WORKFORCE ON SITE

Workforce:

- 3 – Excavator operators
  - Steven, Larry
- 2 – Articulated dump trucks operators
- 3 – Laborers
- 3 – Truck drivers
- 1 – Safety Officer
  - Ashley

Equipment:

- 2 – Excavator – Doosan DX300LC
- 1 – Excavator – Case CX245D
- 1 – Excavator – TBD - **offsite**
- 2 - Articulated dump trucks - Doosan DA30
- 1 – Dozer – Case 2050M – **offsite**
- 3 – Trucks

Daily Field Review Report

KERR WOOD LEIDAL
consulting engineers

CONSTRUCTION PROGRESS

Upstream Taylor Rd's Bridge

- Stage 4 channel construction to design grades and elevation. (Photo 1)

Downstream Taylor Rd Bridge

- Stage 2 channel excavation continues along field fit alignment. Existing material exported to off site approximately 2.4 km from Deroche Creek.
- Temporary access road removed (creek bed material and filter fabric) as construction of stage 2 channel progresses.

REVIEWER'S OBSERVATIONS

Upstream Taylor Rd's Bridge

- Water has receded upstream to approximately 10 m from the Riprap structure.
- Cut-off berm built to design elevation. Top width varies from approximately 3.8m to 1.8m. (Photo 2)
- Cut-off berm used to place excess exiting bed material. Side slopes appear to be relatively steep.
- Excess existing creek bed material used to fill voids along south bank.
- Exiting materials are compacted closely to undermined trees. KWL environmental to comment

Downstream Taylor Rd Bridge

- Suspect petroleum film cleaned up using spill kit. More film appears to migrate downstream from grass lands. KWL environmental to comment.
- Second isolated spill found approximately 10 m from first location. Reported to KWL environmental team.
- Water body outside stage 2 (outside the silt fence) does not show any signs turbidity.
- Stage 2 channel filled with ground water. Isolated from Nicomen Slough via a 3m wide berm. (Photo 3)
- Stage 2 side slopes constructed as best as possible due the material type and the lack of visibility at the bottom.
- Side slopes benched to achieve slopes as excavator is not able to be physically on the channel bed.
- Stage 2 channel construction has transitioned from underwater to dry conditions.

DISCUSSIONS WITH CONTRACTOR

Upstream Taylor Rd's Bridge

- Contractor advised that bed elevation was approximately 1.2 m higher than design (2020 bed level). KWL advised contractor to follow design elevation and prioritize achieving the design side slopes.
- Advised contractor to lessen the slopes at cut-off berm location to meet design slopes. Dig into berm to achieve design slopes. Cut-off berm may be widened if need.

Downstream Taylor Rd Bridge

- Advised contractor to install silt fence along stage 1, per direction from KWL.
- Contractor noticed more suspect petroleum-based material following down the grasslands. KWL advised to isolate with spill kit sausage and continue monitoring and stage 1 may proceed. KWL environmental to comment.

DISCUSSIONS WITH OTHERS

- KWL environmental team advised to monitor suspect spill site, and report back if there is more evidence of suspect spill on site.

ACTION REQUIRED

- n/a

Daily Field Review Report

KERR WOOD LEIDAL
consulting engineers

PHOTOGRAPHS



Photo 1: Facing south – creek bed excavated to design elevations and side slopes

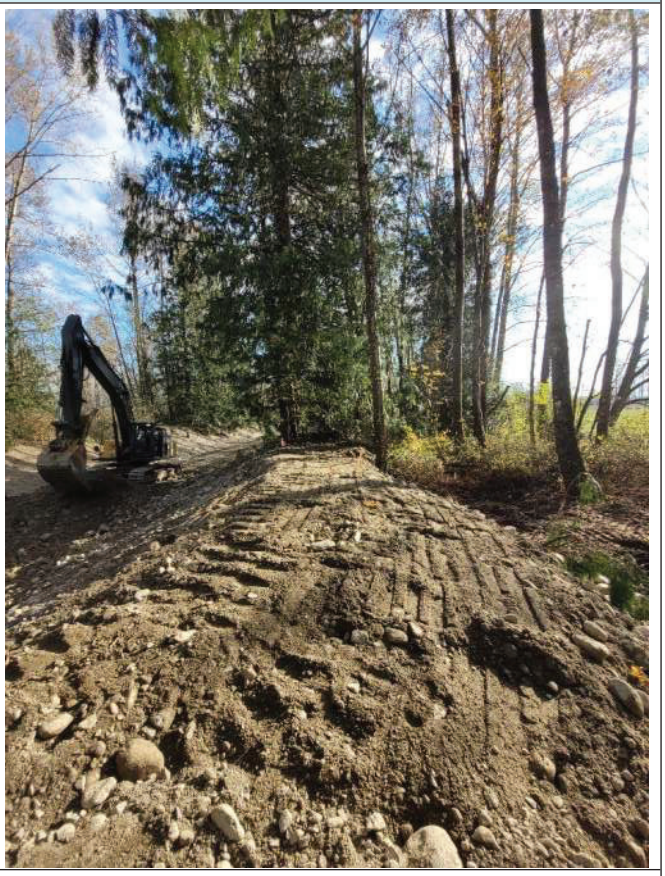


Photo 2: Facing south – top width of cut-off berm varies from 1.8m to 3.8m

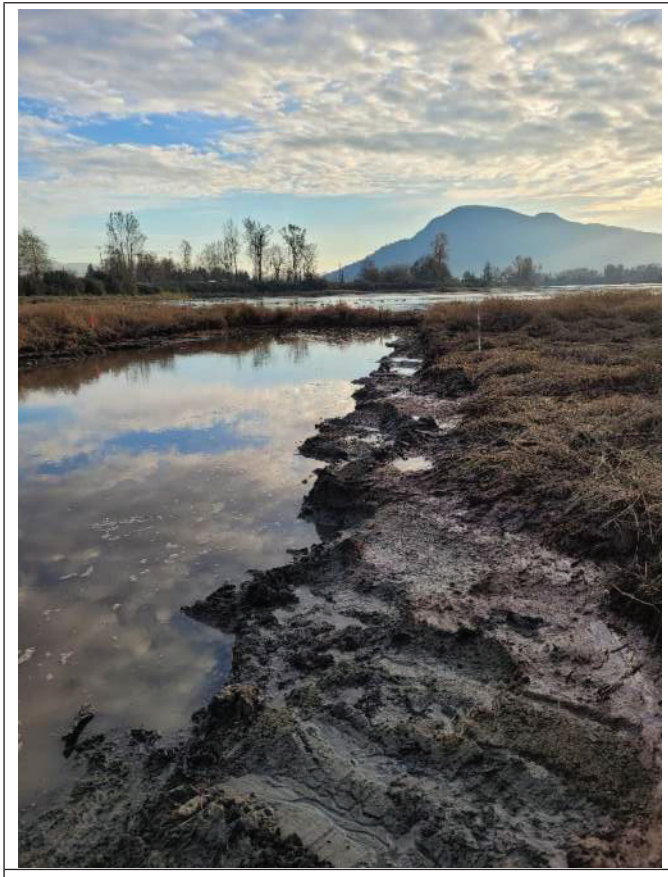


Photo 3: Facing south – stage 2 channel with benched slopes and isolated from Nicomen Slough by 3.0 m berm.



Photo 4: Facing north – slopes benched to achieve desing slopes and transition from underwater conditions to dry.

Daily Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: DEROCHE CREEK EMERGENCY SEDIMENT REMOVAL
Client: Northwest Hydraulic Consultants
Owner: Leq'a:mel First Nation
Contractor: Summit Earthworks
Contract No.: 2838-002

PREPARED BY	David Sanders	**ON SITE**	7:00	**OFF SITE**	1640
DATE	2022-11-13				
WEATHER	Clear and sunny -2°C to 10°C				

TAILGATE MEETING NOTES

*This area may be used in lieu of KWL "Appendix B11-Tailgate Meeting"

KWL Staff: **Must be *signed* by field staff

David Sanders

KWL Activities:

Field review

Site Activities:

Access roads to stage 3 and 2 constructed.
Field fit aligment with contractor
Stage 4 construction

Identified Hazards:

Vehicle traffic, construction vehicles, slips trips and falls from uneven terrain, cold weather

Contractor Tailgate Meeting Notes Reviewed?

(check one) Yes ☒ No ☒ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address

7324 Hurd St
Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services: 911
Hospital (non-emergency): (604) 826-6261
Police (non-emergency): (604) 826-7161
Fire (non-emergency): (604) 820-3793
Other: n/a
Client Health and Safety Officer: TBC
On-site First Aid Attendant:
Ashley from Medix BC
(250)-893-3418

EQUIPMENT AND WORKFORCE ON SITE

Workforce:

- 1 – VP (Ed Jones) for an hour around noon
- 1- Superintendent (Dave)
- 4 - Operators
- 3 – Laborers
- 3 – Truck drivers
- 1 – Safety Officer (Medix First Aid Attendant)
- MP Traffic Control personel

Equipment:

- 1 – Excavator – Doosan DX300LC
- 1 – Excavator – Case CX245D
- 1 – Excavator – JD 350G
- 1 -Excavator (at fill site) – Case 245
- 2 - Articulated rock dump trucks (idle) - Doosan DA300
- 3 – Tandem Trucks

CONSTRUCTION PROGRESS

Upstream Taylor Rd's Bridge

- Stage 4 channel construction done from Section 3 to Section 9 (Photo 1)

Downstream Taylor Rd Bridge

- Stage 2 channel excavation continues along field fit alignment. Existing material continues to be exported off site approximately 2.4 km from Deroche Creek. Work is being done to elevations of Des Goold email dated Nov 11, 2022. Since excavation of Stage 2 at the slough is near the same as slough water level, water follows the excavated Stage 2 excavation as the work proceeds upstream.

- Stage 1 – additional extended silt fence installed at outlet of Stage 1. No other work on Stage 1 done.

REVIEWER'S OBSERVATIONS

Upstream Taylor Rd's Bridge

- No running water at creek bed observed upstream of bridge.
- Side slopes of creek are at 3:1 slope from Section 3 to 9

Downstream Taylor Rd Bridge

- Suspect petroleum film cleaned up using spill kit. More film appears to migrate downstream from grass lands. KWL environmental to comment.
- Second isolated spill found approximately 10 m from first location. Reported to KWL environmental team.
- Water body outside stage 2 (outside the silt fence) does not show any signs turbidity.
- Stage 2 channel filled with ground water. Isolated from Nicomen Slough via a 3m wide berm. (Photo 3)
- Stage 2 side slopes constructed as best as possible due the material type and the lack of visibility at the bottom.
- Side slopes benched to achieve slopes as excavator is not able to be physically on the channel bed.
- Stage 2 channel construction has transitioned from underwater to dry conditions.

DISCUSSIONS WITH CONTRACTOR

Upstream Taylor Rd's Bridge

- Contractor to continue work to design sections. Maintain a 5m metre wide bottom of creek. KWL advised contractor to continue to follow design elevation and prioritize achieving the design side slopes.

Downstream Taylor Rd Bridge

- Advised contractor to install extension of silt fence done previously along Stage 1.
- Stage 2, near Sections 25 and 26 on east side slope, maintain steeper slide slopes to preserve root structures and await further input from Dees Goold tomorrow.
- Yesterday, 48 truckloads of mud, 17 gravel and 8 organic hauled offisite to Leqamel approved waste site.

DISCUSSIONS WITH OTHERS

- MJ of PwC arrived on site at about 3pm for site overview. He advised that he agrees that the suspected oil slick would not be a result of contractor activities, it is well away from the working area. Does not want to undertake the costs of laboratory testing the materials for hydrocarbons. KWL and Leq;a mel think the material is organic. KWL to not take tests unless instructed otherwise. Continue to monitor and report back if there is evidence of suspect spill on site.
- Constant dialogue with Rick McKamey of Leq:a mel First Nation regarding ongoing work. Rick M on-site and satisfied with progress and activities of the work.

ACTION REQUIRED

- n/a

Daily Field Review Report

KERR WOOD LEIDAL
consulting engineers

PHOTOGRAPHS



Photo 1: Facing south – creek bed excavated to design elevations and side slopes

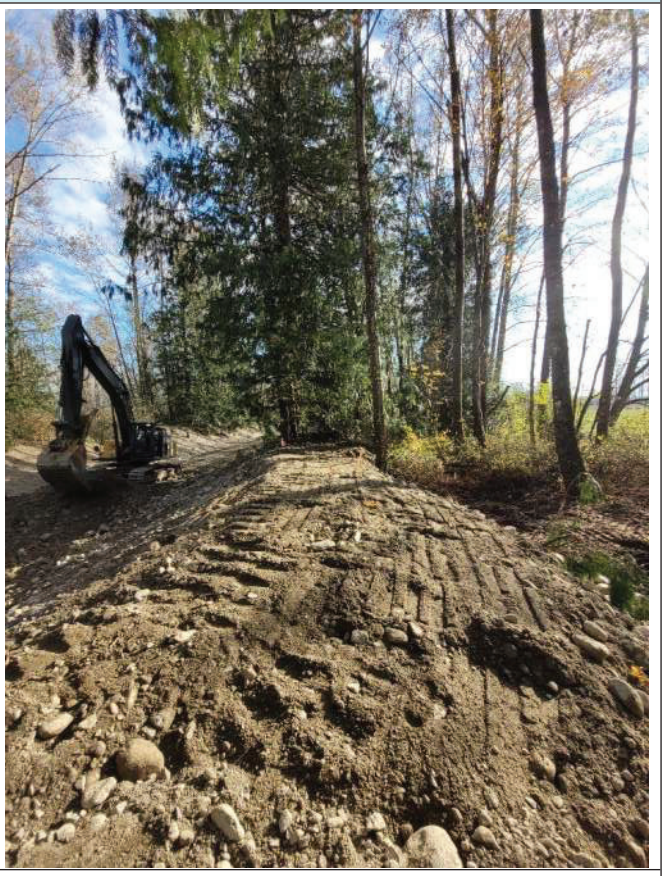


Photo 2: Facing south – top width of cut-off berm varies from 1.8m to 3.8m

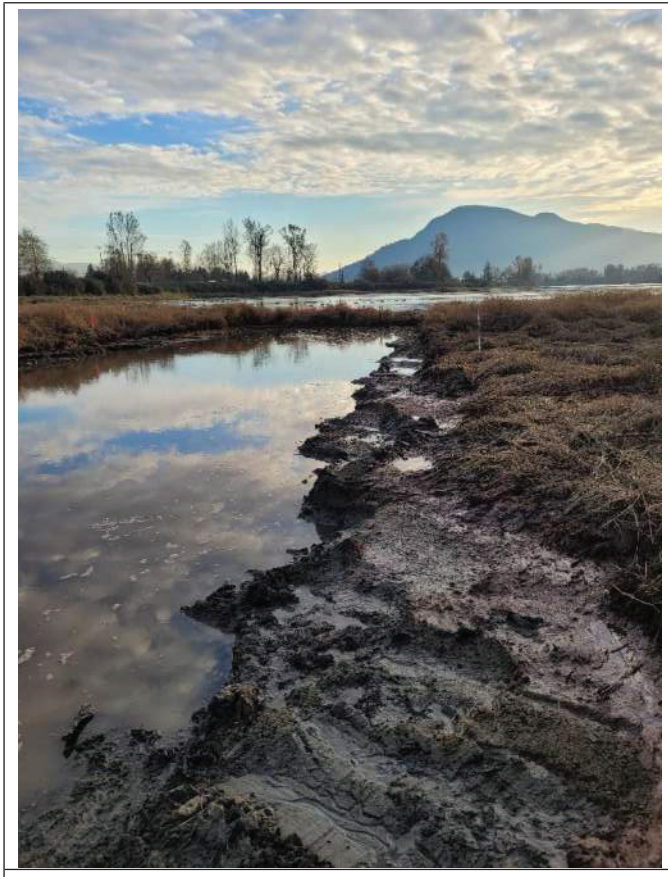


Photo 3: Facing south – stage 2 channel with benched slopes and isolated from Nicomen Slough by 3.0 m berm.



Photo 4: Facing north – slopes benched to achieve desing slopes and transition from underwater conditions to dry.

Daily Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: DEROCHE CREEK EMERGENCY SEDIMENT REMOVAL
Client: Hortkwest Oydraulic Consultants
L wner: qe' 7a:mel First Hation
Contractor: 6ummit gartkworEs
Contract Hox 2838-002

PREPARED BY	David 6anders	**ON SITE**	. :15	**OFF SITE**	14:50
DATE	2022-11-1h				
WEATHER	Clear and sunny 1°C to 10°C				

TAILGATE MEETING NOTES

*Tkis area may be used in lieu of KWq "AppendiNB11-TailSate MeetinS"

KWL Staff: **Must be *signed* by field staff

David 6anders

KWL Activities:

Field review

Site Activities:

6taSes 1V3 and h constructionx
Field fit aliSment witk contractor

Identified Hazards:

, ekicle trafficVconstruction vekiclesVslips trips and falls from uneven terrainVcold weatker

Contractor Tailgate Meeting Notes Reviewed?

(ckecEone) Yes ☒ Ho ☒ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address

. 32h Ourd 6t
MissionVBC , 2, 3O5

Emergency Phone Numbers

gmerSency 6ervices: 911
Oospital (non-emerSency): (40h) 824-4241
Police (non-emerSency): (40h) 824-. 141
Fire (non-emerSency): (40h) 820-3. 93
L tker: n/a
Client Oealtk and 6afety L fficer: TBC
L n-site First Aid Attendant:
Askley from MediNBC
(250)-893-3h18

EQUIPMENT AND WORKFORCE ON SITE

WorEforce:

- 1 – , P (gd Jones) in afternoon
- 1- 6uperintendent (Dave Kress)
- h - L perators
- 3 – qaborers
- 3 – TrucE drivers
- 1 – 6afety L fficer (MediNFirst Aid Attendant)
- MP Traffic Control personel

g' uipment:

- 1 – gNcavator – Doosan DX300qC
- 1 – gNcavator – Case CX2h5D
- 1 – gNcavator – JD 350G
- 1 – gNcavator – qieber 918 witk articulated bucEet
- 1 -gNcavator (at fill site) – Case 2h5
- 2 - Articulated rocE dump trucEs (idle) - Doosan DA300
- 3 – Tandem TrucEsVall witk pups

CONSTRUCTION PROGRESS

Upstream Taylor Rd's Bridge

- 6taSe h ckannel construction done from 6ection 3 to 6ection 9 (Pkoto 1)

Downstream Taylor Rd Bridge

- 6taSe 2 ckannel eNcavation continues alonS field fit aliSnmentxgNstinS material continues to be eNported off site approNmately 2xh Em from Derocke CreeEx WorE is beinS done to elevations of Des

Goold email dated Hov 11V2022x 6ince eNcavation of 6taSe 2 at tke slouSk is near tke same as slouSk water levelVwater follows tke eNcavated 6taSe 2 eNcavation as tke worE proceeds upstreamx

- 6taSe 1 – additional eNtended silt fence installed at outlet of 6taSe 1x Ho otker worE on 6taSe 1 donex

REVIEWER'S OBSERVATIONS

Upstream Taylor Rd's Bridge

- Ho runninS water at creeE bed observed upstream of bridSex
- 6ide slopes of creeE are at 3:1 slope from 6ection 3 to 9

Downstream Taylor Rd Bridge

- 6uspect petroleum film cleaned up usinS spill EitxMore film appears to miSrate downstream from Srass landsxKWq environmental to commentx
- 6econd isolated spill found approNmately 10 m from first locationxReported to KWq environmental teamx
- Water body outside staSe 2 (outside tke silt fence) does not skow any siSns turbidityx
- 6taSe 2 ckannel filled witk Sround waterxIsolated from Hicomen 6louSk via a 3m wide bermx(Pkoto 3)
- 6taSe 2 side slopes constructed as best as possible due tke material type and tke lacE of visibility at tke bottomx
- 6ide slopes bencked to ackieve slopes as eNcavator is not able to be pkysically on tke ckannel bedx
- 6taSe 2 ckannel construction kas transitioned from underwater to dry conditionsx

DISCUSSIONS WITH CONTRACTOR

Upstream Taylor Rd's Bridge

- Contractor to continue worE to desiSn sectionsx Maintain a 5m metre wide bottom of creeEx KWq advised contractor to continue to follow desiSn elevation and prioritize ackievinS tke desiSn side slopesx

Downstream Taylor Rd Bridge

- 6taSe 2Vnear 6ections 25 and 24 on east side slopeVmaintain steeper slide slopes to preserve root structures and await furtker input from Des Goold wken ke is onsite tomorrowx
- YesterdayVh8 trucEloads of mudV1. Sravel and 8 orSanic kauled offisite to qe' amel approved waste sitex
- Contractor to brinS in eNcavator witk articulated bucEet for future worE at bridSe and 6taSe 1x Tkis mackine kas better capabilities for side slopesx

DISCUSSIONS WITH OTHERS

- MJ of PwC arrived on site at about 3pm for site overviewx Oe advised tkat ke aSrees tkat tke suspected oil slicE would not be a result of contractor activitiesVit is well away from tke worEinS areax Does not want to undertaEe tke costs of laboratory testinS tke materials for kydrocarbonsx KWq and qe' ;a mel tkinE tke material is orSanicxKWq to not taEe tests unless instructed otkerwisex Continue to monitor and report bacE if tkere is evidence of suspect spill on sitex
- Constant dialoSue witk RicE McKamey of qe' :a mel First Hation reSardinS onSoinS worEx RicE M on-site and satisfied witk proSress and activities of tke worEx

Daily Field Review Report

KERR WOOD LEIDAL
consulting engineers

ACTION REQUIRED

- n/a

PHOTOGRAPHS

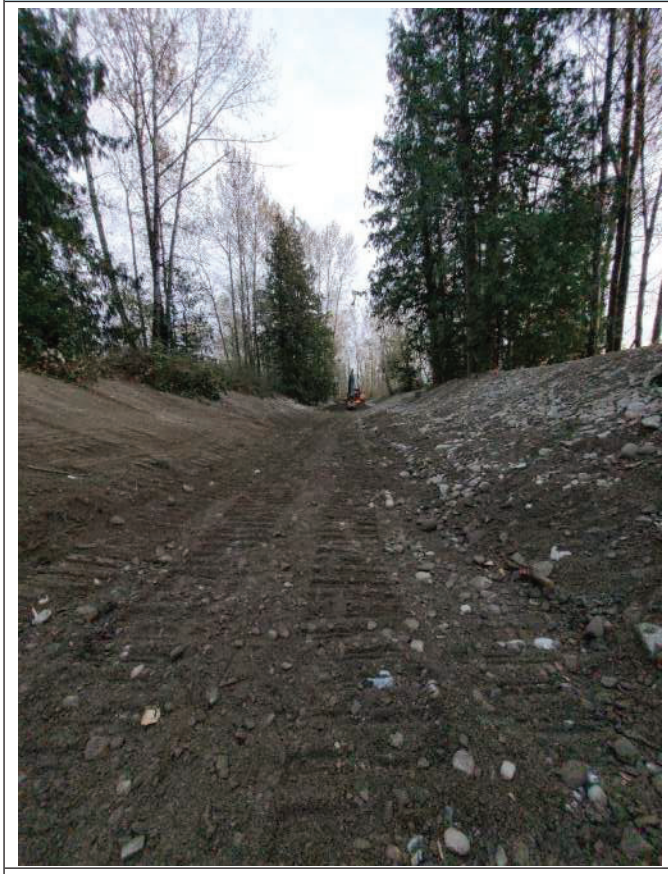


Photo 1: FacinS soutk – creeE bed eNcavated to desiSn elevations and side slopes



Photo 2: FacinS soutk – top widtk of cut-off berm varies from 1x8m to 3x8m

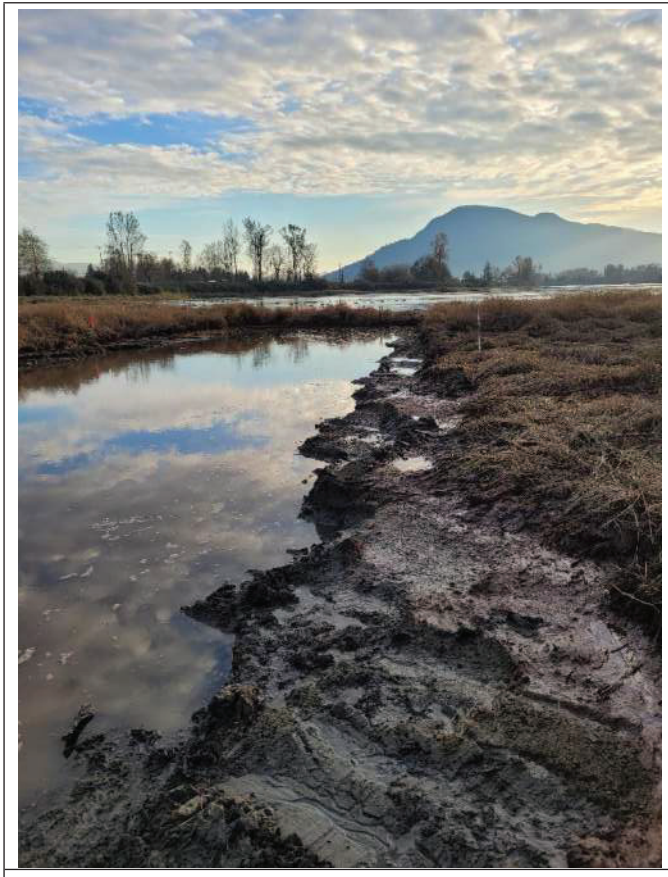


Photo 3: FacinS soutk – staSe 2 ckannel witk bencked slopes and isolated from Hicomen 6 louSk by 3x0 m bermx



Photo 4: FacinS nortk – slopes bencked to ackieve desinS slopes and transition from underwater conditions to dryx

Daily Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: DEROCHE CREEK EMERGENCY SEDIMENT REMOVAL
Client: Northwest Hydraulic Consultants
Owner: Leq'a:mel First Nation
Contractor: Summit Earthworks
Contract No.: 2838-002

PREPARED BY	Santiago Paredes M.	**ON SITE**	845	**OFF SITE**	1430
DATE	2022-11-15				
WEATHER	Partly sunny 3-7 °C				

TAILGATE MEETING NOTES

*This area may be used in lieu of KWL "Appendix B11-Tailgate Meeting"

KWL Staff: **Must be *signed* by field staff

Santiago Paredes M.

KWL Activities:

Field review

Site Activities:

Stage 1 – 4 construction

Identified Hazards:

Vehicle traffic, construction vehicles, slips trips and falls from uneven terrain, cold weather

Contractor Tailgate Meeting Notes Reviewed?

(check one) Yes ☒ No ☒ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address

7324 Hurd St
Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services: 911
Hospital (non-emergency): (604) 826-6261
Police (non-emergency): (604) 826-7161
Fire (non-emergency): (604) 820-3793
Other: n/a
Client Health and Safety Officer: TBC
On-site First Aid Attendant:
Ashley from Medix BC
(250)-893-3418

EQUIPMENT AND WORKFORCE ON SITE

Workforce:

- 3 – Excavator operators
- 1 – Articulated dump trucks operators
- 3 – Laborers
- 3 – Truck drivers
- 1 – Surveyor
  - Alexa from Apex Geomatics
- 1 – Safety Officer
  - Ashley from Medix BC

Equipment:

- 1 – Excavator – Doosan DX300LC
- 1 – Excavator – Case CX245D
- 1 – Excavator – Liebherr 918
- 1 – Excavator – Case CX245D - **offsite**
- 1 - Articulated dump truck - Doosan DA30
- 1 – Dozer – Case 2050M – **offsite**
- 1 – Single drum roller – BW 213 D-40
- 3 – Trucks – used to dispose existing creek bed material approximately 2.4 km from site.

CONSTRUCTION PROGRESS

Upstream Taylor Rd's Bridge

- Banks sloped to achieve design slope and to prevent further erosion.
- Creek bed compacted to lock in rocks and silty material. (Photo 1)

Downstream Taylor Rd Bridge

- Stage 3 channel widened per design. Existing bed material exported offsite 2.4 km from site. (Photo 2)

- Stage 1 channel side slopes graded to design.
- Stage 3,2,1 transition preparation commenced - creek bed elevations finalized and tie in to commence on 2022-11-16.

REVIEWER'S OBSERVATIONS

Upstream Taylor Rd's Bridge

- Side slopes graded to design.
- Cut-off berm finalized to design elevation. (Photo 3)

Downstream Taylor Rd Bridge

- Field fit elevations were surveyed to accomplish smooth transition from stage 2 and 3.
- Trees removed on south bank of stage 2 to achieve design side slopes. (Photo 4)

DISCUSSIONS WITH CONTRACTOR

Upstream Taylor Rd's Bridge

- Contractor to tie in to existing in a smooth transition and use roller to compact fines.

Downstream Taylor Rd Bridge

- Design elevation of transition from stage 3 to stage 1 to be 40cm higher than invert elevation at stage 2. Elevations set with surveyor on site.
- Headwall at Taylor Road's bridge not to be built per NHC previous discussion, contractor to use excavator with knuckle to excavate under bridge.
- Advised contractor of new drawing markups issued NHC in the morning of 2022-11-15 and design changes at the transition zone from stage 2 to stage 1.
- Contractor to lower design elevation upstream of transition zone to achieve a lesser grade change from stage 3 to stage 4. Elevation changes to vary from 4.81 to 4.40m at approximately 2.5% to tie in upstream at stage 3.

DISCUSSIONS WITH OTHERS

- n/a

ACTION REQUIRED

- n/a

PHOTOGRAPHS

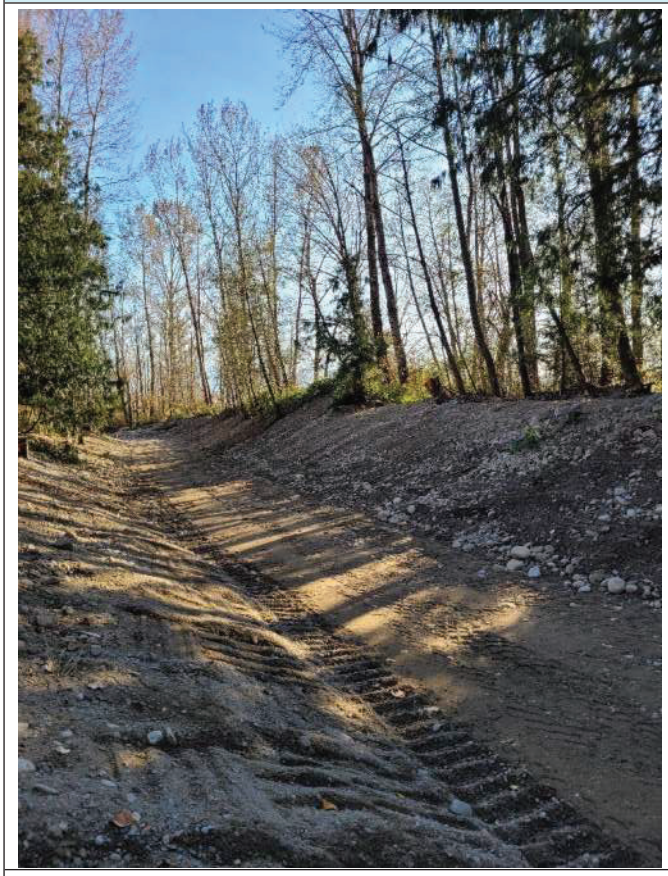


Photo 1: Facing south – creek slopes finalized to desing grades



Photo 2: Facing south – downstream from Taylor Rd's bridge – side slopes with widened bottom

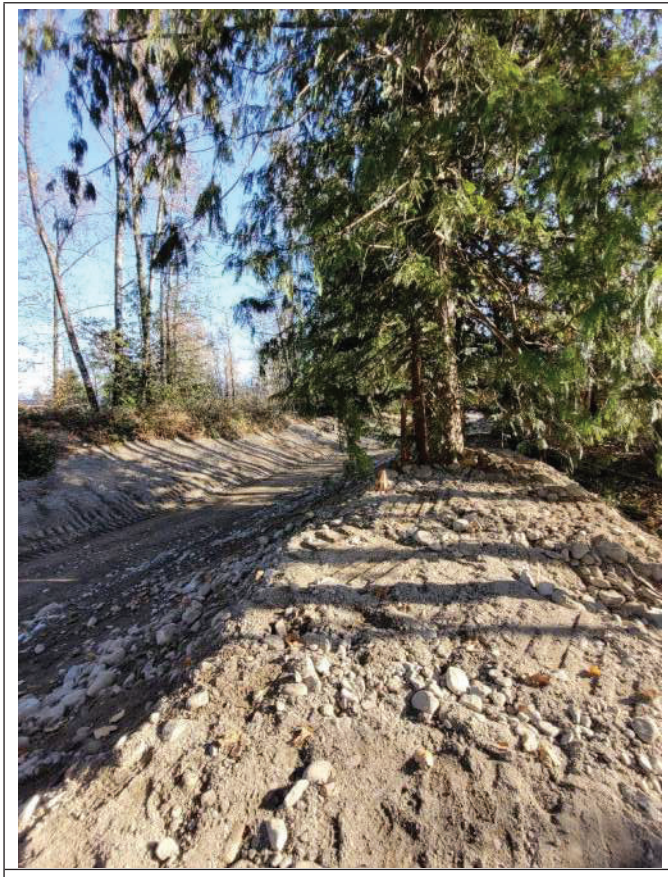


Photo 3: Facing south – cut-off berm finalized at desing elevation



Photo 4: Facing south – trees removed to allow space for desing slopes.

Daily Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: DEROCHE CREEK EMERGENCY SEDIMENT REMOVAL
Client: Northwest Hydraulic Consultants
Owner: Leq'a:mel First Nation
Contractor: Summit Earthworks
Contract No.: 2838-002

PREPARED BY	Santiago Paredes M.	**ON SITE**	845	**OFF SITE**	1430
DATE	2022-11-15				
WEATHER	Partly sunny 3-7 °C				

TAILGATE MEETING NOTES

*This area may be used in lieu of KWL "Appendix B11-Tailgate Meeting"

KWL Staff: **Must be *signed* by field staff

Santiago Paredes M.
Jaimie Dimillio

KWL Activities:
Field review

Site Activities:
Stage 1 – 4 construction

Identified Hazards:
Vehicle traffic, construction vehicles, slips trips and falls from uneven terrain, cold weather

Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☒ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
7324 Hurd St
Mission, BC V2V 3H5

Emergency Phone Numbers
Emergency Services: 911
Hospital (non-emergency): (604) 826-6261
Police (non-emergency): (604) 826-7161
Fire (non-emergency): (604) 820-3793
Other: n/a
Client Health and Safety Officer: TBC
On-site First Aid Attendant:
Ashley from Medix BC
(250)-893-3418

EQUIPMENT AND WORKFORCE ON SITE

Workforce:
- 3 – Excavator operators
- 1 – Articulated dump trucks operators
- 3 – Laborers
- 3 – Truck drivers
- 1 – Safety Officer
  - Ashley from Medix BC

Equipment:
- 1 – Excavator – Doosan DX300LC
- 1 – Excavator – Case CX245D
- 1 – Excavator – Liebherr 918
- 1 – Excavator – Case CX245D - **offsite**
- 1 - Articulated dump truck - Doosan DA30
- 1 – Dozer – Case 2050M – **offsite**
- 1 – Single drum roller – BW 213 D-40 – **not in use**
- 3 – Trucks – used to dispose existing creek bed material approximately 2.4 km from site.

CONSTRUCTION PROGRESS

Upstream Taylor Rd's Bridge
- Excavation upstream bridge started.
- Existing bed material loaded into articulated truck and stockpiled onsite.
- Vegetation cleared close to bridge abutment wings and riprap armouring.

Downstream Taylor Rd's Bridge

- Stage 1 channel graded to final field fit grade.
- Trench to in bed riprap for cut-off berm excavated, riprap placed and shaping to occur on 2022-11-17. (Photo 1)
- Existing bed creek material placed on slopes and bed to provide some rigidity at stage 2. (Photo 2)

REVIEWER'S OBSERVATIONS

Upstream Taylor Rd's Bridge

- Contractor removing existing bed creek material using excavator and will use excavator with rotating knuckle to clean out as much material as possible underneath Taylor Rd bridge.
- Contractor removing existing debris and vegetation adjacent to Taylor Rd's bridge abutment wings. (Photo 3)

Downstream Taylor Rd Bridge

- Stage 1 channel top bank seems lower and may be a path for water flow in higher water levels.
- Slopes at stage 1 have been graded.
- Transition between stages under construction.
- North bank at stage 2 hasn't been graded to design slopes, they still show benching.

DISCUSSIONS WITH CONTRACTOR

Upstream Taylor Rd's Bridge

- Advised contractor to maintain clear of abutment wings and armouring. NHC will advise on transition from under the bridge on 2022-11-17.

Downstream Taylor Rd's Bridge

- Contractor advised that they raised stage 1 channel to meet tie in grades at Nicomen Slough. The elevation difference will now be approximately 60cm (20 cm higher than discussed) at the transition point from stage 3/2 to stage 1. Grades will vary from 1% to 1.5%.
- Advised contractor to build up bank at stage 1 at south bank won't existing bed material from under Taylor Rd's bridge. (Photo 4)
- Advised contactor to remove all remaining filter fabric used to build access road into stage 2.

DISCUSSIONS WITH OTHERS

- Advised NHC of planned transition from underneath Taylor Rd's bridge towards the existing banks upstream. NHC will be present on site on 2022-11-17 to comment on transition and finalize other aspects of the works.

ACTION REQUIRED

- n/a

PHOTOGRAPHS

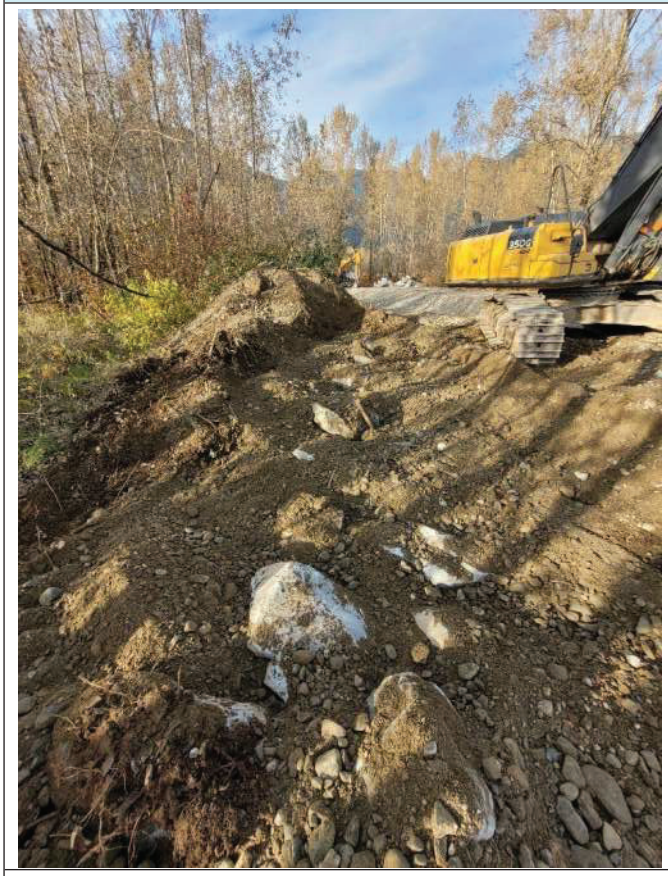


Photo 1: Facing north – keyed in riprap for cut-off berm adjacent to stage 1,2 and 3 transition.

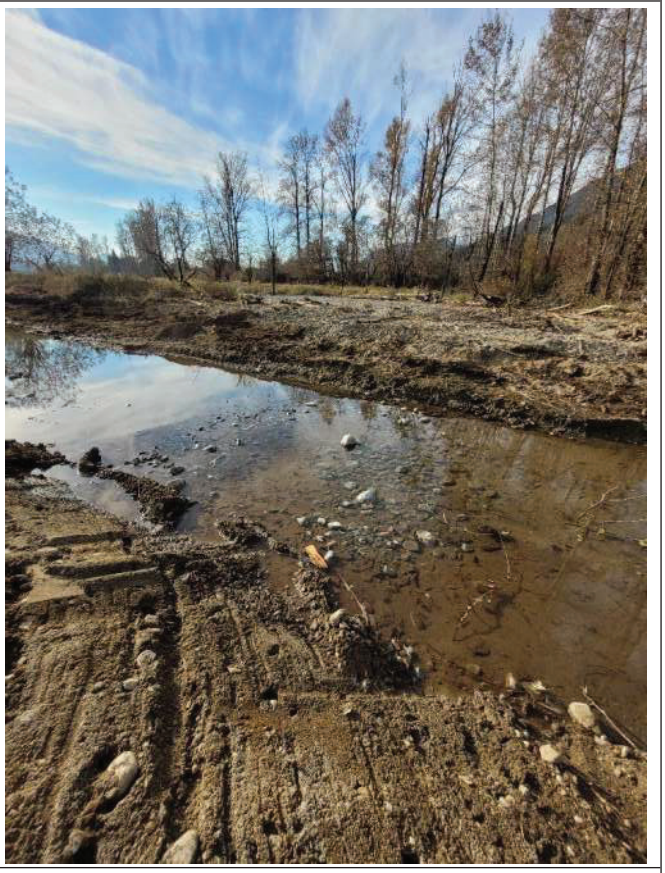


Photo 2: Facing north – stage 2 creek's bed reinforced with existing rocky material.



Photo 3: Facing north – debris and vegetation cleared to allow for grading and transition from stage 4 channel to Taylor Road's bridge.



Photo 4: Facing south – existing rocky material placed on bank to build up to existing surrounding elevation and to provide more rigidity to the south bank.

Daily Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: DEROCHE CREEK EMERGENCY SEDIMENT REMOVAL
Client: Northwest Hydraulic Consultants
Owner: Leq'a:mel First Nation
Contractor: Summit Earthworks
Contract No.: 2838-002

PREPARED BY	Santiago Paredes M.	**ON SITE**	915	**OFF SITE**	1530
DATE	2022-11-17				
WEATHER	Partly sunny 3-7 °C				

TAILGATE MEETING NOTES

*This area may be used in lieu of KWL "Appendix B11-Tailgate Meeting"

KWL Staff: **Must be *signed* by field staff

Santiago Paredes M.
Jaimie Dimillio

KWL Activities:
Field review

Site Activities:
Stage 1 – 4 construction

Identified Hazards:
Vehicle traffic, construction vehicles, slips trips and falls from uneven terrain, cold weather

Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☒ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
7324 Hurd St
Mission, BC V2V 3H5

Emergency Phone Numbers
Emergency Services: 911
Hospital (non-emergency): (604) 826-6261
Police (non-emergency): (604) 826-7161
Fire (non-emergency): (604) 820-3793
Other: n/a
Client Health and Safety Officer: TBC
On-site First Aid Attendant:
Ashley from Medix BC
(250)-893-3418

EQUIPMENT AND WORKFORCE ON SITE

Workforce:
- 3 – Excavator operators
- 1 – Articulated dump trucks operators
- 3 – Laborers
- 3 – Truck drivers
- 1 – Safety Officer
  - Ashley from Medix BC

Equipment:
- 1 – Excavator – Doosan DX300LC
- 1 – Excavator – Case CX245D
- 1 – Excavator – Liebherr 918
- 1 – Excavator – Case CX245D - **offsite**
- 1 - Articulated dump truck - Doosan DA30
- 1 – Dozer – Case 2050M – **offsite**
- 1 – Single drum roller – BW 213 D-40 – **not in use**
- 3 – Trucks – used to dispose existing creek bed material approximately 2.4 km from site.

CONSTRUCTION PROGRESS

Upstream Taylor Rd's Bridge
- North bank adjacent to Taylor Rd's bridge reshaped to shallow slopes to achieve design slope. (Photo 1)
- Excavator with rotation knuckle used to remove existing material from underneath bridge - more material hand excavated to create a smaller berm approximately half the height of the adjacent bank (Photo 2).
- Banks upstream and downstream of Taylor Rd's bride shaped to tie-in to design slope upstream of Taylor Rd'd bridge.

Downstream Taylor Rd's Bridge

- Transition between stages 3, 2 and 1 bank armoured with coble, and small boulders from stage 4. (Photo 3 and Photo 4)
- Stage 3 banks final shaping commenced.

REVIEWER'S OBSERVATIONS

Upstream Taylor Rd's Bridge

- Small berm of approximately 600mm in height left per NHC direction.

Downstream Taylor Rd Bridge

- Smaller imported riprap used to key-in bed armoring at stage 1 channel, smaller existing bed coble and material used to armour the reimaging bank.
- Silt fence at stage 1 boundary with Nicomen Slough removed
- Ground water visible when excavating to key-in coble and small boulders from stage 4.

DISCUSSIONS WITH CONTRACTOR

Upstream Taylor Rd's Bridge

- Advised to contractor hand excavate remaining existing material under Taylor Rd's bride to achieve depth advised by NCH.
- Advised to contractor to shallow banks upstream of a Taylor Rd's bridge and transition into adjacent in close proximity to the abutments as shallow as possible. Contractor to stay clear of bridge structure.

Downstream Taylor Rd's Bridge

- Final shaping of banks along stage 3 to occur on 2022-11-18.

DISCUSSIONS WITH OTHERS

- n/a

ACTION REQUIRED

- n/a

PHOTOGRAPHS



Photo 1: Facing north – banks reshaped to achieve a shallower slope and a smoother transition in close proximity to the existing bridge abutment wing walls.



Photo 2: Facing north – finished excavation underneath Taylor Rd's bridge

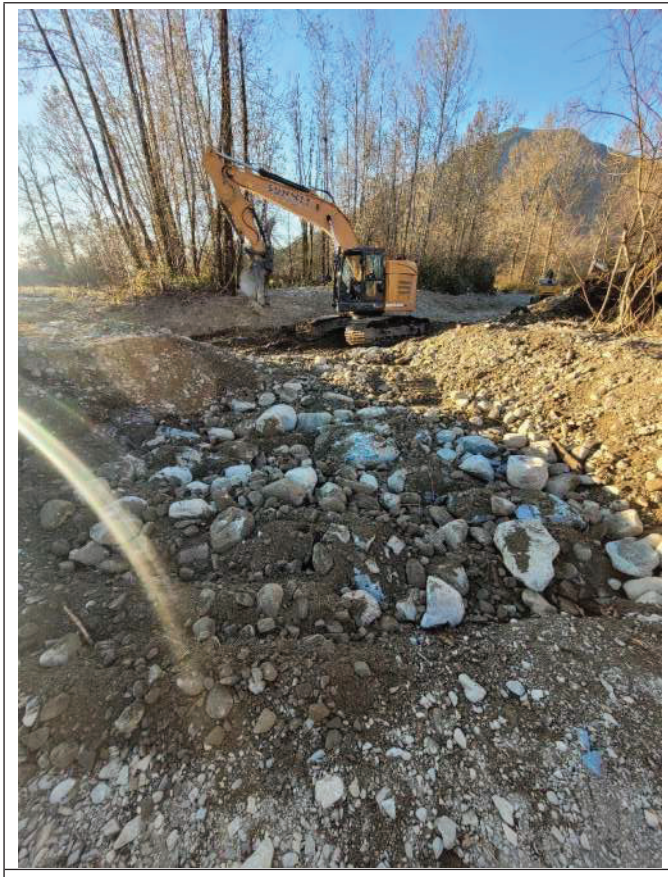


Photo 3: Facing north – transition between stage 3 to stages 1 bed creek armored with coble, and small boulders from stage 4



Photo 4: Facing north – smaller riprap placed at base of bank of transition between stage 3 to stages 1 and 2.

Daily Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: DEROCHE CREEK EMERGENCY SEDIMENT REMOVAL
Client: Northwest Hydraulic Consultants
Owner: Leq'a:mel First Nation
Contractor: Summit Earthworks
Contract No.: 2838-002

PREPARED BY	Santiago Paredes M.	**ON SITE**	1300	**OFF SITE**	1500
DATE	2022-11-18				
WEATHER	Partly sunny 3-7 °C				

TAILGATE MEETING NOTES

*This area may be used in lieu of KWL "Appendix B11-Tailgate Meeting"

KWL Staff: **Must be *signed* by field staff

Santiago Paredes M.
Oskar Von Wahl

KWL Activities:
Field review

Site Activities:
Stage 1 – 4 construction
Equipment demobilization

Identified Hazards:
Vehicle traffic, construction vehicles, slips trips and falls from uneven terrain, cold weather

Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☒ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
7324 Hurd St
Mission, BC V2V 3H5

Emergency Phone Numbers
Emergency Services: 911
Hospital (non-emergency): (604) 826-6261
Police (non-emergency): (604) 826-7161
Fire (non-emergency): (604) 820-3793
Other: n/a
Client Health and Safety Officer: TBC
On-site First Aid Attendant:
Ashley from Medix BC
(250)-893-3418

EQUIPMENT AND WORKFORCE ON SITE

Workforce:
- Geof Ratcliffe – Excavator operator / site supervisor

Equipment:
- 1 – Excavator – Liebherr 918

CONSTRUCTION PROGRESS

Upstream Taylor Rd's Bridge
- North bank adjacent to Taylor Rd's bridge slopes reshaped to shallower slopes and a smoother tie-in close proximity to the abutment wings. (Photo 1)
- Existing material removed underneath Taylor Rd's bridge to match design invert, side slopes left near vertical to provide buffer zone between bridge piers and bed creek. (Photo 2)
- Concrete lock blocks (3) reinstated at temporary creek access road.

Downstream Taylor Rd's Bridge
- Side slopes from underneath Taylor Rd's bridge gradually graded downstream until design slope achieve before channel widening. (Photo 3)
- Transition bet stages 1,2 and 3 bank shaped and armored with cobble and small boulder material. (Photo 4)
- Stage 4 and 3 transition zone (channel bottom) shaped and armored with cobble and small boulder material. (Photo 5)
- Concrete lock blocks reinstated at temporary creek access road.

Daily Field Review Report

KERR WOOD LEIDAL
consulting engineers

REVIEWER'S OBSERVATIONS

Upstream Taylor Rd's Bridge

- Existing bed creek material removed to design invert with near vertical side slopes.

Downstream Taylor Rd Bridge

- Filter fabric sited on east bank of stage 2 channel at approximately STA 10+060.

DISCUSSIONS WITH CONTRACTOR

Upstream Taylor Rd's Bridge

- n/a

Downstream Taylor Rd's Bridge

- Advised contractor that filter fabric needs to be removed using hand excavation methods with a environmental monitor present. (Photo 6)

DISCUSSIONS WITH OTHERS

- n/a

ACTION REQUIRED

- n/a

PHOTOGRAPHS



Photo 1: Facing west – north bank built up to approximately Taylor Rd's elevation prior to bridge. Side slopes gradually transition from 3H:1V to approx. 1.5H:1V to allow transition to bridge abutments.

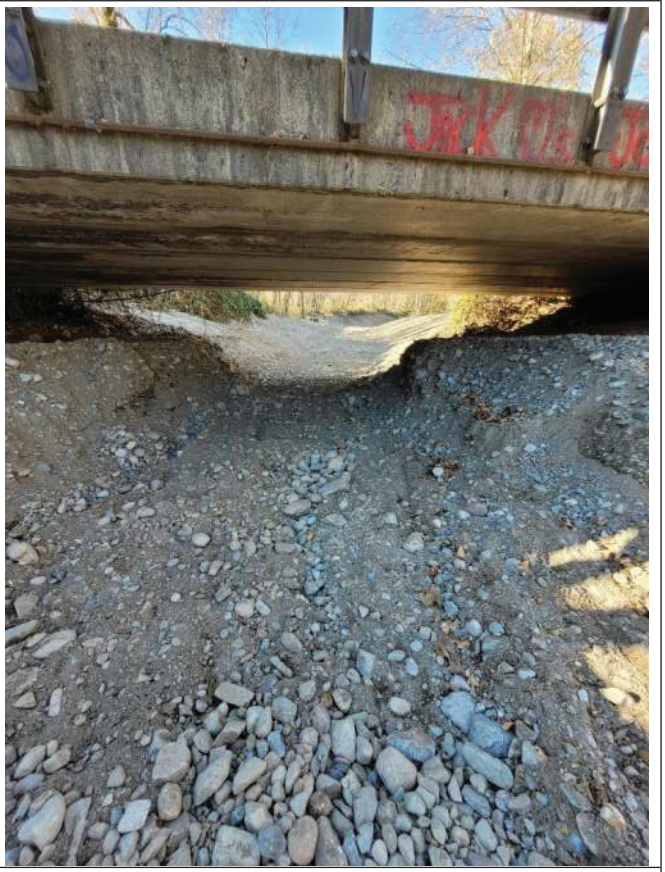


Photo 2: Facing east – exiting bed material removed to match design invert. Side slopes are almost vertical to allow a buffer zone between the main channel and bridge abutment.



Photo 3: Facing south – gradual transition from almost vertical slopes to design slopes



Photo 4: Facing south – transition between stages 1,2 and 3 armoured with cobble and small boulder material



Photo 5: Facing east – stage 4 channel bottom armoured with cobble and small boulder material



Photo 6: Facing west – extents of filter fabric left on stage 2 bank.

Innovation. Integrity.
Employee-Owned.

Appendix L

Before and After Construction Photos

Appendix L – Before and After Construction Photos

Stage One



Photo 1A: Pre-Construction



Photo 1B: Post-Construction

Stage Two



Photo 2A: Pre-Construction



Photo 2B: Post-Construction

Appendix L – Before and After Construction Photos

Stage Three

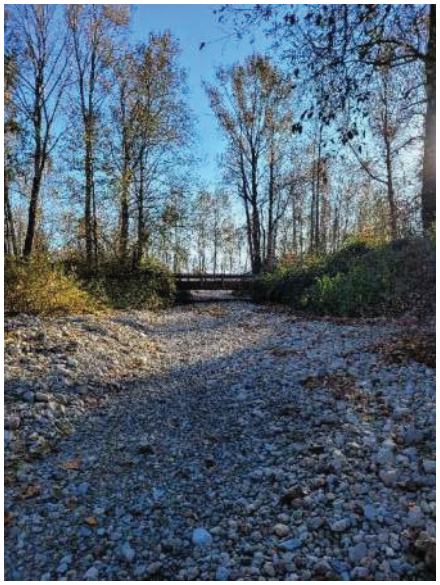


Photo 3A: Pre-Construction



Photo 3B: Post-Construction

Stage Four

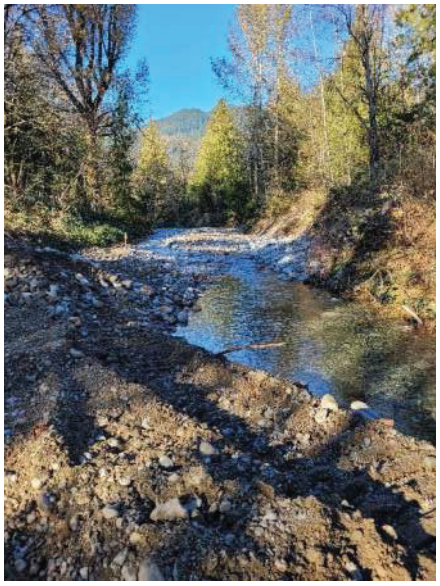


Photo 4A: Pre-Construction

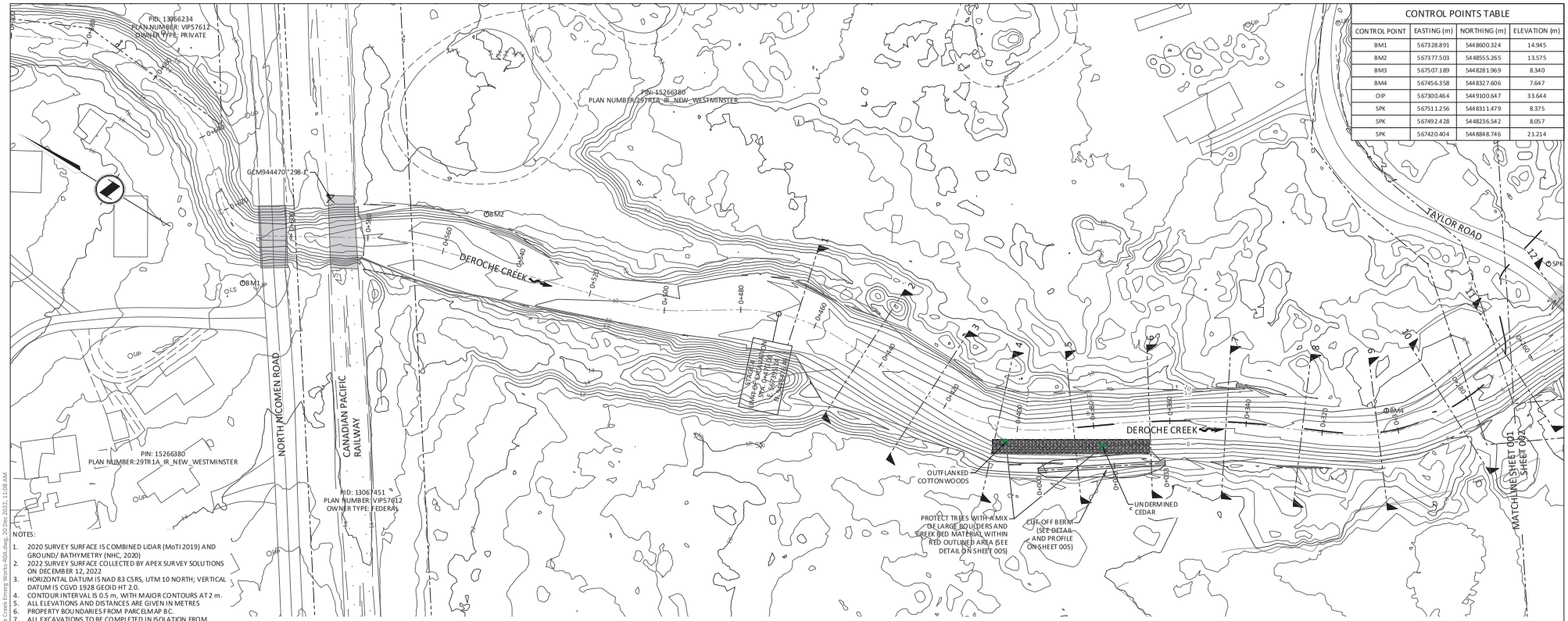


Photo 4B: Post-Construction

Innovation. Integrity.
Employee-Owned.

Appendix M

Record Drawings



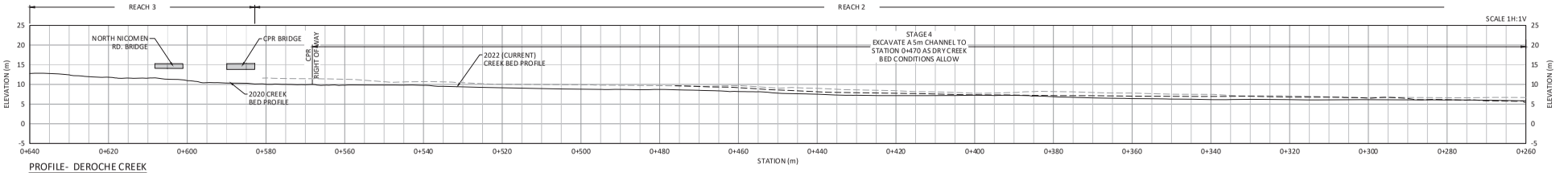
PLAN VIEW
1:500

CONTROL POINTS TABLE

CONTROL POINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
BM1	567328.891	5448600.324	14.945
BM2	567377.503	5448555.265	13.575
BM3	567507.189	5448281.969	8.340
BM4	567456.358	5448327.606	7.647
OIP	567300.464	5449100.647	33.644
SPK	567511.256	5448311.479	8.375
SPK	567492.428	5448236.542	8.057
SPK	567420.404	5448848.746	21.214

NOTES:

1. 2020 SURVEY SURFACE IS COMBINED LIDAR (MoTI 2019) AND GROUND/ BATHYMETRY (NHC, 2020)
2. 2022 SURVEY SURFACE COLLECTED BY APEX SURVEY SOLUTIONS ON DECEMBER 12, 2022
3. HORIZONTAL DATUM IS NAD 83 CSRS, UTM 10 NORTH; VERTICAL DATUM IS CGVD 1928 GEOID HT 2.0.
4. CONTOUR INTERVAL IS 0.5 m, WITH MAJOR CONTOURS AT 2 m.
5. ALL ELEVATIONS AND DISTANCES ARE GIVEN IN METRES
6. PROPERTY BOUNDARIES FROM PARCELMAP BC.
7. ALL EXCAVATIONS TO BE COMPLETED IN ISOLATION FROM FLOWING WATER.



PROFILE- DEROCHE CREEK
1:500

CLIENT:

BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
0	22-12-20	RECORD DRAWING (DRAFT)
0	25-10-01	RECORD DRAWING (FINAL - NO CHANGES)

nhc northwest hydraulic consultants

SEAL:

PROFESSIONAL ENGINEER D. J. GOOLD # 26281 BRITISH COLUMBIA
2025-10-01
Permit to Practice 1000221

LEGEND	
2022 PRE-CONSTRUCTION BED LEVEL	
2020 GROUND SURFACE	
PROPOSED EXCAVATION	
AS-BUILT GROUND	
EQUIPMENT ACCESS	

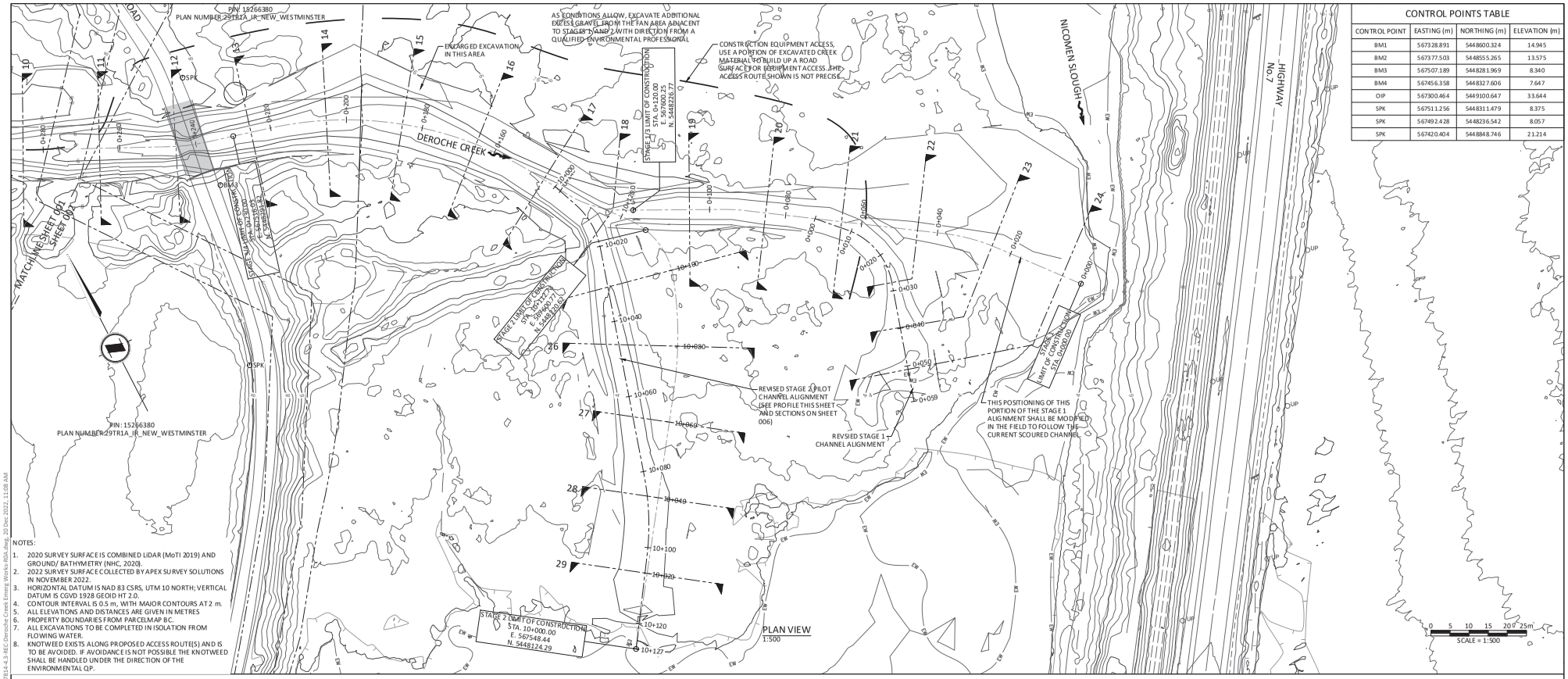
EMERGENCY SEDIMENT REMOVAL
DEROCHE CREEK - REACHES 1 AND 2

PLAN AND PROFILE VIEWS

DESIGNED: DJG	SHEET ID: 3007346-310.04-001 RECORD		SHEET No: 001
DRAFTED: CZZ	STATUS: RECORD DRAWING		
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 01 OCT. 2025		REV No: R0

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\mainfile-van\Projects\Active\3007814 Deroche Creek Emerg Works\96 CAD\02_Production\3007814-4.3-REC-Deroche Creek Emerg Works-R0A.dwg, 20 Dec 2022, 11:08 AM



CONTROL POINTS TABLE			
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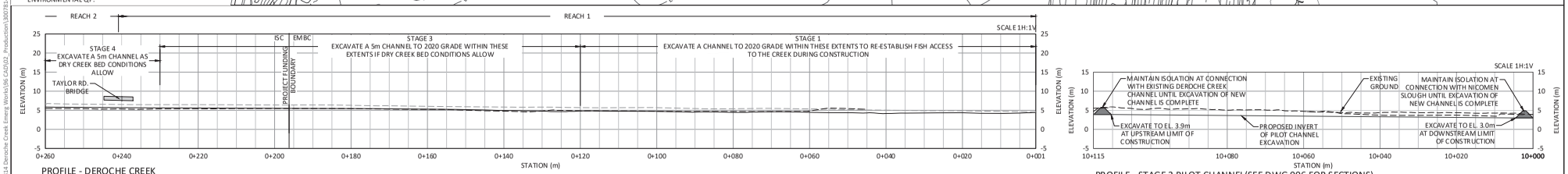
BM1	567328.891	5448600.324	14.945
BM2	567377.503	5448555.265	13.575
BM3	567507.189	5448281.969	8.340
BM4	567456.358	5448327.606	7.647
OIP	567300.464	5449100.647	33.644
SPK	567511.256	5448311.479	8.375
SPK	567492.428	5448236.542	8.057
SPK	567420.404	5448848.746	21.214

NOTES:
1. 2020 SURVEY SURFACE IS COMBINED LIDAR (MoTI 2019) AND GROUND/ BATHYMETRY (NHC, 2020).
2. 2022 SURVEY SURFACE COLLECTED BY APEX SURVEY SOLUTIONS IN NOVEMBER 2022.
3. HORIZONTAL DATUM IS NAD 83 CSRS, UTM 10 NORTH; VERTICAL DATUM IS CGVD 1928 GEOID HT 2.0.
4. CONTOUR INTERVAL IS 0.5 m, WITH MAJOR CONTOURS AT 2 m.
5. ALL ELEVATIONS AND DISTANCES ARE GIVEN IN METRES
6. PROPERTY BOUNDARIES FROM PARCELMAP BC.
7. ALL EXCAVATIONS TO BE COMPLETED IN ISOLATION FROM FLOWING WATER.
8. KNOTWEED EXISTS ALONG PROPOSED ACCESS ROUTE(S) AND IS TO BE AVOIDED. IF AVOIDANCE IS NOT POSSIBLE THE KNOTWEED SHALL BE HANDLED UNDER THE DIRECTION OF THE ENVIRONMENTAL QP.



PROFILE - DEROCHE CREEK
1:500

PROFILE - STAGE 2 PILOT CHANNEL(SEE DWG 006 FOR SECTIONS)
1:500

CLIENT:
BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
0	22-12-20	RECORD DRAWING (DRAFT)
0	25-10-01	RECORD DRAWING (FINAL - NO CHANGES)

nhc northwest hydraulic consultants

SEAL:
PROFESSIONAL ENGINEER
D. J. GOULD
29281
PROVINCE OF BRITISH COLUMBIA
2025-10-01
Permit to Practice 1000221

LEGEND
2022 PRE-CONSTRUCTION BED LEVEL
2020 GROUND SURFACE
PROPOSED EXCAVATION
AS-BUILT GROUND
EQUIPMENT ACCESS

EMERGENCY SEDIMENT REMOVAL
DEROCHE CREEK - REACHES 1 AND 2

PLAN AND PROFILE VIEWS

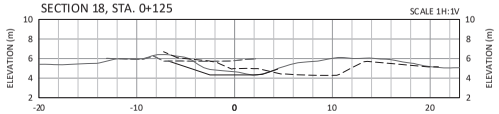
DESIGNED: DJG	SHEET ID: 3007346-310.4-002 RECORD	SHEET No:	002
DRAFTED: CZZ	STATUS: RECORD DRAWING		
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 01 OCT. 2025	REV No:	R0

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nanlfile-van\Projects\Active\3007346 Deroche Creek Emerg Works\06 CAD\02_Production\3007346-4-3 REC Deroche Creek Emerg Works 002a.dwg 20 Dec 2022, 11:08 AM

SECTION 18, STA. 0+125

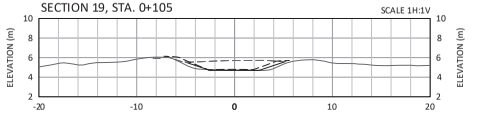
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET (2020) ELEV.	MAX. EXCAV. DEPTH, m
18	0+125	5675 95.62	5448229.28	5.96	4.26	1.70

SECTION 19, STA. 0+105

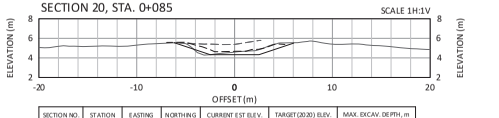
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET (2020) ELEV.	MAX. EXCAV. DEPTH, m
19	0+105	5676 13.41	5448220.13	5.71	4.70	1.01

SECTION 20, STA. 0+085

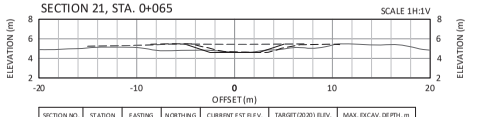
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET (2020) ELEV.	MAX. EXCAV. DEPTH, m
20	0+085	5676 30.76	5448210.25	5.78	4.33	1.45

SECTION 21, STA. 0+065

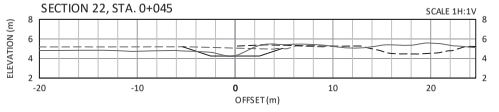
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET (2020) ELEV.	MAX. EXCAV. DEPTH, m
21	0+065	5676 47.38	5448199.13	5.44	4.61	0.83

SECTION 22, STA. 0+045

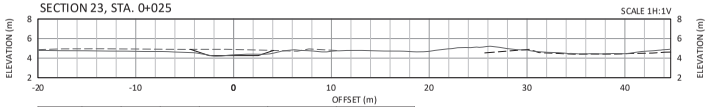
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET (2020) ELEV.	MAX. EXCAV. DEPTH, m
22	0+045	5676 64.00	5448188.00	5.06	4.25	0.81

SECTION 23, STA. 0+025

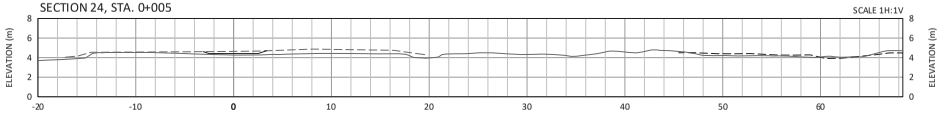
SCALE 1H:1V



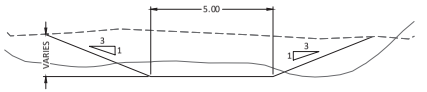
SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET (2020) ELEV.	MAX. EXCAV. DEPTH, m
23	0+025	5676 79.52	5448175.51	4.90	4.26	0.64

SECTION 24, STA. 0+005

SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET (2020) ELEV.	MAX. EXCAV. DEPTH, m
24	0+005	5676 92.29	5448160.12	4.67	4.41	0.26



TYPICAL SECTION
SCALE 1:100

NOTES:

1. ALL ELEVATIONS AND DISTANCES ARE GIVEN IN METRES
2. CROSS-SECTIONS ARE PLOTTED LOOKING DOWNSTREAM.
3. ALL EXCAVATIONS TO BE COMPLETED IN ISOLATION FROM FLOWING WATER.
4. AN ENVIRONMENTAL QP AND ARCH QP SHALL BE PRESENT THROUGHOUT CONSTRUCTION.
5. PORTIONS OF STAGE 3 AND ALL OF STAGE 4 EXCAVATIONS MAY NOT BE FEASIBLE IF SURFACE FLOWS IN DEROCHE CREEK PERSIST

0 5 10 15m
SCALE = 1:250

CLIENT:

BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
0	22-12-20	RECORD DRAWING (DRAFT)
0	25-10-01	RECORD DRAWING (FINAL - NO CHANGES)

nhc northwest hydraulic consultants

SEAL:



LEGEND

2022 PRE-CONSTRUCTION BED LEVEL	
2020 GROUND SURFACE	
PROPOSED EXCAVATION	
AS-BUILT GROUND	
EQUIPMENT ACCESS	

EMERGENCY SEDIMENT REMOVAL DEROCHE CREEK - REACHES 1 AND 2

SECTIONS STAGE 1

DESIGNED:	DJG	SHEET ID: 3007346-310.4-003 RECORD	SHEET No: 003
DRAFTED:	CZZ	STATUS: RECORD DRAWING	
CHECKED:	DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE: 01 OCT. 2025	REV No: R0

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

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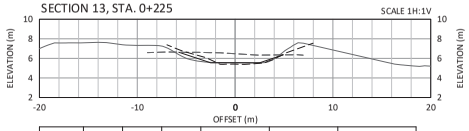
SECTION 13, STA. 0+225

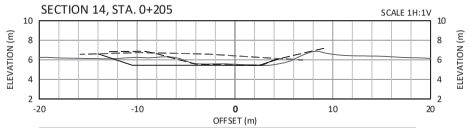
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
13	0+225	567520.61	5448290.62	6.57	5.55	1.02

SECTION 14, STA. 0+205

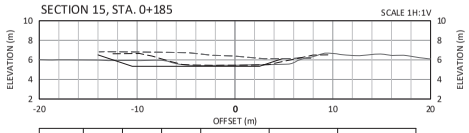
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
14	0+205	567539.58	5448284.37	6.74	5.45	1.29

SECTION 15, STA. 0+185

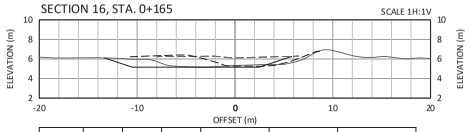
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
15	0+185	567556.84	5448274.34	6.77	5.34	1.43

SECTION 16, STA. 0+165

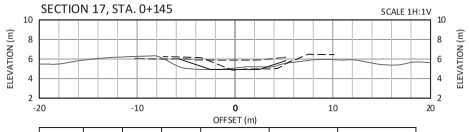
SCALE 1H:1V



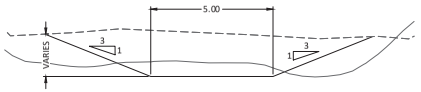
SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
16	0+165	567571.56	5448260.86	6.29	5.16	1.13

SECTION 17, STA. 0+145

SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
17	0+145	567583.11	5448244.57	5.89	4.94	0.95



TYPICAL SECTION
SCALE 1:100

NOTES:

1. ALL ELEVATIONS AND DISTANCES ARE GIVEN IN METRES
2. CROSS-SECTIONS ARE PLOTTED LOOKING DOWNSTREAM.
3. ALL EXCAVATIONS TO BE COMPLETED IN ISOLATION FROM FLOWING WATER.
4. AN ENVIRONMENTAL QP AND ARCH QP SHALL BE PRESENT THROUGHOUT CONSTRUCTION.
5. PORTIONS OF STAGE 3 AND ALL OF STAGE 4 EXCAVATIONS MAY NOT BE FEASIBLE IF SURFACE FLOWS IN DEROCHE CREEK PERSIST

0 5 10 15m
SCALE = 1:250

CLIENT:

BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
0	22-12-20	RECORD DRAWING (DRAFT)
0	25-10-01	RECORD DRAWING (FINAL - NO CHANGES)

nhc northwest hydraulic consultants

SEAL:

PROFESSIONAL ENGINEER D. J. GOOLD # 28281 COLUMBIA
2025-10-01
Permit to Practice 1000221

LEGEND	
2022 PRE-CONSTRUCTION BED LEVEL	
2020 GROUND SURFACE	
PROPOSED EXCAVATION	
AS-BUILT GROUND	
EQUIPMENT ACCESS	

EMERGENCY SEDIMENT REMOVAL
DEROCHE CREEK - REACHES 1 AND 2

SECTIONS STAGE 3

DESIGNED:	DJG	SHEET ID:	3007346-310.4-004 RECORD	SHEET No:
DRAFTED:	CZZ	STATUS:	RECORD DRAWING	004
CHECKED:	DJG	SCALE:	AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE:	01 OCT. 2025	REV No: R0

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

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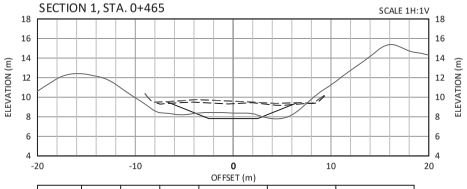
SECTION 1, STA. 0+465

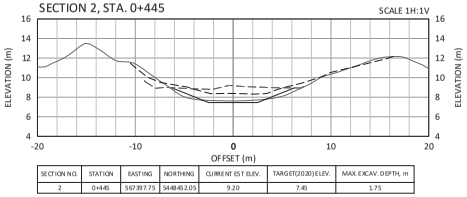
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
1	0+465	567396.49	5448471.93	9.59	7.82	1.77

SECTION 2, STA. 0+445

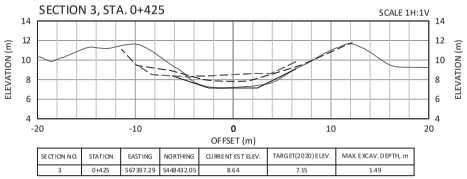
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
2	0+445	567397.75	5448452.05	9.20	7.45	1.75

SECTION 3, STA. 0+425

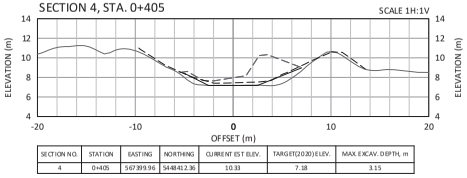
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
3	0+425	567397.29	5448432.05	8.64	7.15	1.49

SECTION 4, STA. 0+405

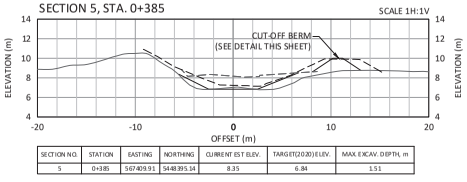
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
4	0+405	567399.96	5448412.36	10.33	7.18	3.15

SECTION 5, STA. 0+385

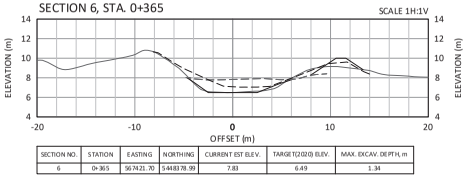
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
5	0+385	567409.91	5448395.14	8.35	6.84	1.51

SECTION 6, STA. 0+365

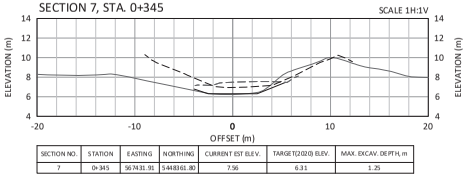
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
6	0+365	567421.70	5448378.99	7.83	6.49	1.34

SECTION 7, STA. 0+345

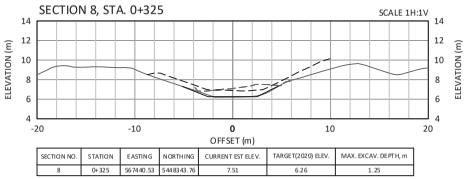
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
7	0+345	567431.91	5448361.80	7.56	6.31	1.25

SECTION 8, STA. 0+325

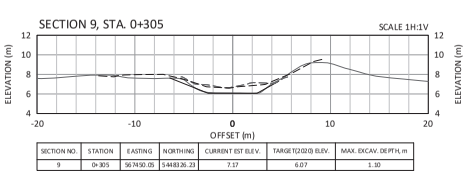
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
8	0+325	567440.53	5448343.76	7.51	6.26	1.25

SECTION 9, STA. 0+305

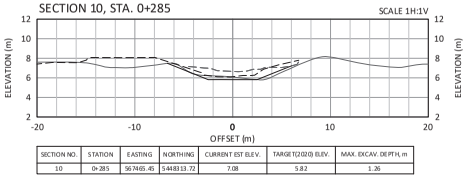
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
9	0+305	567450.05	5448326.23	7.17	6.07	1.10

SECTION 10, STA. 0+285

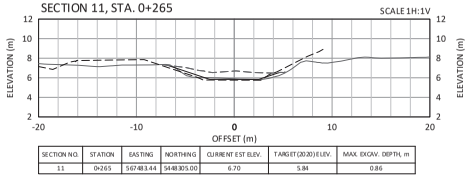
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
10	0+285	567465.45	5448313.72	7.08	5.82	1.26

SECTION 11, STA. 0+265

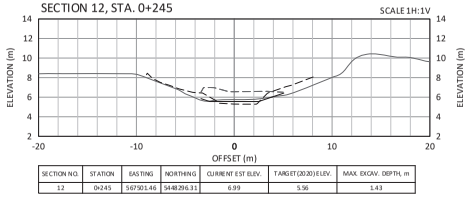
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
11	0+265	567483.44	5448305.00	6.70	5.84	0.86

SECTION 12, STA. 0+245

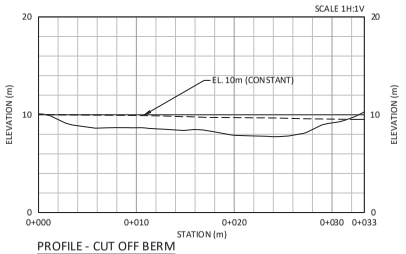
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
12	0+245	567501.46	5448296.31	6.99	5.56	1.43

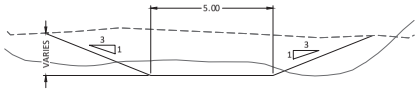
PROFILE - CUT OFF BERM

1:250



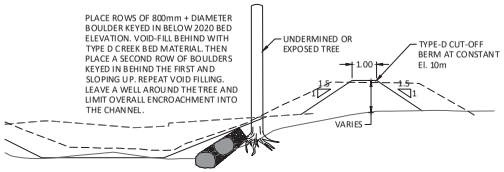
TYPICAL SECTION

SCALE 1:100



DETAIL - TREE PROTECTION AND CUT-FF BERM

SCALE 1:100



NOTES:

1. ALL ELEVATIONS AND DISTANCES ARE GIVEN IN METRES
2. CROSS-SECTIONS ARE PLOTTED LOOKING DOWNSTREAM.
3. ALL EXCAVATIONS TO BE COMPLETED IN ISOLATION FROM FLOWING WATER.
4. AN ENVIRONMENTAL QP AND ARCH QP SHALL BE PRESENT THROUGHOUT CONSTRUCTION.
5. PORTIONS OF STAGE 3 AND ALL OF STAGE 4 EXCAVATIONS MAY NOT BE FEASIBLE IF SURFACE FLOWS IN DEROCHE CREEK PERSIST.
6. IF CREEK BED MATERIAL INDICATED FOR VOID-FILLING IS NOT AVAILABLE IT SHALL BE REPLACED WITH CLEAN 6-INCH MINUS ROCK.
7. THE CUT-OFF BERM SHALL BE CONSTRUCTED OF CREEK BED MATERIAL WITH NO STONES LARGER THAN 150mm, AND SHALL BE BUCKET-COMPACTED.
8. THE CUT-OFF BERM SHALL BE CONSTRUCTED OF IN-SITU CREEK BED TYPE-D OR IMPORTED TYPE-D, AND SHALL BE BUCKET-COMPACTED.

0 5 10 15m

SCALE = 1:250

CLIENT:

BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
0	22-12-20	RECORD DRAWING (DRAFT)
0	25-10-01	RECORD DRAWING (FINAL - NO CHANGES)

nhc northwest hydraulic consultants

SEAL:

PROFESSIONAL ENGINEER — D. J. GOULD — # 28281 — PROVINCE OF BRITISH COLUMBIA

2025-10-01

Permit to Practice 1000221

LEGEND

2022 PRE-CONSTRUCTION BED LEVEL	
2020 GROUND SURFACE	
PROPOSED EXCAVATION	
AS-BUILT GROUND	
EQUIPMENT ACCESS	

EMERGENCY SEDIMENT REMOVAL DEROCHE CREEK - REACHES 1 AND 2

SECTIONS STAGE 4

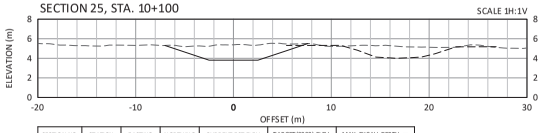
DESIGNED:	DJG	SHEET ID: 3007346-310.4-005 RECORD	SHEET No: 005
DRAFTED:	CZZ	STATUS: RECORD DRAWING	
CHECKED:	DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE: 01 OCT. 2025	REV No: R0

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nanlfile-van\Projects\Active\3007814 Deroche Creek Emerg Works\06 CAD\02_Production\3007814-4.3-REC-Deroche Creek Emerg Works-RGA.dwg, 20 Dec 2022, 11:08 AM

SECTION 25, STA. 10+100

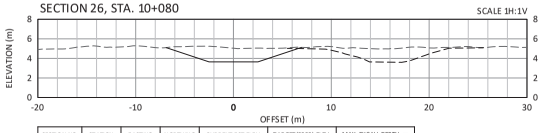
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
25	101+00	567602.07	5448208.18	5.19	3.81	1.38

SECTION 26, STA. 10+080

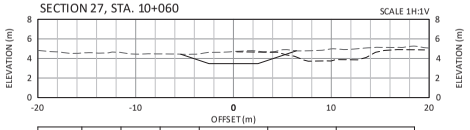
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
26	100+80	567594.35	5448189.78	5.03	3.64	1.39

SECTION 27, STA. 10+060

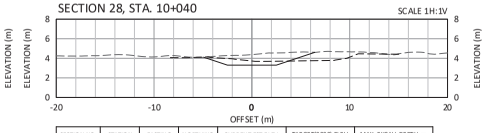
SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
27	100+60	567563.32	5448173.11	4.44	3.47	0.97

SECTION 28, STA. 10+040

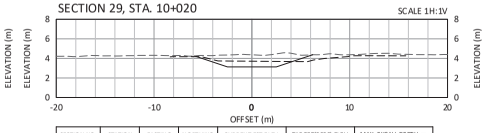
SCALE 1H:1V



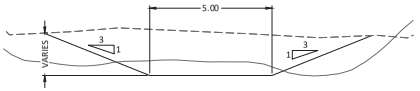
SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
28	100+40	567571.69	5448156.84	4.09	3.30	0.79

SECTION 29, STA. 10+020

SCALE 1H:1V



SECTION NO.	STATION	EASTING	NORTHING	CURRENT EST ELEV.	TARGET(2020) ELEV.	MAX. EXCAV. DEPTH, m
29	100+20	567560.06	5448140.57	4.23	3.13	1.10



TYPICAL SECTION
SCALE 1:100

NOTES:

1. ALL ELEVATIONS AND DISTANCES ARE GIVEN IN METRES
2. CROSS-SECTIONS ARE PLOTTED LOOKING DOWNSTREAM.
3. ALL EXCAVATIONS TO BE COMPLETED IN ISOLATION FROM FLOWING WATER.
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0 5 10 15m
SCALE = 1:250

CLIENT:

BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
0	22-12-20	RECORD DRAWING (DRAFT)
0	25-10-01	RECORD DRAWING (FINAL - NO CHANGES)

nhc northwest hydraulic consultants

SEAL:



LEGEND

2022 PRE-CONSTRUCTION BED LEVEL	
2020 GROUND SURFACE	
PROPOSED EXCAVATION	
AS-BUILT GROUND	
EQUIPMENT ACCESS	

EMERGENCY SEDIMENT REMOVAL
DEROCHE CREEK - REACHES 1 AND 2

SECTIONS STAGE 2

DESIGNED:	DJG	SHEET ID: 3007346-310.4-006 RECORD	SHEET No: 006
DRAFTED:	CZZ	STATUS: RECORD DRAWING	
CHECKED:	DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE: 01 OCT. 2025	REV No: R0

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nanlfile-van\Projects\Active\3007814 Deroche Creek Emerg Works\06 CAD\02_Production\3007814-4.3-REC Deroche Creek Emerg Works-RGA.dwg, 20 Dec 2022, 11:08 AM

Innovation. Integrity.
Employee-Owned.

Appendix N

Environmental Monitoring Report

KERR WOOD LEIDAL
consulting engineers

Greater Vancouver
200 - 4185A Still Creek Drive
Burnaby, BC V5C 6G9
T 604 294 2088
F 604 294 2090

Technical Memorandum

DATE: December 9, 2022

TO: Des Goold, P.Eng., Principal
Northwest Hydraulic Consultants

FROM: Jaime Dimillo, B.Sc.
Patrick Lilley, M.Sc., RPBio

RE: **Deroche Creek Emergency Sediment Removal**
Environmental Monitoring Completion Report
Our File 2838.002-300

This technical memorandum summarizes environmental monitoring activities that occurred during the Deroche Creek Emergency Sediment Removal project in November 2022. The project was coordinated by PricewaterhouseCoopers (PwC) and the BC Ministry of Environment and Climate Change Strategy to address potential flooding risks resulting from the impacts of the November 2021 Atmospheric River Event (ARE). Kerr Wood Leidal Associates Ltd. (KWL) was retained as a subconsultant by Northwest Hydraulic Consultants Ltd. (NHC) to provide environmental monitoring services. An Environmental Monitor (EM) from KWL was present on site for the duration of the project to ensure all construction activities were conducted in accordance with the project Construction Environmental Management Plan (CEMP), relevant best management practices, and regulatory permits to minimize the potential for adverse environmental effects caused by the project.

1. Project Background

Deroche Creek is a headwater stream that flows through the Leq'a:mel First Nation community located within Lakahahmen IR 11 where it enters Nicomen Slough, a historical tributary of the Fraser River that was diked in the 1930s. Lakahahmen IR 11 is located on and adjacent the Deroche Creek alluvial fan, approximately 22 km east of the City of Mission, BC. The ARE of November 2021 deposited significant amounts of sediment within the lower reaches of Deroche Creek. The accumulated sediment within the creek resulted in surrounding homes being susceptible to flooding, raised concerns about the potential failure of the Taylor Road bridge or the dike protecting Highway 7, and left several large trees vulnerable to collapse. Deroche Creek was identified as an Area of Concern requiring immediate attention based on a high level, preliminary hazard and risk assessment. Intervention to remove the sediment and increase capacity of Deroche Creek was imperative to mitigate risks to humans, infrastructure, and the environment. This work occurred from November 8-21, 2022. KWL completed environmental monitoring to ensure compliance with all environmental permits to provide on-site guidance to the Contractor (Summit Earthworks).

2. Permitting and Approvals

The project was completed under the following permits and approvals:

- *Water Sustainability Act* Notification for Changes in and About a Stream (WSA Change Approval #: 2010056)

As all institutional projects are not subject to the Riparian Areas Protection Regulation (RAPR), a RAPR assessment was not required for the Project. A DFO Request for Review was not submitted for this project as it was determined that the project could avoid prohibited effects to fish and fish habitats and through consistent monitoring by a Qualified Environmental Professional (QEP).

A *Species at Risk Act* permit was not required as no critical habitat for listed species was found on site. No fish salvage occurred as a result of the project, as such, no fish collection permits were required.

3. Construction Works

The construction activities that were undertaken to complete the project are summarized in Table 3-1.

Table 3-1: Construction Activities During the Works

Stage	Activity	Description of Activity
Site Preparation	Mobilization	Mobilization of contractor and equipment to site
	Access	Clearing and grubbing vegetation for site access, widening of existing path to create machinery access road.
Construction	Tree Protection	Protection of two groupings of large trees (2 western redcedar and 1 black cottonwood) in Reach 2 with large boulders and creek bed material;
	Invasive Species Management	Flagging and isolation of patches of invasive Knotweed plant (*Fallopia sp.*)
	Equipment Access (Stage 1 and 2)	Construction of equipment access out to Stage 1/ Stage 2 areas
	Excavation (Stage 1)	Excavation and grading within Stage 1 to re-establish pre-ARE bed levels. Excavated materials were hauled off site to Zaitscullachan (Zaits) IR 9.
	Excavation (Stage 2)	Excavation and grading within Stage 2 to re-establish a pilot channel west intoa wetland area of Nicomen Slough. Excavated materials to were hauled off site to Zaitscullachan (Zaits) IR 9. The Stage 2 excavation was isolated by sediment fencing and a headwall until complete. Additional tree clearing occurred to allow for proper sloping of Stage 2 channel bank.
	Site Clean Up	Contractor demobilization, removal of sediment fencing, flagging tape and filter cloth. Return channel to natural state.

4. Construction Monitoring

Construction environmental monitoring was completed to ensure that Summit Earthworks (The Contractor) were compliant with the CEMP, regulatory requirements, and best management practices.

KWL team members (Jaime Dimillo, B.Sc., Oskar von Wahl, BIT, and Andrew Baylis, M.Sc.) conducted environmental monitoring of the site throughout the project works under the direction of Patrick Lilley, RPBio.

During construction the Environmental Monitor (EM) documented the following items related to compliance with the environmental permits and best practices:

- Weather conditions;
- Environmental protection measures and materials on site;
- Condition of site equipment;
- Storage and handling of fuel and hazardous substances;
- Vegetation removal and invasive plant management;
- Discussion with construction supervisor and staff; and
- Any environmental deficiencies, incidents, concerns, recommendations, and/or required actions.

Daily Monitoring Reports, including site photographs, are included in Enclosure A.

5. Mitigation Measures

A comprehensive list of recommended mitigation measures was provided to the Contractor in the CEMP. The CEMP can be found in Enclosure B. Specifically, the following mitigation measures were most relevant to project activities:

- The timing of works outside of the least risk work window was approved by a Qualified Environmental Professional (QEP) who determined that fish and wildlife would not be impacted because of the lack of connected surface flow in Deroche Creek and its fan in the vicinity of the work at the time of construction. Due to the lack of any substantial rainfall during construction, the work was able to completed fully in isolation from flowing water.
- The duration of instream works was minimized and water quality was monitored carefully so that chum (*Oncorhynchus keta*) and coho (*Oncorhynchus kisutch*) salmon returning to spawn in Nicomen Slough downstream of the fan were not impacted nor were their ability to carry out one or more of their life processes diminished. Returning salmon did not have access to Deroche Creek for spawning because of the lack of connected surface flows due to the dry conditions and amount of gravel deposited by the ARE.
- Patches of knotweed encountered during site clearing or other works were flagged off and avoided by machinery.
- Sediment fencing was constructed around the Stage 1 and Stage 2 channels to prevent sediment from entering the slough and fish from entering the work area.
- A spill response plan, spill kit, and spill trays were present on-site throughout the duration of the works.
- Construction materials, garbage, and debris were removed from the site following completion of works (to the greatest extent possible).
- Activities were monitored full time under the direction of a QEP for the full duration of construction.

6. Monitoring Outcomes

The Contractor had experience completing similar sediment removal projects, therefore they were proactive in applying the appropriate mitigation measures and were compliant with the requests of the EM throughout the duration of the activities. They were receptive to concerns, recommendations, and requests of the EM.

The following environmental concerns arose and were resolved during the project:

- **Short-term dewatering of isolated pools inhabited by fish within Deroche Creek:** On November 9, 2022, KWL EM Jaime Dimillo observed the Contractor working within a wetted portion of Deroche

Creek upstream of Taylor Road. This area was not connected to Nicomen Slough and believed to be an isolated pool from previous days of rain. No fish were observed. The Contractor wished to shape the slope of the bank within this area using an excavator. The EM permitted this activity to begin around 10:00 AM and continued to visually monitor the turbidity. At approximately 12:00 PM, the EM observed a live salmonid fry stranded outside of the wetted area. Water levels were fluctuating from the bank shaping, and the fish quickly made its way back into the water. As this confirmed there were in fact fish in this isolated pool, the EM immediately told the operator to stop work and allow for turbidity to settle within the water. Work in this area was quickly wrapped up and discontinued until the area naturally dewatered in the following days due to a lack of precipitation.

- **Invasive knotweed adjacent the work area:** Several patches of Knotweed species were observed in the construction area with specific concern in the excavation area and machinery access road. KWL EM Jaime Dimillo asked the Contractor to indicate these patches using flagging tape to prevent site laborers, machinery operators and truck drivers from accidentally disturbing these plants during construction. Although disturbance within 15 metres (m) of Knotweed is not typically permitted, due to the proximity of the knotweed in relation to the channel excavation works, a 15 m setback was not possible. Discussions between a KWL QEP and Leq'a:mel representative Rick McKamey determined that excavation activities would not occur within 5 m of Knotweed. The flagging tape and 5 m excavation setback was followed throughout the duration of the project.



Photo 1. Knotweed with Flagging Tape and Additional Fence

- **Fish access from and sedimentation to Nicomen Slough during Stage 2 channel works:** On November 11, 2022, KWL EM Andrew Baylis instructed the Contractor to construct sediment fencing to isolate the Stage 1 and Stage 2 channels from Nicomen Slough. Construction of the Stage 1 channel occurred entirely in dry conditions, but the Stage 2 channel was to be constructed within an existing wetland area and groundwater was expected to fill the channel and potentially provide a hydrologic connection with Nicomen Slough. The sediment fencing served two purposes: prevent fish from entering the work area and prevent sediment from exiting the work area.
- **Sheen of unknown origin:** On November 11, 2022, KWL EM Andrew Baylis discovered what appeared to be a hydrocarbon sheen in some isolated pools at the toe of the fan adjacent the large riffle on the left bank of Nicomen Slough. The volume of contamination observed did not meet the reportable quantity in the Spill Reporting Regulation. In addition, the sheen was a large distance away from the work area and machinery had not been around the sheen at any stage of this project. The

EM instructed the Contractor to use absorbent pads to remove some surface contamination and continue to isolate the contaminated area using absorbent booms. The sheen and absorbent boom were monitored throughout the remainder of the project and eventually removed at the end of project works.

- **Leftover filter fabric:** On November 18, 2022, during site cleanup and demobilization, KWL EM Oskar von Wahl and KWL engineering inspector Santiago Paredes observed that filter cloth used for the temporary access road to construct the Stage 2 channel had not been completely removed during site clean up activities. Bringing in machinery to remove the filter cloth was deemed to be too invasive on the newly completed banks especially with heavy rain in the immediate forecast. As such, it was determined that the Contractor would bring a crew on November 21 to remove the remaining fabric by hand. Hand removal was overseen by KWL EM Jaime Dimillo. The Contractor removed as much filter cloth as physically possible given the conditions within a wet section and dry section of the Stage 2 channel. A small portion of filter cloth could be removed and remained buried within the Stage 2 channel. However, most of the filter cloth was successfully removed.

7. Submission

We trust that this Environmental Monitoring Completion Report meets your requirements at present. Please do not hesitate to contact Patrick Lilley at 604-293-3121 or plilley@kwl.ca if you have any questions or concerns.

KERR WOOD LEIDAL ASSOCIATES LTD.

Prepared by:

Reviewed by:

Jaime Dimillo, B.Sc.
Junior Biologist

Patrick Lilley, M.Sc., R.P.Bio.
Technical Reviewer

JMD/

Encl.: Enclosure A – Daily Environmental Monitoring Reports
Enclosure B – Construction Environmental Management Plan

Statement of Limitations

This document has been prepared by Kerr Wood Leidal Associates Ltd. (KWL) for the exclusive use and benefit of the intended recipient. No other party is entitled to rely on any of the conclusions, data, opinions, or any other information contained in this document.

This document represents KWL's best professional judgement based on the information available at the time of its completion and as appropriate for the project scope of work. Services performed in developing the content of this document have been conducted in a manner consistent with that level and skill ordinarily exercised by members of the engineering profession currently practising under similar conditions. No warranty, express or implied, is made.

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Revision History

Revision #	Date	Status	Revision Description	Author
A	December 5, 2022	Draft	Internal draft	JMD

KERR WOOD LEIDAL
consulting engineers

Environmental Monitoring Report

PROJECT: DEROCHE CREEK EMERGENCY SEDIMENT REMOVAL
Client: Northwest Hydraulic Consultants
Owner: Leq'a:mel First Nation
Contractor: Summit Earthworks
Contract No.: 2838-002

PREPARED BY	Oskar von Wahl (OAVW)	**ON SITE**	7:00	**OFF SITE**	15:00
DATE	November 8, 2022				
WEATHER	Sunny, clear, windy, 0-3 °C				

Participants: Oskar von Wahl (KWL)

EQUIPMENT AND WORKFORCE ON SITE

Workforce:

- 2 – Excavator operators
- 1 – Articulated dump truck operator
- 3 – Laborers
- 1 – Safety Officer

Equipment:

- 2 – Excavator – Doosan DX300LC
- 2 - Articulated dump trucks - Doosan DA30 – **one in use**
- 1 – Dozer – Case 2050M – **not in use**

CONSTRUCTION ACTIVITIES AND PROGRESS

- Creek diverted at upstream end of works into new channel.
- Rip Rap placed in old channel bed.

NOTES AND COMMENTS

- Tree protection activities of several mature Western Red Cedar trees occurred upstream of Taylor Road (Photo 1).
- The excavator created a temporary crossing of Deroche Creek by placing clean rip rap directly in the stream channel
- Work within a wet area upstream of Taylor Road was occurring. The area was isolated from the Slough and was assumed to be an isolated area with no fish present. The excavator was working partially within the wet to carve and modify the channel, making the existing water fairly turbid. Work was stopped for several minutes until turbidity cleared when work created large turbidity plumes.

KERR WOOD LEIDAL
consulting engineers

Environmental Site Conditions (NC= Non-Compliant, N/A= Not Applicable)					
Erosion and Sediment Control	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Access points	X				
Laydown area	X				
Water diversion			X		
Instream isolation			X		
Other:					
Fuel and Oil Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Spill Kits/Spill Response Plan	X				
Fuel Storage	X				
Refueling Location	X				
Equipment Condition (e.g.leaks)	X				
Spill trays	X			Spill trays placed under idle equipment	
Other:					
Waste Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Deleterious substance use and storage			**X**		
Waste disposal	X			Crew observed using garbage bins for waste	
Other:					
Habitat Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Wetland			**X**		
Riparian area					
Other:					

DISCUSSIONS WITH CONTRACTOR

- See above

DISCUSSIONS WITH OTHERS

- See above

ACTIONS RECOMMENDED/REQUIRED

- Recommend waiting until the area upstream of Taylor Rd is dry before conducting more extensive works in the stream channel.

Incident Report Required?	Yes		No	X	Reason:	

PHOTOGRAPHS

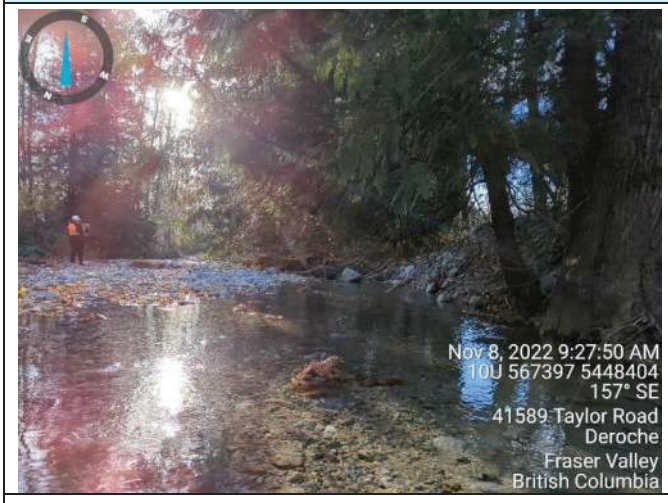

Photo 1: Facing southeast – Large cottonwood to be armoured

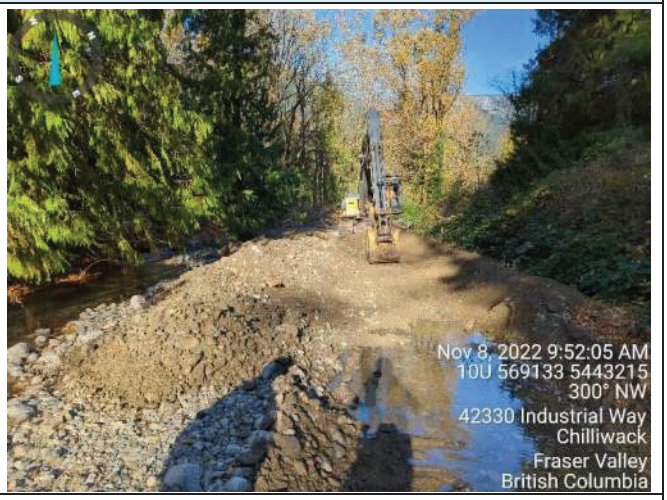

Photo 2: Facing north – Excavating alternate channel (original channel on left).



Photo 3: Facing S – Breaching the top end of the new channel



Photo 4: Facing northeast – turbidity generated at the bottom end of the alternate channel

KERR WOOD LEIDAL
consulting engineers

Environmental Monitoring Report

PROJECT: DEROCHE CREEK EMERGENCY SEDIMENT REMOVAL
Client: Northwest Hydraulic Consultants
Owner: Leq'a:mel First Nation
Contractor: Summit Earthworks
Contract No.: 2838-002

PREPARED BY	Jaime Dimillo (JMD)	**ON SITE**	7:00	**OFF SITE**	16:00
DATE	November 9, 2022				
WEATHER	Sunny, clear, windy, 0-3 °C				

Participants: Jaime Dimillo (KWL)

EQUIPMENT AND WORKFORCE ON SITE

Workforce:

- 2 – Excavator operators
- 2 – Articulated dump trucks operators
- 2 – Laborers
- 1 – Safety Officer

Equipment:

- 2 – Excavator – Doosan DX300LC
- 1 – Excavator – Case CX245D – **not in use**
- 2 - Articulated dump trucks - Doosan DA30
- 1 – Dozer – Case 2050M – **not in use**

CONSTRUCTION ACTIVITIES AND PROGRESS

- Tree protection structure completed from access road along adjacent property to the upstream end of the cut-off berm.
- Cut-off berm partially completed on western side of bank.
- Creek scour channel filled with native material to divert flow to linear section to prevent future bank erosion.

NOTES AND COMMENTS

- Tree protection activities of several mature Western Red Cedar trees occurred upstream of Taylor Road (Photo 1).
- Work within a wet area upstream of Taylor Road was occurring. The area was isolated from the Slough and was assumed to be an isolated area with no fish present. The excavator was working within the wet to carve and modify the channel, making the existing water fairly turbid. As the water was further receding north, JMD observed a small coho fry alive on land. The fry made it back into the water. At that time, JMD requested the operator to stop work and let the turbidity settle. Within 1 hour the turbidity had settled and JMD requested that work be quickly wrapped up in this section. After the hour had passed, the excavator was removed from the area within the next 20 minutes.
- Several patches of Knotweed, a noxious plant were observed adjacent the work area. As the Contractor was working to establish an access road, JMD educated contractor about knotweed and requested some patches be flagged. In addition, JMD requested to build the access road farther west away from knotweed patches. The contractor marked the knotweed with caution tape as they did not have reflective tape on-site but JMD asked AJB to bring proper flagging tape the next day (Photo 3).

KERR WOOD LEIDAL
consulting engineers

Environmental Site Conditions (NC= Non-Compliant, N/A= Not Applicable)					
Erosion and Sediment Control	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Access points	X				
Laydown area	X				
Water diversion			X		
Instream isolation			X		
Other:					
Fuel and Oil Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Spill Kits/Spill Response Plan	X				
Fuel Storage	X				
Refueling Location	X				
Equipment Condition (e.g.leaks)	X				
Spill trays	X			Spill trays placed under idle equipment	
Other:					
Waste Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Deleterious substance use and storage			**X**		
Waste disposal	X			Crew observed using garbage bins for waste	
Other:					
Habitat Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Wetland			**X**		
Riparian area					
Other:					

DISCUSSIONS WITH CONTRACTOR

- See above

DISCUSSIONS WITH OTHERS

- See above

ACTIONS RECOMMENDED/REQUIRED

- Properly stake out Knotweed patches adjacent to work area
- Do not work upstream of Taylor Road until dry

Incident Report Required?	Yes		No	X	Reason:	

PHOTOGRAPHS



Photo 1: Facing southeast – berm with armoring surrounding cedar trees



Photo 2: Facing southwest – spill kit accessible and garbage can



Photo 3: Facing NE – Patch of Knotweed with Caution tape



Photo 4: Facing northeast – turbidity generated in wetted section upstream of Taylor Road

Environmental Monitoring Report

PROJECT: DEROCHE CREEK EMERGENCY SEDIMENT REMOVAL
Client: Northwest Hydraulic Consultants
Owner: Leq'a:mel First Nation
Contractor: Summit Earthworks
Contract No.: 2838-002

PREPARED BY	Andrew Baylis (AJB)	**ON SITE**	7:00	**OFF SITE**	16:00
DATE	November 10, 2022				
WEATHER	Sunny and cloud, -1-3 °C				

Participants: Andrew Baylis (KWL)

EQUIPMENT AND WORKFORCE ON SITE

Workforce:

- 2 – Excavator operators
- 2 – Articulated rock truck operators
- 2 – Laborers
- 1 – Safety Officer

Equipment:

- 2 – Excavator – Doosan DX300LC
- 1 – Excavator – Case CX245D – **not in use**
- 2 - Articulated rock trucks - Doosan DA30
- 1 – Dozer – Case 2050M – **not in use**

CONSTRUCTION ACTIVITIES AND PROGRESS

- Riprap stockpile moved from cut-off berm to edge of construction area downstream of Taylor Road bridge (photo 2).
- Access road adjacent to Taylor Road bridge widened and strengthened with gravel to support use by rock trucks.
- Survey conducted by Apex Geomatics for stage 2 channel alignment.
- Clearing and grubbing for stage 2 channel access road (photo 3).
- Excavation of material for stage 2 channel access road from downstream of Taylor Road bridge (photo 4).
- Test pit dug at stage 2 channel outlet (photo 5).

NOTES AND COMMENTS

- AJB marked primary patch of Japanese Knotweed with flagging tape as per JMD's request from previous day (photo 1)
- Discussion with contractor: extra riprap may be used to armour bend at boundary in between stage 1 and stage 2 to prevent bank erosion.
- Surveyor arrived on site at 1:00pm to stake out new alignment for stage 2 channel. Stage 2 channel designated for primary flow. Stage 1 channel excavation planned to initiate on Nov. 11 or 12 (alongside stage 2 channel excavation).
- Clearing and grubbing started after new alignment was approved. Test pit dug at stage 2 channel outlet; accessed by using swamp mats.
- AJB marked outlet headwall for stage 2 channel with flagging tape in discussion with excavator operator and supervisor.
- AJB directed that no materials should remain once stage 2 access road is decommissioned.
- KWL engineer advised contractor to stake out design elevation for cut-off berm once surveyor onsite and to place more fill to allow for a 1.0m top width (photo 6).

KERR WOOD LEIDAL
consulting engineers

Environmental Site Conditions (NC= Non-Compliant, N/A= Not Applicable)					
Erosion and Sediment Control	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Access points	X				
Laydown area	X				
Water diversion			X		
Instream isolation			X		
Other:					
Fuel and Oil Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Spill Kits/Spill Response Plan	X				
Fuel Storage	X				
Refueling Location	X				
Equipment Condition (e.g.leaks)	X				
Spill trays	X			Spill trays placed under idle equipment	
Other:					
Waste Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Deleterious substance use and storage			**X**		
Waste disposal	X			Crew observed using garbage bins for waste	
Other:					
Habitat Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Wetland			**X**		
Riparian area					
Other:					

DISCUSSIONS WITH CONTRACTOR

- See above

DISCUSSIONS WITH OTHERS

- See above

ACTIONS RECOMMENDED/REQUIRED

- Leave ~5m headwall buffer at outlet of stage 2 channel to maintain isolation from Nicomen Slough until construction is complete.
- Once stage 2 channel excavation is complete, remove access road and do not leave any road materials in place (gravel, geotextile fabric, etc.).

Incident Report Required?	Yes		No	X	Reason:	

PHOTOGRAPHS



Photo 1: Facing east – Japanese Knotweed patch marked with flagging tape (left) and riprap placed at edge of construction area near stage 2 channel.



Photo 2: Facing southeast – trees stripped by beavers to be removed for excavation of stage 2 channel.



Photo 3: Facing south – clearing/grubbing in preparation for stage 2 channel excavation



Photo 4: Facing south – start of excavation near Taylor Road bridge (material to be used for stage 2 channel access road)



Photo 5: Facing south – excavators and swamp mats to access stage 2 channel outlet test pit



Photo 6: Facing northwest – channel and adjacent cut-off berm (left)

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Environmental Monitoring Report

PROJECT: DEROCHE CREEK EMERGENCY SEDIMENT REMOVAL
Client: Northwest Hydraulic Consultants
Owner: Leq'a:mel First Nation
Contractor: Summit Earthworks
Contract No.: 2838-002

PREPARED BY	Andrew Baylis (AJB)	**ON SITE**	7:00	**OFF SITE**	16:00
DATE	November 11, 2022				
WEATHER	Cloudy, windy, 0-3 °C in the morning, partly sunny in the afternoon 7 °C				

Participants: Andrew Baylis (KWL)

EQUIPMENT AND WORKFORCE ON SITE
Workforce:
- 2 – Excavator operators
- 2 – Articulated rock truck operators
- 2 – Laborers
- 1 – Safety Officer

Equipment:
- 2 – Excavator – Doosan DX300LC
- 1 – Excavator – Case CX245D – **not in use**
- 2 - Articulated rock trucks - Doosan DA30
- 1 – Dozer – Case 2050M – **not in use**

CONSTRUCTION ACTIVITIES AND PROGRESS
Workforce:
- 3 – Excavator operators
  - Steven, Larry
- 2 – Articulated dump trucks operators
- 3 – Laborers
- 3 – Truck drivers
- 1 – Safety Officer
  - Ashley
- 1 – Surveyor (Alexa from Apex Geomatics – subcontracted to Summit)

Equipment:
- 2 – Excavator – Doosan DX300LC
- 1 – Excavator – Case CX245D
- 2 - Articulated dump trucks - Doosan DA30
- 1 – Dozer – Case 2050M – **not in use**
- 3 – Trucks – parked in Taylor Rd – **not in use**
-

NOTES AND COMMENTS
- AJB instructed contractor to construct a silt fence on eastern side of Stage 2 alignment and within stage 1 construction limits
- AJB discovered suspect petroleum based liquid spill found at end of stage 1 construction limits
- AJB instructed contractor to use spill kit to clean up minor suspect petroleum spill and contain the spill.

KERR WOOD LEIDAL
consulting engineers

Environmental Site Conditions (NC= Non-Compliant, N/A= Not Applicable)					
Erosion and Sediment Control	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Access points	X				
Laydown area	X				
Water diversion			X		
Instream isolation			X		
Other:					
Fuel and Oil Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Spill Kits/Spill Response Plan		X		Suspect petroleum spill found in Stage 1 construction limits. No machinery had been placed in this area and Summit is not likely responsible for the spill.	Spill kit used and spill contained
Fuel Storage	X				
Refueling Location	X				
Equipment Condition (e.g.leaks)	X				
Spill trays	X			Spill trays placed under idle equipment	
Other:					
Waste Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Deleterious substance use and storage			X		
Waste disposal	X			Crew observed using garbage bins for waste	
Other:					
Habitat Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Wetland			**X**		
Riparian area					
Other:					

DISCUSSIONS WITH CONTRACTOR

- See above

DISCUSSIONS WITH OTHERS

- See above

ACTIONS RECOMMENDED/REQUIRED

- Continue to monitor suspect spill and maintain fuel management practices
- Continue to monitor efficacy of silt fences within Stage 1 and Stage 2 construction limits

Incident Report Required?	Yes		No	X	Reason:	Spill not believed to be from Summit work activities and volume of spill not enough to report to spill regulation

PHOTOGRAPHS



Photo 1: Facing east – Silt fencing adjacent Stage 1 channel area.



Photo 2: Facing southwest– beginning excavation of stage 2 channel.



Photo 3: Facing north – placement of filter fabric for stage 2 channel access road



Photo 4: Facing southeast – newly constructed Stage 2 Channel with headwall to prevent connection with Nicomen Slough



Photo 5: Facing south – suspect petroleum sheen at end of stage 1 construction limits



Photo 6: Facing south – excavation of Stage 2 channel

Environmental Monitoring Report

PROJECT: DEROCHE CREEK EMERGENCY SEDIMENT REMOVAL
Client: Northwest Hydraulic Consultants
Owner: Leq'a:mel First Nation
Contractor: Summit Earthworks
Contract No.: 2838-002

PREPARED BY	Jaime Dimillo (JMD)	**ON SITE**	7:00	**OFF SITE**	16:45
DATE	November 14, 2022				
WEATHER	Clear and sunny 1°C to 10°C				

Participants: Jaime Dimillo (KWL)

EQUIPMENT AND WORKFORCE ON SITE

- Contractor and associated equipment

CONSTRUCTION ACTIVITIES AND PROGRESS

- Dry channel excavation continues
- Material being removed off-site.

NOTES AND COMMENTS

- The Contractor had tandem trucks on-site to remove excavated material. The drivers had to reverse the truck and pup trailer down the access road adjacent several patches of Knotweed. JMD requested that the knotweed patches be indicated with stakes and flagging tape at least 1 m from the edge of vegetation so that drivers and/or machinery is not disturbing the plant (Photo 1).
- Sheen of unknown origin was monitored adjacent the Slough. Containment measures put in on the weekend were effective (Photo 2).
- Monitored sediment fencing erected around work area (Photo 3).
- Spoke with Rick about distance of completed channel from knotweed, PL recommended 5 m at minimum, and Rick was more comfortable with 10 m.

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consulting engineers

Environmental Site Conditions (NC= Non-Compliant, N/A= Not Applicable)					
Erosion and Sediment Control	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Access points	X				
Laydown area	X				
Water diversion			X		
Instream isolation	X				
Other:					
Fuel and Oil Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Spill Kits/Spill Response Plan	X				
Fuel Storage	X				
Refueling Location	X				
Equipment Condition (e.g.leaks)	X				
Spill trays	X			Spill trays placed under idle equipment	
Other:					
Waste Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Deleterious substance use and storage			**X**		
Waste disposal	X			Crew observed using garbage bins for waste	
Other:					
Habitat Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Wetland	X			ESC measures placed around wetland work area	
Riparian area	X				
Other:					

DISCUSSIONS WITH CONTRACTOR

- See above

DISCUSSIONS WITH OTHERS

- See above

ACTIONS RECOMMENDED/REQUIRED

- Continue to monitor sheen
- Continue to educate and be vigilant about work adjacent knotweed patches

Incident Report Required?	Yes		No	X	Reason:	

PHOTOGRAPHS



Photo 1: Facing northwest – protective knotweed fencing with stakes and tape



Photo 2: Facing west – sheen of unknown origin with effective containment measures



Photo 3: Facing west – sediment fencing surrounding wetland area and slough



Photo 4: Facing southwest – completed stage 2 channel filled with groundwater

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consulting engineers

Environmental Monitoring Report

PROJECT: DEROCHE CREEK EMERGENCY SEDIMENT REMOVAL
Client: Northwest Hydraulic Consultants
Owner: Leq'a:mel First Nation
Contractor: Summit Earthworks
Contract No.: 2838-002

PREPARED BY	Jaime Dimillo (JMD)	**ON SITE**	7:45	**OFF SITE**	15:00
DATE	November 15, 2022				
WEATHER	Partly sunny 3-7 °C				

Participants: Jaime Dimillo (KWL)

EQUIPMENT AND WORKFORCE ON SITE

- Contractor and associated equipment

CONSTRUCTION ACTIVITIES AND PROGRESS

- Dry channel excavation continues, bank sloping and creek bed compaction
- Material being removed off-site.

NOTES AND COMMENTS

- Continued monitoring of sheen of unknown origin adjacent the Slough. Containment measures put in on the weekend were effective. Other small areas of sheen observed to be present in adjacent pools. Sheen appears to be of biological origin. (Photo 1).
- Monitored sediment fencing erected around work area, the sediment fence separating the newly completed stage 2 channel and the slough was deemed to not be effective at keeping sediment from entering the Slough. No fish were able to pass but there was a slight hydrological connection (trickling from the channel to the Slough). JMD requested the contractor to improve fence before more works occur within the Stage 2 channel. Contractor to bring waders tomorrow. (Photo 2)
- Tree removal and vegetation grubbing occurred beside the Stage 2 channel to achieve desired slope of the south bank. No stick nests or snag trees were observed. Trees removed were primarily young alder and maple.
- The decision was made not to move ahead with the "green" channel on the drawings as to not risk disrupting potential spawning salmon and potential redds in the existing riffle.

KERR WOOD LEIDAL
consulting engineers

Environmental Site Conditions (NC= Non-Compliant, N/A= Not Applicable)					
Erosion and Sediment Control	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Access points	X				
Laydown area	X				
Water diversion					
Instream isolation		X			To be corrected tomorrow
Other:					
Fuel and Oil Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Spill Kits/Spill Response Plan	X				
Fuel Storage	X				
Refueling Location	X				
Equipment Condition (e.g.leaks)	X				
Spill trays	X			Spill trays placed under idle equipment	
Other:					
Waste Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Deleterious substance use and storage			**X**		
Waste disposal	X			Crew observed using garbage bins for waste	
Other:					
Habitat Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Wetland	X			ESC measures placed around wetland work area	
Riparian area	X				
Other:					

DISCUSSIONS WITH CONTRACTOR

- See above

DISCUSSIONS WITH OTHERS

- See above

ACTIONS RECOMMENDED/REQUIRED

- Fix sediment fencing separating stage 2 channel and slough
- Continue to educate and be vigilant about work adjacent knotweed patches

Incident Report Required?	Yes		No	X	Reason:	

PHOTOGRAPHS



Photo 1: Facing north – sheen of unknown origin with effective containment measures



Photo 2: Facing southeast – sediment fence separating stage 2 channel and slough providing no barrier to sediment or hydrology



Photo 3: Facing southeast – sediment fence separating stage 2 channel and slough providing no barrier to sediment or hydrology



Photo 4: Facing north – accessible spill kit adjacent flagged Knotweed patches

KERR WOOD LEIDAL
consulting engineers

Environmental Monitoring Report

PROJECT: DEROCHE CREEK EMERGENCY SEDIMENT REMOVAL
Client: Northwest Hydraulic Consultants
Owner: Leq'a:mel First Nation
Contractor: Summit Earthworks
Contract No.: 2838-002

PREPARED BY	Jaime Dimillo (JMD)	**ON SITE**	8:00	**OFF SITE**	15:00
DATE	November 16, 2022				
WEATHER	Partly sunny 1-9 °C				

Participants: Jaime Dimillo (KWL)

EQUIPMENT AND WORKFORCE ON SITE

- Contractor and associated equipment

CONSTRUCTION ACTIVITIES AND PROGRESS

- Dry channel excavation continues, bank sloping and creek bed compaction
- Some wet work occurring in Stage 2 channel
- Material being removed off-site.

NOTES AND COMMENTS

- Contractor under the direction of JMD attempted to make sediment fencing more effective at preventing sediment and water flow between Stage 2 channel and slough. The Contractor had wet works planned for Stage 2 Channel, JMD was concerned about sediment being disturbed entering the slough and the potential for fish from the slough entering the work area. The fence was repaired as best as possible (Photo 2).

KERR WOOD LEIDAL
consulting engineers

Environmental Site Conditions (NC= Non-Compliant, N/A= Not Applicable)					
Erosion and Sediment Control	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Access points	X				
Laydown area	X				
Water diversion					
Instream isolation	X				
Other:					
Fuel and Oil Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Spill Kits/Spill Response Plan	X				
Fuel Storage	X				
Refueling Location	X				
Equipment Condition (e.g.leaks)	X				
Spill trays	X			Spill trays placed under idle equipment	
Other:					
Waste Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Deleterious substance use and storage			**X**		
Waste disposal	X			Crew observed using garbage bins for waste	
Other:					
Habitat Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Wetland	X			ESC measures placed around wetland work area	
Riparian area	X				
Other:					

DISCUSSIONS WITH CONTRACTOR

- See above

DISCUSSIONS WITH OTHERS

- See above

ACTIONS RECOMMENDED/REQUIRED

- Maintain effective sediment fencing separating stage 2 channel and slough for remainder of wet works

Incident Report Required?	Yes		No	X	Reason:	

PHOTOGRAPHS



Photo 1: Facing northwest – sheen of unknown origin with effective containment measures



Photo 2: Facing northwest – attempts to create a barrier using sediment and vegetation



Photo 3: Facing southeast – Stage 1 Channel



Photo 4: Facing northeast – accessible spill kit

Environmental Monitoring Report

PROJECT: DEROCHE CREEK EMERGENCY SEDIMENT REMOVAL
Client: Northwest Hydraulic Consultants
Owner: Leq'a:mel First Nation
Contractor: Summit Earthworks
Contract No.: 2838-002

PREPARED BY	Jaime Dimillo (JMD)	**ON SITE**	7:45	**OFF SITE**	11:30
DATE	November 17, 2022				
WEATHER	Sunny, very windy 1-9 °C				

Participants: Jaime Dimillo (KWL)

EQUIPMENT AND WORKFORCE ON SITE

- Contractor and associated equipment

CONSTRUCTION ACTIVITIES AND PROGRESS

- Dry channel excavation continues, bank sloping and creek bed compaction
- Some wet work occurring in Stage 2 channel
- Material being removed off-site.
- Some site demobilization and clean up

NOTES AND COMMENTS

- Discussions about channel placement in an area at the minimum distance away from a patch of knotweed. The decision was made to compromise on bank slope to avoid getting too close to the knotweed.
- Sediment fencing around the wetland was removed while fencing separating stage 2 channel and slough remained.
- Containment around the sheen near the slough was removed.
- Some site demobilization and clean up occurred.

KERR WOOD LEIDAL
consulting engineers

Environmental Site Conditions (NC= Non-Compliant, N/A= Not Applicable)					
Erosion and Sediment Control	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Access points	X				
Laydown area	X				
Water diversion					
Instream isolation	X				
Other:					
Fuel and Oil Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Spill Kits/Spill Response Plan	X				
Fuel Storage	X				
Refueling Location	X				
Equipment Condition (e.g.leaks)	X				
Spill trays	X			Spill trays placed under idle equipment	
Other:					
Waste Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Deleterious substance use and storage			**X**		
Waste disposal	X			Crew observed using garbage bins for waste	
Other:					
Habitat Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Wetland			**X**	ESC measures placed around wetland work area removed	
Riparian area	X				
Other:					

DISCUSSIONS WITH CONTRACTOR

- See above

DISCUSSIONS WITH OTHERS

- See above

ACTIONS RECOMMENDED/REQUIRED

- Remove all evidence of construction activities on Nov 18
- Maintain buffer from knotweed patches while finishing work
- Remove sheen containment measures

Incident Report Required?	Yes		No	X	Reason:	

PHOTOGRAPHS



Photo 1: Facing north – sheen of unknown origin with effective containment measures



Photo 2: Facing southeast – repaired sediment fence being more effective at separating hydrology of stage 2 channel and the slough



Photo 3: Armored cedar trees in upstream area



Photo 4: Facing west – work area

KERR WOOD LEIDAL
consulting engineers

Environmental Monitoring Report

PROJECT: DEROCHE CREEK EMERGENCY SEDIMENT REMOVAL
Client: Northwest Hydraulic Consultants
Owner: Leq'a:mel First Nation
Contractor: Summit Earthworks
Contract No.: 2838-002

PREPARED BY	Jaime Dimillo (JMD)	**ON SITE**	0730	**OFF SITE**	1500
DATE	November 18, 2022				
WEATHER	Sunny, 1-9 °C				

Participants: Oskar von Wahl (KWL)

EQUIPMENT AND WORKFORCE ON SITE

- Two Excavators
- One Rock truck
- Road trucks

CONSTRUCTION ACTIVITIES AND PROGRESS

- Dry channel excavation continues, bank sloping and creek bed compaction
- Some wet work occurring in Stage 2 channel
- Material being removed off-site.
- Site demobilization and clean up

NOTES AND COMMENTS

- All sediment fencing was removed.
- Geotextile remained embedded in stage 2 channel, left in place while decision was made whether removal would have more impact than leaving in place. Geotextile to be removed following Monday.
- Upstream of the stage 2 channel was completely dry for the length of the project.
- Containment around the sheen near the slough was not removed as per Rick's recommendation (in case future testing is required).

KERR WOOD LEIDAL
consulting engineers

Environmental Site Conditions (NC= Non-Compliant, N/A= Not Applicable)					
Erosion and Sediment Control	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Access points	X				
Laydown area	X				
Water diversion			X		
Instream isolation	X				
Other:					
Fuel and Oil Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Spill Kits/Spill Response Plan	X				
Fuel Storage	X				
Refueling Location	X				
Equipment Condition (e.g.leaks)	X				
Spill trays	X			Spill trays placed under idle equipment	
Other:					
Waste Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Deleterious substance use and storage			**X**		
Waste disposal	X			All flagging tape and materials removed from site except for survey points.	
Other:					
Habitat Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Wetland	X			ESC measures placed around entire work area removed	
Riparian area	X				
Other:					

DISCUSSIONS WITH CONTRACTOR

- See above

DISCUSSIONS WITH OTHERS

- See above

ACTIONS RECOMMENDED/REQUIRED

- Remove geotextile in stage 3 channel by hand on Monday

Incident Report Required?	Yes		No	X	Reason:	

PHOTOGRAPHS



Photo 1: Sheen with containment measures left in place.



Photo 2: Geotextile left in place to be removed.



Photo 3: Finished channel upstream of the Taylor Road Bridge.



Photo 4: Finished channel downstream of Taylor Road Bridge.

KERR WOOD LEIDAL
consulting engineers

Environmental Monitoring Report

PROJECT: DEROCHE CREEK EMERGENCY SEDIMENT REMOVAL
Client: Northwest Hydraulic Consultants
Owner: Leq'a:mel First Nation
Contractor: Summit Earthworks
Contract No.: 2838-002

PREPARED BY	Jaime Dimillo (JMD)	**ON SITE**	7:00	**OFF SITE**	9:00
DATE	November 21, 2022				
WEATHER	Sunny, 2°C				

Participants: Jaime Dimillo (KWL)

EQUIPMENT AND WORKFORCE ON SITE

- Contractor, comprised of one foreman and three laborers
- No machinery on-site

CONSTRUCTION ACTIVITIES AND PROGRESS

- Hand removal of remnant filer cloth in wet and dry area of Stage 2 Channel

NOTES AND COMMENTS

- Summit's crew worked to remove filter fabric in two areas within the Stage 2 Channel. One area was wet, and one was dry. A sediment fence was constructed around the work in the wet area. Within the wet section, removal was challenged by poor visibility in the water and deep burial of the cloth. In the dry section, the filter cloth was buried deep. Even with three men using shovels and pulling on the cloth, removal was difficult. Ultimately, cloth was pulled out as much as physically possible before being cut at the bottom and further buried with surrounding native sediment. Summit foreman Geoff communicated he would revisit the site tomorrow (Nov 22) to check on wetted section when less turbid and remove any more exposed fabric.

KERR WOOD LEIDAL
consulting engineers

Environmental Site Conditions (NC= Non-Compliant, N/A= Not Applicable)					
Erosion and Sediment Control	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Access points			X		
Laydown area			X		
Water diversion			X		
Instream isolation			X		
Other:					
Fuel and Oil Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Spill Kits/Spill Response Plan			X		
Fuel Storage			X		
Refueling Location			X		
Equipment Condition (e.g.leaks)			X		
Spill trays			X		
Other:					
Waste Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Deleterious substance use and storage			X		
Waste disposal	X				
Other:					
Habitat Management	**OK**	**NC**	**N/A**	**Comments and Mitigation**	**Action Corrected?**
Wetland	X			ESC measures placed around wet work area and removed when work was complete	
Riparian area			X		
Other:			X		

DISCUSSIONS WITH CONTRACTOR

- See above

DISCUSSIONS WITH OTHERS

- See above

ACTIONS RECOMMENDED/REQUIRED

- If more filter cloth is exposed, remove what is physically possible and cover remainder with native material.

Incident Report Required?	Yes		No	X	Reason:	

PHOTOGRAPHS



Photo 1: Facing south – Sediment fencing set up to isolate area of filter cloth removal



Photo 2: Facing northeast – portion of removed filter cloth from dry area of Stage 2 Channel



Photo 3: Facing south- removed filter cloth from wet area of Stage 2 channel

KERR WOOD LEIDAL
consulting engineers

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Deroche Creek Sediment Removal

Environmental Management Plan

Final Report
October 31, 2022
KWL Project No. 2838.002

Prepared for:
BC Ministry of Environment and Climate Change Strategy

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Appendix A: Change of Approval - 2022-10-21 Approval-2010056

1. Introduction

1.1 Project Description

The Ministry of Environment and Climate Change Strategy (ENV) is working to review and consider risks, potential consequences, and to prioritize urgent repair and mitigation measures to existing damaged waterway systems, including removal of sediments introduced by the 2021 Atmospheric River Event (ARE). This project is intended to address erosion and sediment and debris accumulation concerns in Deroche Creek upstream and downstream of the Taylor Road bridge. The accumulated material has the potential to create channel erosion, road flooding, and infrastructure damage in the Leq'a:mel First Nation (Leq'a:mel FN) community located within Lakahahmen IR 11 and the neighbouring properties near Deroche in the Fraser Valley Regional District (FVRD).

The immediate proposed Project includes the following works:

- Protection of 2 large western redcedar (*Thuja plicata*) trees and 1 black cottonwood (*Populus trichocarpa*) approximately 100 m upstream of the Taylor Road bridge which have been affected significant scour and are at risk of falling into the creek; and
- Removal of accumulated sediment and re-establishment of a fish passable channel from the Taylor Road bridge to the edge of the low water boundary of the alluvial fan of Nicomen Slough; and
- Construction of a new larger pilot channel from downstream of the Taylor Road bridge into Nicomen Slough to the west of the existing conveyance channel to divert sediment deposition away from the east bank of Nicomen Slough.

Kerr Wood Leidal Associates Ltd. (KWL), as a subconsultant to Northwest Hydraulic Consultants (NHC), was retained to provide engineering review, contract administration, and environmental services including the preparation of an Environmental Management Plan (EMP) for the Project. The EMP includes general guidance on the following topics:

- Environmental monitoring;
- Timing of works;
- Protection of fish and fish habitat;
- Vegetation management;
- Erosion and sediment control;
- Deleterious substance control and spill management; and
- Site clean up and restoration.

1.2 Purpose of the Environmental Management Plan

This Environmental Management Plan (EMP) sets out the requirements and measures that will be adopted to avoid, minimize, and mitigate the potential adverse environmental impacts of the Project. This plan is to be implemented by Summit Earthworks (the Contractor) throughout the duration of the Project and applies to the construction phase. The EMP intends to provide overarching guidance for how environmental considerations will be implemented and monitored during the construction phase of the Project.

The EMP is a living document and will be updated over the course of the construction phase of the Project as planning for work activities is finalized and as findings from the monitoring program warrant changes in environmental management.

1.3 Roles and Responsibilities

The parties involved in the Project have the following roles and responsibilities with respect to environmental management:

1. The Contract Administrator shall:
    a. ensure that the appropriate resources are available to establish, implement, maintain, and improve environmentally responsible construction practices; and
    b. liaise with the EM about potential impacts to environmental components during construction;
    c. liaise with all QPs involved with the Project as needed; and
    d. provide the resources required for environmental awareness and protection training, contract Qualified Professionals[1] (QPs) with specific expertise as needed, environmental documents specific to the Project, and financial resources.
2. The Environmental Monitor (EM) shall:
    a. advise the Contractor on environmental protection and monitor environmental protection measures;
    b. identify deficiencies of the Contractor and communicate with the Contractor on how to address deficiencies;
    c. have written authority to halt or modify any construction activity if it is deemed necessary to protect fish and wildlife populations or their habitats; and
    d. report to the Contract Administrator.
3. The Contractor includes any company and its field staff retained by the Contract Administrator to construct a component of the Project. The Contractor shall:
    a. plan and conduct activities in compliance with the EMP and all applicable legislation, approvals, and best management practices;
    b. report directly to the Contract Administrator regarding all site activities;
    c. ensure that there is no release of deleterious substances into Deroche Creek, Nicomen Slough, or any other nearby water sources;
    d. ensure all staff, including subcontractors, are familiar with the EMP, and know their responsibilities in meeting the outcomes of the plan;
    e. communicate changes in construction plans or activities that could impact the implementation of the EMP to the Contract Administrator, the EM, and KWL as quickly as possible; and
    f. keep a copy of the EMP on-site at all times.

[1] QPs will have the expertise or knowledge needed to advise and/or support the Contract Administrator, the EM, the Contractor, and KWL with respect to environmental (i.e., biologist) or other (i.e., engineering) concerns.

1.4 Guiding Documents

The following guidance documents were used to develop the EMP:

- *Requirements and Best Management Practices for Making Changes In and About a Stream* (Government of British Columbia 2022);
- *Guidelines for Reduced Risk Instream Work Windows* (MOE 2006)
- *Measures to Protect Fish and Fish Habitat* (DFO 2019);
- *Standards and Best Practices for Instream Works* (WLAP 2004);
- *A Field Guide to Fuel Handling, Transportation and Storage* (WLAP 2002);
- *B.C. Approved Water Quality Guidelines: Aquatic Life, Wildlife, and Agriculture* (MOE 2021);
- *Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia* (MOE 2014); and
- *Land Development Guidelines for the Protection of Aquatic Habitat* (DFO 1993).

2. Project Location and Scope of Work

2.1 Project Location and Physical Setting

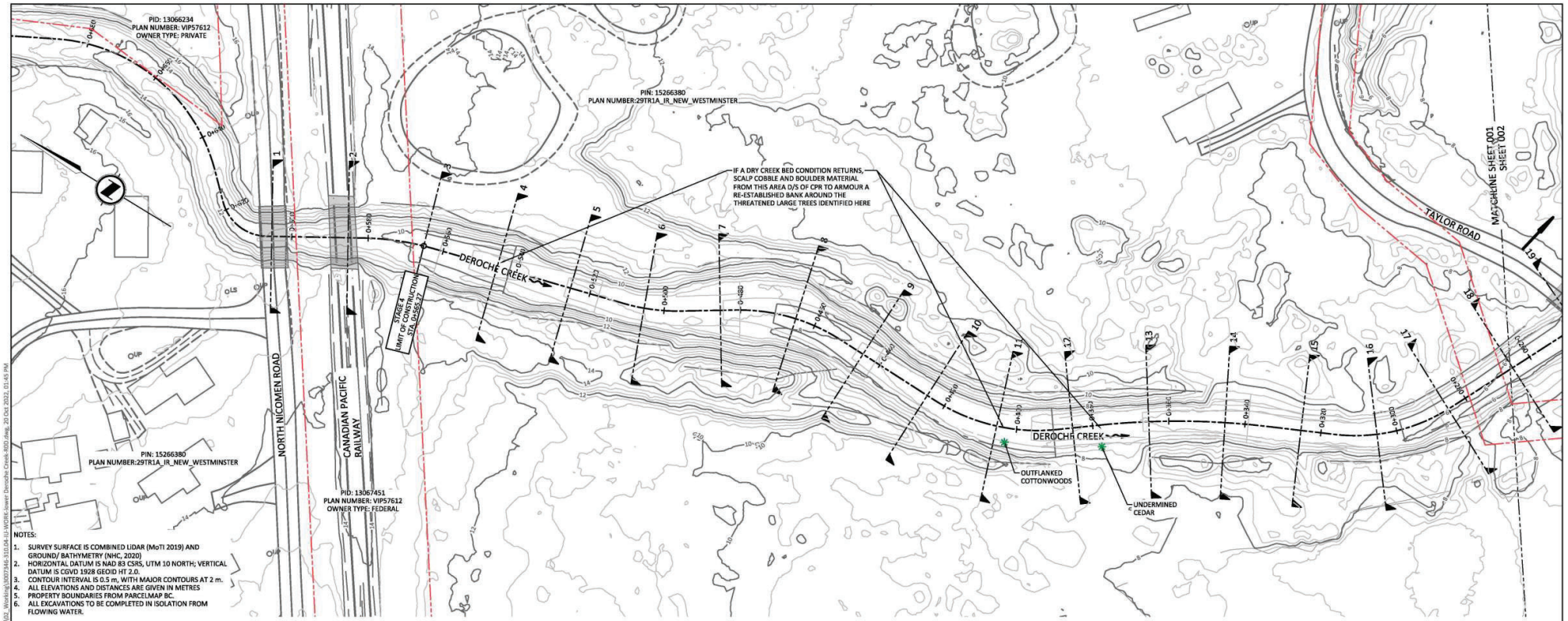
Deroche Creek is a headwater stream that flows through Lakahahmen IR 11 where it enters Nicomen Slough, a historical tributary of the Fraser River that was diked in the 1930s. Lakahahmen IR 11 is located on and adjacent the Deroche Creek alluvial fan, approximately 22 km east of the City of Mission, BC.

The project location is the mainstem of Deroche Creek, starting at its crossing with North Nicomen Road, running southeast to and under Taylor Road, and ending at the downstream edge of the alluvial fan on the east side of Nicomen Slough.

Deroche Creek has been identified as an Area of Concern (AC) requiring immediate attention based on a high level, preliminary hazard, and risk assessment.

Table 2-1: Site Information

Site ID	S-CR-30
Site Description	Deroche Creek at Lakahahmen IR 11
Location	UTM Zone 10U 567551E 5448285N
Local Government Agency	Leq'a:mel First Nation, Fraser Valley Regional District
Waterbody	Deroche Creek, Nicomen Slough



NOTES:

1. SURVEY SURFACE IS COMBINED LiDAR (MoTI 2019) AND GROUND/ BATHYMETRY (NHC, 2020)
2. HORIZONTAL DATUM IS NAD 83 CSRS, UTM 10 NORTH; VERTICAL DATUM IS CGVD 1928 GEOID HT 2.0.
3. CONTOUR INTERVAL IS 0.5 m, WITH MAJOR CONTOURS AT 2 m.
4. ALL ELEVATIONS AND DISTANCES ARE GIVEN IN METRES
5. PROPERTY BOUNDARIES FROM PARCELMAP BC.
6. ALL EXCAVATIONS TO BE COMPLETED IN ISOLATION FROM FLOWING WATER.

PLAN VIEW
1:500

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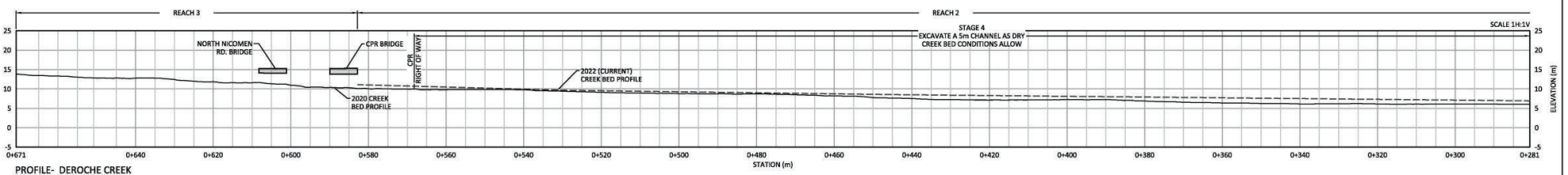
SCALE = 1:500



PROFILE- DEROCHE CREEK
1:500

CLIENT:

Ministry of Environment and Climate Change Strategy
BRITISH COLUMBIA

REV.	DATE	DESCRIPTION
0	22-10-19	ISSUED FOR REVIEW

nhc northwest hydraulic consultants

SEAL:

LEGEND

2022 BED LEVEL	
2020 GROUDN SURFACE	
PROPOSED EXCAVATION	

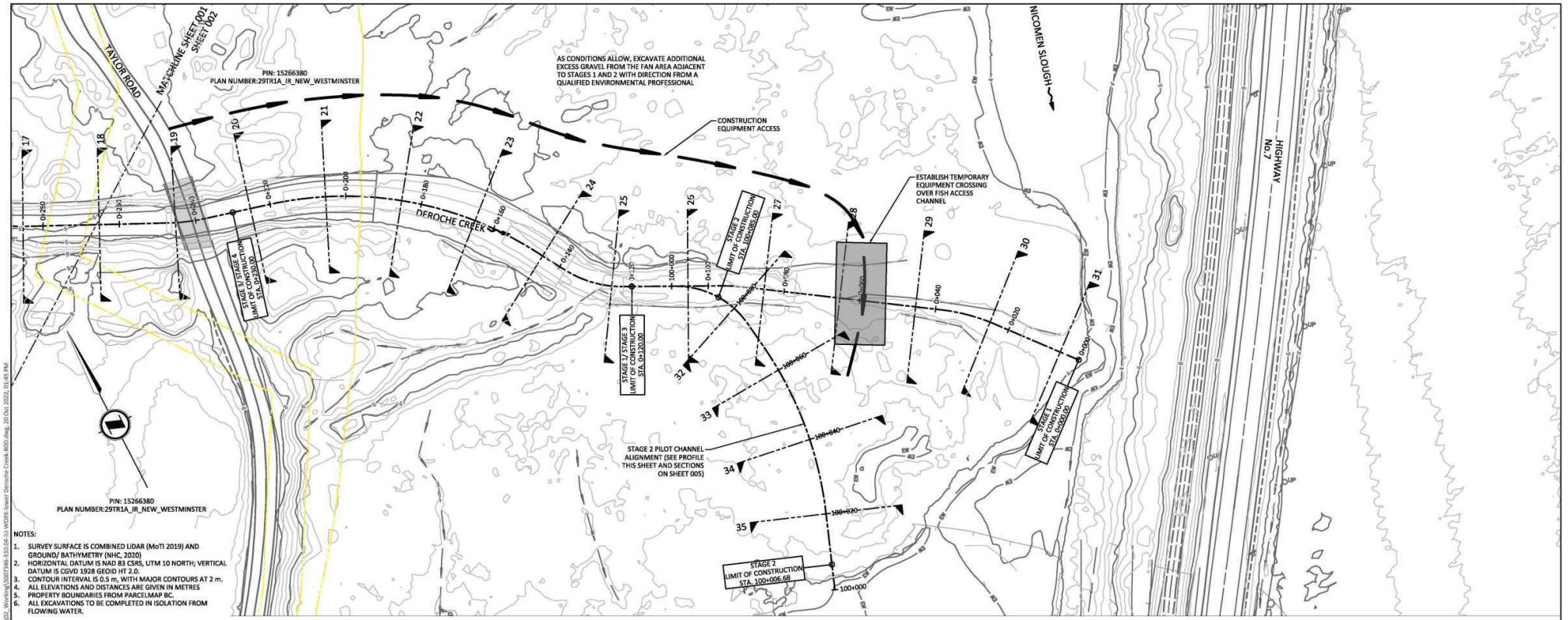
EMERGENCY SEDIMENT REMOVAL
DEROCHE CREEK - REACHES 1 AND 2

PLAN AND PROFILE VIEWS

DESIGNED:	DJG	SHEET ID: 3007346-310.04-001 R0	SHEET No: 001
DRAFTED:	CZZ	STATUS: ISSUED FOR REVIEW	
CHECKED:	DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE: 20 OCT 2022	REV No: R0

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nanoffile.nan\Projects\Active\3007346 2021 Sediment Assessment\310 Deroche Ck Life (CR-307)\06 CAD\01_Models\01_Arc+Grid\3007346-310.04-01 WORK Lower Deroche Creek 3007.dwg, 20 Oct 2022, 01:45 PM



NOTES:

1. SURVEY SURFACE IS COMBINED LiDAR (MoTI 2019) AND GROUND/ BATHYMETRY (NHC, 2020)
2. HORIZONTAL DATUM IS NAD 83 CSRS, UTM 10 NORTH; VERTICAL DATUM IS CGVD 1928 GEOID HT 2.0.
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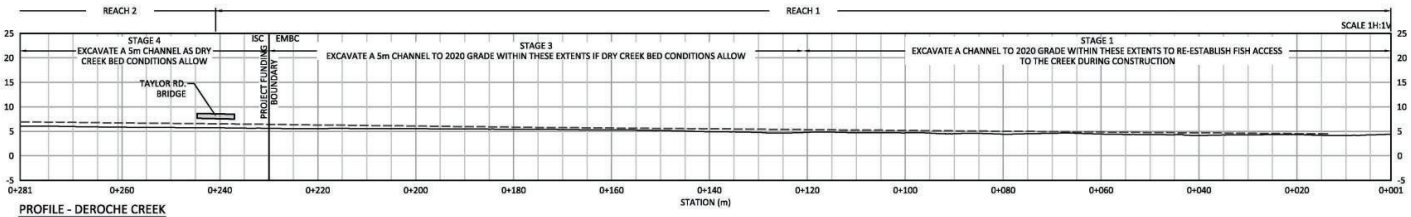
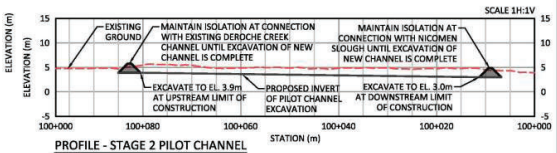
6. ALL EXCAVATIONS TO BE COMPLETED IN ISOLATION FROM FLOWING WATER.

PLAN VIEW
1:500

0 5 10 15 20 25m
SCALE = 1:500



PROFILE - DEROCHE CREEK
1:500



PROFILE - STAGE 2 PILOT CHANNEL
1:500

CLIENT:

BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
0	22-10-19	ISSUED FOR REVIEW

nhc northwest hydraulic consultants

SEAL:

LEGEND

2022 BED LEVEL	
2020 GROUDN SURFACE	
PROPOSED EXCAVATION	

EMERGENCY SEDIMENT REMOVAL
DEROCHE CREEK - REACHES 1 AND 2

PLAN AND PROFILE VIEWS

DESIGNED:	DJG	SHEET ID:	3007346-310.4-002 R0	SHEET No:
DRAFTED:	CZZ	STATUS:	ISSUED FOR REVIEW	002
CHECKED:	DJG	SCALE:	AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE:	20 OCT 2022	REV No: R0

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\mainfile-van\Projects\Active\3007346 2021 AR Sediment Assessment\310 Deroche Ck LFN (CR-30)\96 CAD\01_Model\02_Working\3007346-310.04-RI-WORK-lower Deroche Creek-ROD.dwg, 20 Oct 2022, 01:45 PM

2.2 Scope of Proposed Works

The work is expected to be undertaken as follows:

Table 2-2: Proposed Construction Methods

Stage	Activity	Description of Activity
Site Preparation	Mobilization	Mobilization of civil contractor and equipment to site.
	Access	Preparation of equipment access into Reaches 1 and 2.
Construction	Tree Protection	Protection of two groupings of large trees (2 western redcedar and 1 black cottonwood trees) in Reach 2 (Stage 4 area), using a mix of large riprap and in-situ streambed material.
	Equipment Access (Stage 1 and 2)	Construction of equipment access out to Stage 1/ Stage 2 areas, including provision for a small bridge crossing of the Stage 1 channel.
	Excavation (Stage 1)	Excavation and grading within Stage 1 to re-establish pre-ARE bed levels. Excavated materials to be hauled off site to Zaitscullachan (Zait).
	Excavation (Stage 2)	Excavation and grading within Stage 2 to re-establish a pilot channel west into Nicomen Slough. Excavated materials to be hauled off site to Zaitscullachan (Zait). The Stage 2 excavation will be isolated by berms are both ends until it is complete.
	Site Clean Up	Once the sediment is removed, the channel will be left in as natural a state as possible.

2.3 Construction Timeline

The target date for start of works is October 27, 2022. Works will end on or before November 30, 2022.

3. Environmental Setting

Deroche Creek provides cold, clean water to watercourses downstream, which helps to support populations of fish found in the area, including White Sturgeon (*Acipenser transmontanus*), Rainbow Trout (*Oncorhynchus mykiss*), Cutthroat Trout (*Oncorhynchus clarkii*), Threespine Stickleback (*Gasterosteus aculeatus*), Prickly Sculpin (*Cottus asper*), Longnose Sucker (*Catostomus catostomus*), Chinook Salmon (*Oncorhynchus tshawytscha*), and Coho Salmon (*Oncorhynchus kisutch*).

Due to the urgent nature of the work to reduce the potential for channel erosion, road flooding, and infrastructure damage in Leq'a:mel FN lands, the project is being pursued this fall prior to the onset of higher river flows. As a result, we propose that the work is relatively low risk and can proceed with appropriate mitigation measures and Qualified Environmental Professional oversight outside of the least-risk work window.

4. Regulatory Requirements

4.1 Permits and Approvals

As all institutional projects are not subject to the Riparian Areas Protection Regulation (RAPR), an RAPR assessment is not required for the Project. Work within a regulatory riparian setback cannot be avoided as the sediment to be removed is within the creek bed. Therefore, this Project was submitted to the Ministry of Forests (*Water Sustainability Act* Change Approval for Works In and About a Stream) for review.

- *Water Sustainability Act* Notification for Changes in and About a Stream (WSA Change Approval #: 2009983)

A DFO Request for Review has not been submitted for this project as it has been determined that the project can avoid prohibited effects to fish and fish habitats and species at risk through consistent monitoring by a QEP. The ability to continue to avoid these effects will be determined throughout the duration of the project by the QEP.

A *Species at Risk Act* permit is not required as no critical habitat for listed species is found on site.

5. Environmental Management Plan

The following measures will be used to avoid, minimize, and mitigate potential environmental impacts of the Project and to ensure compliance with all environmental legislation, permits, and approvals.

5.1 Environmental Monitoring

Environmental monitoring will be conducted to ensure appropriate measures are being taken to protect the environment. The Environmental Monitor (EM) must be an appropriately Qualified Environmental Professional (QEP). The EM will regularly inspect the work site for compliance with the environmental requirements of the Project. Findings will be recorded and reported to the Contract Administrator and the Contractor. The EM must be familiar with the regulatory requirements of the Project and has the responsibility to report all non-compliance events and stop work if necessary. The EM will be on-site at project start-up and during any instream works or sensitive activity. A copy of this document, including the EM's contact information, will be kept on-site for the duration of the Project. Responsibilities of the EM will include, but are not limited to, the following:

- Review all permits, best management practices, and the EMP.
- Be on-site for Project start-up and critical works (i.e., works adjacent to sensitive areas).
- Meet with the contractor before construction to explain all mitigation and environmental protection measures.
- Monitor project compliance with the EMP, address changes to the Contractor, and Contract Administrator to ensure EMP is continuously updated, as needed.
- Inspect all mitigation and ESC measures to ensure they are appropriate and working properly and recommend modifications and repairs when necessary.
- Have written authority to halt any construction activity if it is deemed necessary to protect fish, wildlife, and their habitat.
- Identify, monitor, and promptly report any situations of ongoing or potential damage to the environment.
- Report to the Contract Administrator and relevant regulatory agencies on environmental issues encountered during construction.
- Prepare a monitoring report within 60 days of the Project's completion and submit to any agencies if required.

5.2 Timing of Works

- Project activities will be scheduled for dry weather conditions whenever possible.
- As works will occur outside of the timing window, necessary mitigation measures will be implemented. A QEP will provide environmental monitoring during the work to provide advice on work timing and additional mitigation measures that may be required.
- Due to the late timing of the proposed work and the imminent return of chum (*Oncorhynchus keta*) and coho (*Oncorhynchus kisutch*) salmon to the creek, once water levels have risen, it may not be possible to continue the project once fish have entered the creek and begin to spawn. The project QEP will be responsible for advising the contractor on when work can or cannot occur based on fish

presence, activity, and the type of works to be undertaken. Work may need to be delayed entirely until next year or reduced substantially to adequately protect fish and fish habitat.

- Vegetation clearing and tree removal will occur outside the general bird timing window for the region (March 1 to August 31), which will protect breeding birds and bats in the assessment area.

5.3 Protection of Fish and Fish Habitat

- If water pumping is required, pump intakes, will be equipped with fish screens (mesh width < 2.54 mm) to prevent entrainment and impingement of fish, in accordance with the DFO Interim Code of Practice for End-of-pipe fish protection screens.
- The duration of in-water works will be minimized so that it does not diminish the ability of fish to carry out one or more of their life processes.
- Minimize disturbance will occur to natural materials (e.g., embedded logs) and vegetation that contributes to habitat or stream channel stability.
- Minimize disturbance will occur to existing vegetation on and adjacent to the stream banks.

5.4 Vegetation Management

- Vegetation clearing and tree removal will occur outside the general bird timing window for the region (March 1 to August 31), which will protect breeding birds and bats in the assessment area.
- Professional arborists and biologists will be consulted throughout the site clearing and construction phases to minimize impacts to vegetation communities.
- Clearing will be limited to areas necessary for the works. Existing roads, trails, and other access points will be used where possible.
- A tree or other structure containing a nest of eagles, peregrine falcons, gyrfalcons, ospreys, and herons must not be felled, even outside of the breeding season for these species. This is in accordance with Section 34(b) of the *Wildlife Act*.
- Wildlife trees will be retained if possible. They provide essential habitats to birds and other wildlife.
- Where topping or removing dead limbs of danger trees will remove the hazard, this option is preferred over removing the entire tree.
- Vegetation should be replanted, where temporary clearing is needed to accommodate the works.

5.5 Invasive Plant Management

- All machinery will be inspected and cleaned before entering or leaving the construction site to remove any invasive plant propagules.
- All invasive vegetation removed will be disposed of off site at an appropriate facility.
- All material used on site (e.g., straw, hydroseeding, etc.) must be certified weed-free.
- If patches of knotweed or hogweed are encountered during site clearing or other works in the Project area, they will be flagged off and reported to the QEP immediately. Knotweed must be managed carefully as it is able to reproduce from rhizomes and stem fragments. The following procedures should be adhered to:

- All plant and soil material must be removed from site in a way as to minimize transfer of plant parts to other areas;
- All plant parts must be removed, potentially by hand with appropriate personal protective equipment, sealed in plastic bags, and disposed of appropriately off site; and
- Topsoil within 10 m of the extent of the knotweed patch may not be used as backfill. The soil should be disposed off site at an appropriate waste management facility experiences in dealing with knotweed-contaminated soils.

5.6 Erosion and Sediment Control Plan

The purpose of erosion and sediment control (ESC) is to prevent the introduction of sediments (e.g., silts, clays, and sand) into watercourses. The ESC Plan prescribes methods to prevent the erosion and mobilization of sediment of exposed areas by rainfall or water flow through the work site, to intercept and manage sediment-laden runoff from works prior to leaving the work site and entering the watercourse, and/or manage the risk of a sediment discharge.

The ESC measures can be adapted or added to before, during, and after construction as required based on the recommendations of the EM. ESC measures will be set up prior to starting work. Measures will be monitored regularly and maintained until all disturbed ground has been stabilized.

ESC measures include the following:

1. Undertake works during dry weather where possible.
2. Deposit all spoil materials above the high-water mark, ensuring sediment re-entry into watercourses or waterbodies is prevented.
3. Cover all disturbed areas and spoil piles with poly sheeting or a reasonable alternative if inclement weather is expected.
4. Minimize vegetation disturbance on banks to the furthest extent possible.
5. Deploy perimeter ESC measures such as silt fences, berms, and check dams as necessary.
6. All ESC measures will be monitored regularly by both the Contractor and the EM and maintained until all disturbed ground has been stabilized.
7. Any other measures needed to prevent erosion of a watercourse and work site, or sediment from entering any watercourse, as determined by the EM or Engineer.

5.7 Deleterious Substance Control and Spill Management

- All fueling of vehicles and equipment will be done off-site or onsite in a designated fueling area over a spill containment tray at least 50 m from any watercourse.
- All equipment washing must be done off-site or onsite in a designated area at least 50 m from any watercourse or in a manner that will prevent wash from reaching any waterway.
- Generators, pumps, and other stationary equipment will be placed on spill trays or equipped with other secondary containment. Where possible, generators will be located at least 50 m from any waterway.
- All machinery will be clean, in good working condition and free of excess oil and grease. Equipment will be inspected daily and documented.

- Containers will be labelled according to the *Transportation of Dangerous Good Act* and *Workplace Hazardous Materials Information Systems* (WHMIS) regulations.
- Oil waste, filters, absorbent pads, and cartridges will be collected and disposed of off-site at an appropriate facility in accordance with federal, provincial, and municipal regulatory requirements.
- To prevent the release of substances toxic to fish, there will be no use of treated wood products within a watercourse.
- A spill response plan and spill kit will be on site and suitable for all substances on-site, and staff trained in its use.

Spill Response

- The contractor will prepare a spill management plan which includes notification procedures, contact telephone numbers and spill report forms.
- A spill kit will remain on site during construction. The kit will be stocked with appropriate supplies for the site size and conditions (e.g., absorbent pads, booms, granular absorbent). Staff will be trained in the proper use of the kit.
- Any spill of a toxic or deleterious substance over the reportable limits as outlined in the Ministry of Environment and Climate Change Strategy Spill Reporting Factsheet (MOE, 2021)[2] will be reported immediately to the BC Provincial Emergency Program 24–hour phone line at 1-800-663-3456.
- If a spill of toxic or deleterious substances occurs within a watercourse or waterbody both MOF and DFO will be notified immediately. All spills will be reported to the EM immediately.

5.8 Site Clean Up and Restoration

- All construction materials and garbage will be removed from site after the Project is complete.
- Erosion and sediment control devices and measures will be removed following the stabilization of all disturbed areas.
- The contractor will be responsible for leaving the site in compliance with all Permits, Approvals, and Authorizations.

[2] https://www2.gov.bc.ca/assets/gov/environment/air-land-water/spills-and-environmental-emergencies/docs/materials/fact_sheet_spill_reporting.pdf

Report Submission

Prepared by:

KERR WOOD LEIDAL ASSOCIATES LTD.

Andrew Baylis, M.Sc.
Project Biologist

Reviewed by:



Patrick Lilley, M.Sc., RPBio, BC-CESCL
Senior Biologist

Statement of Limitations

This document has been prepared by Kerr Wood Leidal Associates Ltd. (KWL) for the exclusive use and benefit of BC Ministry of Environment and Climate Change Strategy for the Environmental Management Plan for the Deroche Creek Emergency Sediment Removal Project. No other party is entitled to rely on any of the conclusions, data, opinions, or any other information contained in this document.

This document represents KWL's best professional judgement based on the information available at the time of its completion and as appropriate for the project scope of work. Services performed in developing the content of this document have been conducted in a manner consistent with that level and skill ordinarily exercised by members of the engineering profession currently practising under similar conditions. No warranty, express or implied, is made.

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Revision History

Revision #	Date	Status	Revision	Author
0	October 31, 2022	Final		AJB

Proudly certified as a leader in quality management under Engineers and Geoscientists BC's OQM Program from 2013 to 2021.

References

Dillon Consulting Ltd. 2017. Leq'a:mel First Nation - Environmental Management Framework. URL http://leqamel.ca/wp-content/uploads/2017/04/Leqamel-EMF-Part-1-FINAL-Compiled-with-Maps.pdf

Fisheries and Oceans Canada (DFO). 1993. *Land Development Guidelines for the Protection of Aquatic Habitat.* URL http://www.sxd.sala.ubc.ca/9_resources/fed_%20files/fed%20land%20development%20guidelines.pdf

Fisheries and Oceans Canada (DFO). 2019. *Measures to Protect Fish and Fish Habitat*. URL https://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures-eng.html

Government of British Columbia. 2022. *Requirements and Best Management Practices for Making Changes In and About a Stream in British Columbia*. Version 2022.01. URL https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/wsa-cias-requirements-bmps.pdf

Ministry of Environment (MOE). 2006. *Guidelines for Reduced Risk Instream Work Windows*. URL: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/work_windows_low_main.pdf

Ministry of Environment (MOE). 2014. *Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia.* URL https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/best-management-practices/develop-with-care

Ministry of Environment and Climate Change Strategy (MOE). 2021. B.C. Approved Water Quality Guidelines: Aquatic Life, Wildlife, and Agriculture. URL https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/wqg_summary_aquaticlife_wildlife_agri.pdf

Ministry of Water, Land, and Air Protection (WLAP). 2002. *A Field Guide to Fuel Handling, Transportation and Storage*. URL https://www2.gov.bc.ca/assets/gov/environment/waste-management/industrial-waste/industrial-waste/oilandgas/fuel_handle_guide.pdf

Ministry of Water, Land, and Air Protection (WLAP). 2004. *Standards and Best Practices for Instream Works*. URL https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/best-management-practices/iswstdsbpsmarch2004.pdf

Appendix A

Change of Approval - 2022-10-21 Approval-2010056

October 21, 2022 Approval Number: 2010056

Ministry of Environment - Flood Debris Management Secretariat,
Environmental Emergencies and Land Remediation
PO Box 9342 Stn Prov Govt
Victoria, BC V8W 9M1
Sent via email: thyren.jacobs@gov.bc.ca

Leq'a mel First Nation
43101 Leq'a:mel Way Way
Deroche BC V0M1G0
Sent via email: rick@leqamel.ca

Dear All,

RE: Change Approval - Changes In and About a Stream on Deroche Creek

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

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

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

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

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

Ministry of Forests
Mailing Address: 200-10428 153 Street, Surrey BC V3R1E1
Location: 200-10428 153 Street, Surrey BC V3R1E1
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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.

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,

Barbara Sutherland

Assistant Water Manager

Cc: Desmond Goold | Northwest Hydraulic Consultants Ltd. | dgoold@nhcweb.com
Kristen Endacott | Ministry of Forests | kristen.endacott@gov.bc.ca

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October 21, 2022 Approval Number: 2010056

APPROVAL

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

MINISTRY OF ENVIRONMENT - FLOOD DEBRIS MANAGEMENT SECRETARIAT, ENVIRONMENTAL EMERGENCIES AND LAND REMEDIATION and LEQ'A MEL FIRST NATION

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

(a) The name of the stream is Deroche Creek.

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

1. Removal of gravel and sediment in Reaches 1 and 2 to re-establish creek bed to 2020 levels to restore hydraulic capacity in the channel.

All works shall occur within Part of Primary: I.R. NO. 11, being Lakahahmen, New Westminster District.

(c) The location of the works are at the following coordinates, as provided by the applicant: 49.1848040, -122.0748330.

(d) The works authorized in this Approval shall be completed on or before September 15, 2023.

(e) 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

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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 to the holder of this Approval, 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.

(f) All works shall be completed within the designed project footprint and in accordance with the following documents. Any major changes to the design must be submitted to the Water Manager for written authorization.

1. "Site Assessment of Potential Areas of Concern for Fall-Winter 2022 PwC Site CR-30 Deroche Creek, Fall-Winter Final, Rev. 0", dated October 5, 2022, prepared by Northwest Hydraulic Consultants Ltd.

(g) 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

(h) 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:

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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 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.

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

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

(k) All equipment and machinery used in or near the stream channel:

1. Must be in good operating condition and free of leaks, excess oil, and grease;
2. Must have a spill containment kit readily accessible on-site. All staff must be trained in handling and applying a spill kit appropriately to any spills/incidents;
3. Refueling must occur a minimum of 30 metres away from all streams; and
4. Must use environmentally sensitive hydraulic fluids which are non-toxic to aquatic life and are readily or inherently biodegradable.

(l) 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.

(m) 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 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.

(n) All excavated material and debris shall be removed from the site or placed in a stable area above the high water mark of the stream.

Mitigative measures must be applied to protect the excavated material and debris from erosion and reintroduction into the watercourse. These measures may include covering the material with erosion blankets, seeding and planting with native vegetation, or as otherwise directed by a Qualified Professional.

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(o) 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.

(p) The Creek alignment should be maintained and in no case should the excavation increase the overall width of the channel. No over excavation of the channel is permitted.

(q) A pre-construction and post-construction survey shall be conducted, and elevations should be verified during sediment removal.

(r) The finished channel should have a gentle U or V shape in the cross section with the stream bed left in a reasonably smooth state with no depressions that could strand fish.

(s) Large boulders and large woody debris should be retained in the channel for fish habitat as per advice from a Qualified Professional.

(t) In the unlikely event that flows are encountered during the work the contractor will stop working and commence excavation only when the channel is dry, or the site isolated and appropriate erosion and sediment control measures are put in place.

(u) The holder of this Approval must provide a detailed post-construction report no later than December 1 of the year works are completed. The report must be submitted to SouthCoastWSAReporting@gov.bc.ca. The subject line of the email and the report must be labelled with this Approval file number 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;
5. The frequency of monitoring, including the name(s) of the designated monitor(s);
6. Representative site photographs;
7. Whether or not they observed or were otherwise aware of any non-compliance with the terms and conditions of this Approval; and
8. A description of any environmental incidents, non-compliance, or other difficulties, and how these were addressed and reported.
9. Post-construction survey of the streambed.

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Barbara Sutherland.

Assistant Water Manager

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Appendix O

Archaeological Report

Leq’á:mel First Nation Permit Report
Archaeological Assessment Deroche Creek, Phase 1

(LFNIUP# 2023-003, October 2, 2023)

Prepared for: Stephen McGlenn Leq’á:mel First Nation Lands Department.
Des Goold (NHC) Northwest Hydraulic Consultants, Project Permittee.

Prepared by: Gordon Mohs, M.A., Summit Earthworks Inc. Sr. Archaeologist, First Nations Community & Business Relations.

October 31, 2023

Subject: Permit Report, Archaeological Assessment Deroche Creek, Phase 1, Leq'á:mel First Nation Permit LFNIUP# 2023-003, October 2, 2023.

Date: October 31, 2023

Attention: Stephen McGlenn (stephen@leqamel.ca), Leq'á:mel First Nation Lands Department.
Des Goold (DGoold@nhcweb.com) NHC Northwest Hydraulic Consultants, Project Permittee.

Prepared by: Gordon Mohs, M.A., Summit Earthworks Inc. Sr. Archaeologist, First Nations Community & Business Relations.

EXECUTIVE SUMMARY

Phase 1 Archaeological Investigations are now complete at Lakahahmen IR 11 on the left bank of Deroche Creek within the site of a proposed Sediment Basin. A one (1) hectare area was closely inspected for surface archaeological deposits, after the site area was cleared of surface vegetation. No trees were disturbed and no archaeological excavations occurred. Brush clearing and grubbing occurred to a maximum depth of @ 25cm.

Following 5.5 days of investigations, nothing of an archaeological nature was found within the boundaries of the proposed Sediment Basin, with the possible exception of a small (2x3 inch/5x7.5cm), flat, chipped, river pebble found near the centre of the proposed sediment basin. The chipped pebble is not identified as an archaeological artifact as there is no evidence of use-wear or microdenticulation on the piece. The flake scars at either end of the chipped pebble could have occurred from natural causes. At the same time, the pebble itself is likely a 'manuport' to the site (something carried to the site from somewhere else), as the stone is uncharactistic of all other stones observed at the site.

Three small, glassy-basalt, waterworn artifacts were recovered from the creekbed of Deroche Creek near the northern end of the proposed sediment basin. They are not associated with the site and were likely carried downstream from a location much further up Deroche Creek. The presence of these 3 artifacts is proof of indigenous land-use and occupancy of Deroche Creek and the area in general.

A 'mound' spotted within the densely covered blackberry underbrush of the Sediment Basin area in the spring of 2023, was initially considered a possible 'ancestral burial mound'. Ancestral burial mounds dating between 1,400 – 1,600 years ago are common throughout the region, with many occurring within a 10km radius. Upon brushing and clearing, the mound feature was identified as a mound of glacial/river till deposits, probably associated with construction of the original dike containing Deroche Creek. Altogether, three mounds of this nature were identified, all within the southern third of the of the proposed Sediment Basin.

The southern third of the proposed Sediment Basin is characterized by very minimal soil (humus) cover and significant amounts of historic garbage. One notable historic artifact, a horse-drawn plow, was identified and recovered, at the request of LFN resident Rick McKamey (Willow Creek Environmental Services, Environmental Programs Manager), who identified the plow as belonging to his grandmother. Historically, she owned the farm immediately east of the site area. In addition to the plow, an historic 'dog burial' was identified by LFN Guardian Erik Still at the base of a large cedar tree near Spillway Marker (0+360). Mr. McKamey confirmed Mr. Still's assessment and suggested the dog burial be removed and transported to an adjacent site immediately east of the Sediment Basin.

In summary, further monitoring is recommended during future (Phase 2) excavation works associated with the Sediment Basin.

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SEDIMENT BASIN BACKGROUND

The proposed Sediment Basin at Deroche Creek is envisioned as a Long-Term Solution to major flooding episodes and excessive sediment deposition, associated with extreme weather events in the Lower Mainland Region. Emergency sediment removals took place in the fall of 2022, at the request of Leq'á:mel First Nation and the BC Ministry of Environment and Climate Change Strategy. Summit Earthworks (Summit) was prime contractor for this emergency work through its Joint Venture partnership with Leq'á:mel First Nation (LDLP-SEW JV). Summit responded immediately to requests to mitigate the damage caused to Deroche Creek associated with the atmospheric river weather storms that occurred in the fall of 2021. The 2022 Emergency Sediment Removal Project involved clearing and grubbing along Deroche Creek, the creation of two access points north and south of the Deroche Creek Bridge on Taylor Road; embankment repairs within Deroche Creek, and the in-stream removal of massive amounts of flood-deposited fill from Deroche Creek to enable Chum Salmon migration and spawning within Deroche Creek; Chum Salmon were in Nicomen Slough waiting to spawn while Project Works were taking place. The Deroche Creek Emergency Sediment Removal Project was very successful and resulted in Summit Earthworks & Leq'á:mel First Nation being awarded the 2022 (EMA) Environmental Managers Association of BC prestigious Environmental Remediation Project of the Year Award (Figure 1). The proposed sediment basin covers an area of approximately one (1) hectare and is designed to be excavated to a depth between 3 and 6 meters below the existing floodplain level. Design plans for the sediment basin are near completion (Figure 4). The purpose of the sediment basin is to allow the capture of sediments during flood events, thereby limiting the volume of sediments reaching Nicomen Slough, a major salmon spawning habitat.

ARCHAEOLOGICAL PROJECT SUMMARY

This Project Permit Report describes Phase 1 Archaeological Investigations at Lakahahmen IR 11 associated with the construction of the proposed Sediment Basin bordering Deroche Creek located between Taylor Road and North Nicomen Road along the east side of Deroche Creek (Figures 2 & 3). The sediment basin is key component of the Long-Term Solution to manage sediment deposition in Deroche Creek, designed under the guidance of Northwest Hydraulic Consultants Ltd. (Design Consultant) and Kerr Wood Leidal Consultants Ltd. (Environmental and Construction Management Consultant).

As this Project occurred on Lakahahmen IR 11 (First Nation Reserve Lands), a Provincial Permit was not required. However, a comprehensive Heritage Investigation Permit was applied for—and obtained—from Leq'á:mel First Nation (Appendix 1). In addition to the LFN Investigation Permit, a comprehensive Chance Find Procedure (Appendix 2) was developed for the LFN Lands Department, prior to Archaeological Investigations commencing. A training/orientation program (Appendix 3) was also developed for LFN Guardians/Technicians (and all Project equipment operators) to familiarize them with the LFN Permitting process, Chance Find Procedure requirements, and proposed investigations at the site. Supporting materials for this training included a comprehensive PowerPoint presentation, hands-on familiarization with real artifacts, an on-site orientation, and familiarization with Summit Earthworks Safety Protocols for all individuals working at the site, which included a Site Specific Health & Safety Binder.

ARCHAEOLOGICAL ASSESSMENT OVERVIEW

Summit Earthworks' resident archaeologist, Gordon Mohs, M.A., participated in two preliminary field inspections at Deroche Creek in March and April of 2023. Following these visitations and his observations, Mohs recommended to the Deroche Creek Task Force Committee that the area of the proposed Sediment Basin be thoroughly examined for archaeological/cultural remains, prior to excavation of the basin proper, and that all excavation works be monitored throughout construction. He ascertained a moderate to high probability of archaeological/cultural remains occurring within the area, based on his field observations and background knowledge of the area (detailed comments below). In

this regard, he recommended a 2-Phase Assessment Plan, including the development of a comprehensive Chance Find Procedure (CFP) and Monitoring Plan & Training Program involving Leq'á:mel First Nation Field Technicians.

In addition to the Sediment Basin, it should be noted there are other proposed features associated with this Project, including two Deflection Berms southwest of the Taylor Road Bridge, protection of a Cemetery Berm southeast of the CP/Kansas City Rail Bridge which crosses Deroche Creek on North Nicomen Road, and additional bank stabilization activities. Based on preliminary field inspections, Mohs assessed these activities as having limited surface impact disturbances, as the focus is to be on 'capping' construction activities. Archaeological Monitoring of these areas is, however, recommended to occur as part of the overall heritage resources assessment.

In summary, Cultural Heritage Resources/Archaeological Monitoring of the eastern floodplain of Deroche Creek was the core activity recommended for the Sediment Basin Project, proposed to occur in 2 Phases to coincide with the construction activities:

1) **Phase 1**: A preliminary archaeological investigation to ascertain the presence of any surface cultural/ archaeological features/deposits within the proposed Sediment Basin area, with brush (notably blackberries) and other forest understory cleared by a size 60 excavator to allow a comprehensive inspection of the site area.

2) **Phase 2**: A more comprehensive Monitoring program to occur during deep excavation activities of the proposed Sediment Basin.

Each of these Phases is described in further detail below.

1) Phase 1: Archaeological Assessment Supported by Light Clearing: STATUS = COMPLETE.

Phase 1 Archaeological Investigations are now complete. Investigations involved detailed surface inspections of the proposed sediment basin area east of Deroche Creek within a forested area. Brush and other forest understory was cleared and grubbed to a maximum depth of 25cm by a size 60 excavator to allow inspection.

Phase 1 Archaeological investigations occurred between October 3 – 12, 2023, led by Gordon Mohs M.A., resident archaeologist at Summit Earthworks Inc. (Sub-Contractor to NHC) with key support of Leq'á:mel First Nation (LFN) Lands Department Guardians/Field Technicians: Erik Still, Megan Friesen, and Melissa Friesen.

- 5.5 days were required to complete detailed archaeological investigations.
- Field Investigations activities involved clearing the understory, primarily a heavy cover of blackberries, with a size 60 excavator.
    - No trees greater than 4-inches diameter were removed.
- Comprehensive Archaeological monitoring activities were conducted by a 3-person crew comprised of Archaeologist Gordon Mohs and two Archaeological Technicians/Guardians from Leq'á:mel FN Lands Department. Monitoring Procedures were set out in an Archaeological Chance Find Procedures document, developed as part of this project.

Observations associated with Field Inspections are described in detail below.

2) **Phase 2 Archaeological Monitoring: to Occur During Construction of the Sediment Basin & Berms in Spring/Summer of 2024**

Phase 2 Archaeological Monitoring is to involve detailed inspections of excavation activities associated with the Sediment Basin and Berm construction (Phase 1 & Phase 2 Works) during the construction/excavation stage. It is anticipated that limited materials of a cultural/archaeological nature will be found during this phase of the Monitoring process, except for excavations associated with the Sediment Basin, within the first meter or so of the surface.

- Estimated duration 16 weeks.
- Phase 2 archaeological monitoring is to take place during construction, which is proposed between June - September 2024.
- The focus of Phase 2 is monitoring the removal of subsurface deposits and disturbance of surface deposit by excavator.
- LFN Permit Regulations & Chance Find Procedures will apply during project works.
- As with surface monitoring, inspections during this phase will be conducted by a crew of Summit Earthworks Sr. Archaeologist, Gordon Mohs, and two Leq'á:mel First Nation Guardians/Archaeological Technicians.

CULTURAL BACKGROUND INFORMATION

Cultural background information was important in making archaeological assessments for this Project.

Lakahahmen IR 11: Place Name & Gathering Place

Lakahahmen IR 11 (Leq'á:mel) comprises the eastern part of the historic 1864 'Tlatwaas' (aka Tlat-whas, Klat-waas, Clatwass) Douglas Reserve. Although this Reserve no longer exists, the eastern portion was designated Lakahahmen IR 11.

In 1977, Sto:lo Linguist Brent Galloway recorded ….

> "*IR No. 11 is called "Lakahahmen." "The word for this place means "level place". It was an important gathering place for parties, dances, sports days, feasts, and other occasions. Another meaning is based on this use. The word "la:leq'el" means "visiting one another", and deals with a place where people go to have a big visit (from Elders meeting July 13, 1977)*".

Longhouse

There is evidence that there used to be an old longhouse in the general area, as described to Gordon Mohs by Leq'á:mel Elder Sam Kelly, December 2nd, 1997. One of Sam's stories was about the old longhouse near to where the Big E Restaurant on Taylor Road is now located. Sam said that there used to be a big longhouse here that stretched downriver along the slough about 400 feet and that Jeff Paul's house sits on top of part of it. Sam said he remembered pulling out an old house post when he was younger and that the house post was over 2 feet in diameter. He also said the area has since been ploughed and bulldozed. Sam commented on how the house was constructed and organized. He described it as a shed-type longhouse that ran parallel to Nicomen Slough along Taylor Road. He said that family compartments stretched all along the back wall of the house; the whole front half running along the slough was the common area. Here is where the people did their dancing and where half-a-dozen or more fires were located. Sam said that the broken rock from the fires stretched in an elongated mound along the whole back of the house and that most of this had been leveled out over the years.

Burial Mounds

A major component of archaeological sites in the immediate and regional area are burial mounds, several of which were identified and excavated by Anthropologist/Archaeologist Charles Hill-Tout at Hatzic and at Harrison Mills at the turn of the century (late 1800s – early 1900s). Further excavations of burial mounds occurred in the 1990s. These burial mounds

were located on the right bank of the Harrison River at its confluence with the Fraser River and involved teams of archaeologists from the University of British Columbia and Simon Fraser University. These mounds date to about 1,400 years ago and are very complex burial structures for important tribal ancestors, rich in grave inclusions and elaborate burial features. Examples are showcased in Appendix 2 of the Chance Find Procedure.

PRIMARY OBSERVATIONS AT SEDIMENT BASIN SITE

At Lakahahmen IR 11, within or in close proximity to the proposed Sediment Basin, is a relatively large mound, observed Thursday, March 9, 2023, during a site visitation by Summit's resident archaeologist, Gordon Mohs. At the time, Mohs noted that he was uncertain if this mound was a cultural feature, a natural feature, or a more recent historic feature within the development zone. He also noted that it was impossible to get anywhere near the mound during the March site visitation, as the entire area is heavily overgrown with blackberries.

CHANCE FIND PROCEDURES

Chace Find Procedures for Archaeological investigations were developed by Gordon Mohs in August 2023 (Appendix 2). LFN First Nation Guardians/Field Technicians and Summit's Excavator Operator were oriented to CFP procedures, related documents, maps, and diagrams at the LFN Lands Department office October 4th, 2023 (See Appendix 3 for more information).

POTENTIAL FOR DISCOVERY

The potential for discovery of archaeological deposits was originally assessed as 'Moderate to High', but has subsequently been revised to 'moderate' status, based on current archaeological investigations. In this regard, it should not be overlooked that artifacts were identified within Deroche Creek, that there are significant cultural traditions associated with Deroche Creek, that Deroche Creek is a salmon-bearing creek, that there is an LFN cemetery located in close proximity, at the up-creek boundary of the proposed sediment basin, that historically there was a former longhouse located nearby the outlet of Deroche Creek, and that 'Lakahahmen' was a noted gathering place utilized by the Leq'á:mel peoples and their neighbours in pre-contact and early contact times.

OBSERVATIONS ASSOCIATED WITH 2023 FIELD INSPECTIONS

Phase 1 Archaeological Investigations at Lakahahmen IR 11 on the left bank of Deroche Creek, associated with a proposed 1-hectare Sediment Basin, between the Taylor Road Bridge and the North Nicomen Road Bridge, are now complete. Following 5.5 days of investigations, between October 4-12, 2023, nothing of an archaeological nature was found in the area, with the possible exception of a small (2x3 inch/5x7.5cm), flat, chipped, river pebble found near the centre of the proposed Sediment Basin (Photo 12). The chipped pebble is not identified as an archaeological artifact as there is no evidence of use-wear or microdenticulation on the piece. The flake scars at either end of the pebble could be from natural causes (e.g., dropping, river tumble, machine fracture). However, it should be noted that the pebble itself is likely a 'manuport' to the site (something carried to the site from somewhere else), as it is uncharactistic of all other stones (glacial till/river till deposits) observed at the site.

Three small, glassy-basalt, waterworn artifacts were recovered from the creekbed of Deroche Creek near the northern end of the proposed sediment basin (Photos 11a, 11b, 11c). They are not associated with the site and were likely carried downstream from a location further up Deroche Creek. While not associated with the Sediment Basin, the presence of these 3 artifacts is proof of indigenous land-use and occupancy of Deroche Creek and the general area.

A ‘mound’ was spotted within the densely covered blackberry underbrush of the Sediment Basin in the spring of 2023, and was initially considered a possible ‘ancestral burial mound’ by Archaeologist Gordon Mohs. Ancestral burial mounds dating between 1,400 – 1,600 years ago are common throughout the region, with many recorded within a 10 km radius of Lakahahmen IR 11 (Photos 9, 10 and CFP pp 15-16). Upon brushing and clearing of the extensive blackberry brush cover, three mound features were identified, all characterized as glacial till deposits, possibly associated with construction of the original dike containing Deroche Creek. All 3 mounds were identified within the southern third of the of the proposed Sediment Basin.

To the north of the gravel mounds, north of Spillway Marker (0+380), soils are characterized by a thin to moderate humus layer (10 – 30 cm thick), underlain by a yellow, sandy-gravel layer or silty-loam. Within this area, one notable historic artifact, a horse-drawn plow (Photo 13), was identified and recovered. LFN resident Rick McKamey (Willow Creek Environmental Services, Environmental Programs Manager) identified the plow as belonging to his grandmother, who owned the farm immediately east of the site area. Also within this area, an historic ‘dog burial’ (Photos 7-8) was identified by LFN Guardian Erik Still at the base of a large cedar tree near Spillway Marker (0+360). Mr. McKamey suggested the dog burial be removed and transported to an adjacent site immediately east of the Sediment Basin.

Within the southern third of the proposed Sediment Basin (between survey marker 0+380 and the Taylor Road Deroche Creek Bridge – Figure 4), it is unlikely that anything of a cultural/archaeological nature will be found, as the soils in this area are characterised by glacial till deposits. This area was a former creekbed, materials of which were excavated and utilized to construct the current dike along the east (left) bank of Deroche Creek. Significant amounts of historic garbage occur throughout this area.

North of Sediment Basin Spillway Marker (0+360) there is a ‘Moderate’ likelihood that additional objects of a cultural/archaeological nature may be found. As a consequence, further monitoring is recommended during future (Phase 2) excavation works associated with the Sediment Basin.

SUMMARY

In summary, nothing of archaeological significance was found during Phase 1 investigations associated with the proposed Sediment Basin at Deroche Creek. However, given the probability of cultural heritage resources within the area, further monitoring is recommended during future (Phase 2) excavation works associated with the Sediment Basin and other features associated with this Project.

Sincerely yours



Gordon Mohs, M.A.
Sx̱wōx̱wíyam, El:ólìye, Pop’qo’les
First Peoples’ Community/Business Relations
604-820-0569 (office); 604-302-8983 (cell)
gordon@summitearthworks.ca

Photo 1

Summit Excavator Clearing & Grubbing Underbrush



LFN GUARDIAN Melissa Friesen in foreground at Spill Channel Stake (0+360)

Note: one of three Till Mounds just beyond Melissa at Spillway location (0+370)

Glacial till deposits predominate south of Sediment Basin Spillway Channel Marker (0+380)

Photo 2

Summit Excavator Clearing & Grubbing Underbrush



Excavator working near Spillway Channel Marker (0+440)

Note: Entire Sediment Basin north of Spillway Marker 0 + 380 appears relatively undisturbed but was extension of historic farm (Rick McKamey, Willow Creek Environmental Services, Environmental Programs Manager, personal communication).

There are few blackberries in this area, except along the dike embankment.

The soils north of Spillway Marker 0 + 380 are characterized by a thin to relatively thick humus layer (10 – 30 cm thick), underlain by a yellow sandy gravel layer or silty loam. Relatively fine till deposits can be seen on left (west) and right (east) sides of picture.

Photos 3 & 4

LFN Guardians Melissa Friesen & Erik Still conducting detailed site inspections



LFN Guardian Melissa Friesen in foreground at Spillway Channel east-boundary Stake (0+320)



LFN Guardian Erik Still inspecting exposed surface after rainfall within the Sediment Basin in proximity to Spill Channel Marker (0 + 440)

FIGURE 5



LFN Guardians Megan Friesen & Erik Still conducting detailed site inspections within the Sediment Basin in proximity to Spillway Channel Marker (0+420)

Note: Surface glacial till deposits in this area decrease in size moving northwards within the Sediment Basin

FIGURE 6

LFN Guardians Melissa Friesen & Erik Still conducting site inspections within the Sediment Basin adjacent the Deroche Creek dike in proximity to Spillway Channel Marker (0+360)



Note: there is significant historic garbage within this area of the Sediment Basin from Spillway Channel Marker (0 + 280) to Spillway Channel Marker (0 + 380)

FIGURES 7 & 8
Historic Structural Feature: Dog Burial





LFN Guardian Eric Still identified this feature as a Dog Burial. Apparently, Bella was poisoned and buried by her owners at this location. Erik's comments were confirmed by Rick McKamey (Willow Creek Environmental Services, Environmental Programs Manager) whose grandmother formerly lived on a farm immediately east of the proposed Sediment Basin.

Rick suggested the dog burial could be moved immediately east of the proposed Sediment Basin utilizing an excavator. Rick noted that his own (former) dog is buried nearby.

***It should be noted that none of the stones associated with the feature displayed any characteristics of artifact manufacture such as chipping, pecking, grinding, etc.

FIGURES 9 & 10
GRAVEL/TILL MOUNDS



Three Gravel Mounds were identified between Sediment Basin Markers (0 + 340) and (0 + 380)



These mounds were first identified in the spring of 2023 and were covered with blackberries

GLASSY VOLCANIC BASALT ARTIFACTS

FIGURE 11a



Three water-worn glassy volcanic basalt artifacts were discovered within the current Deroche Creek channel adjacent Sediment Basin Marker (0+460).

FIGURE 11b



FIGURE 11c



***It is very unlikely these artifacts are associated with the proposed Sediment Basin area. Deroche Creek is a dynamic creek and these artifacts likely rolled down the creek a significant distance. They are all quite water-worn. The adjacent creek embankment was carefully examined for archaeological deposits by Erik and Melena and nothing but gravel was noted. In addition, the adjacent Sediment Basin area was carefully inspected following two October rain events (one of the best times for searching for artifacts), and nothing was found.

***Of note: A significant amount of fill was removed from Deroche Creek in 2022 where the artifacts were found.

FIGURE 12 CHIPPED PEBBLE (77 x 52cm)



(actual size)

A small, chipped river pebble was identified on the surface within the Sediment Basin in proximity to Spill Channel Marker (0 + 380).

There are 2 small fractures at the wider end (right end in photo), including a small curved fracture (top right) that is fairly recent (assessment based on the lack of patination), and a larger composite fracture below the smaller fracture, estimated to be much older (based on the patination). Neither fracture is characterized by microdenticulaton or use-wear.

There is also a small chip/fracture at the opposite end of the river pebble. It too is lacking micro-denticlation or use-wear and is characterized by patination, similar to that of larger fracture on the right end of the pebble. There are also recent scratchmarks across the surface of the stone, possibly related to Summit's excavator activity.

***Of Note: this pebble is interesting as it uncharacteristic of all the other stones (till deposits & creekbed deposits) on site, which strongly suggests it is a 'manuport' (an object transported or carried to the site).

FIGURE 13
Historic Horse-Drawn Plow



Plow was found partially buried in silty humus layer within the Sediment Basin in proximity to Spill Channel Marker (0+440)

Note: Rick McKamey (Willow Creek Environmental Services, Environmental Programs Manager) commented that the plow belonged to his grandmother who formerly lived on the property immediately east of the proposed Sediment Basin.

FIGURES 14 & 15
HISTORIC GARBAGE



Historic garbage was observed throughout the southern third of of the proposed Sediment Basin extending from Spill Channel Marker (0+280) to (0+400+). Garbage observed included tires, casettes, foam, metal piping, car parts, bottles, wire, metal containers, purses, etc.



FIGURE 1: Summit Earthworks/Leq'amel FN EMA BC, Deroche Creek, Project of Year Award



FIGURE 2: DEROCHE CREEK SEDIMENT BASIN/SPILLWAY LOCATION (Google Earth Map)



FIGURE 3: SEDIMENT BASIN MAP



FIGURE 4: PROPOSED SEDIMENT BASIN/SPILLWAY DESIGN PLAN

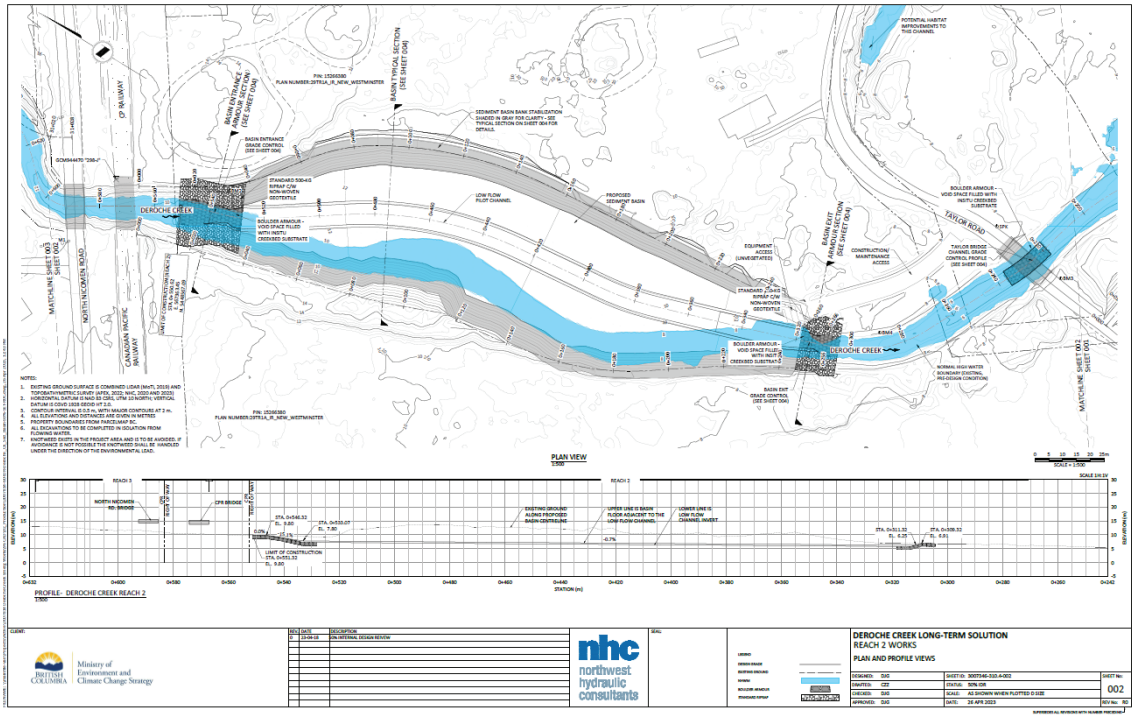
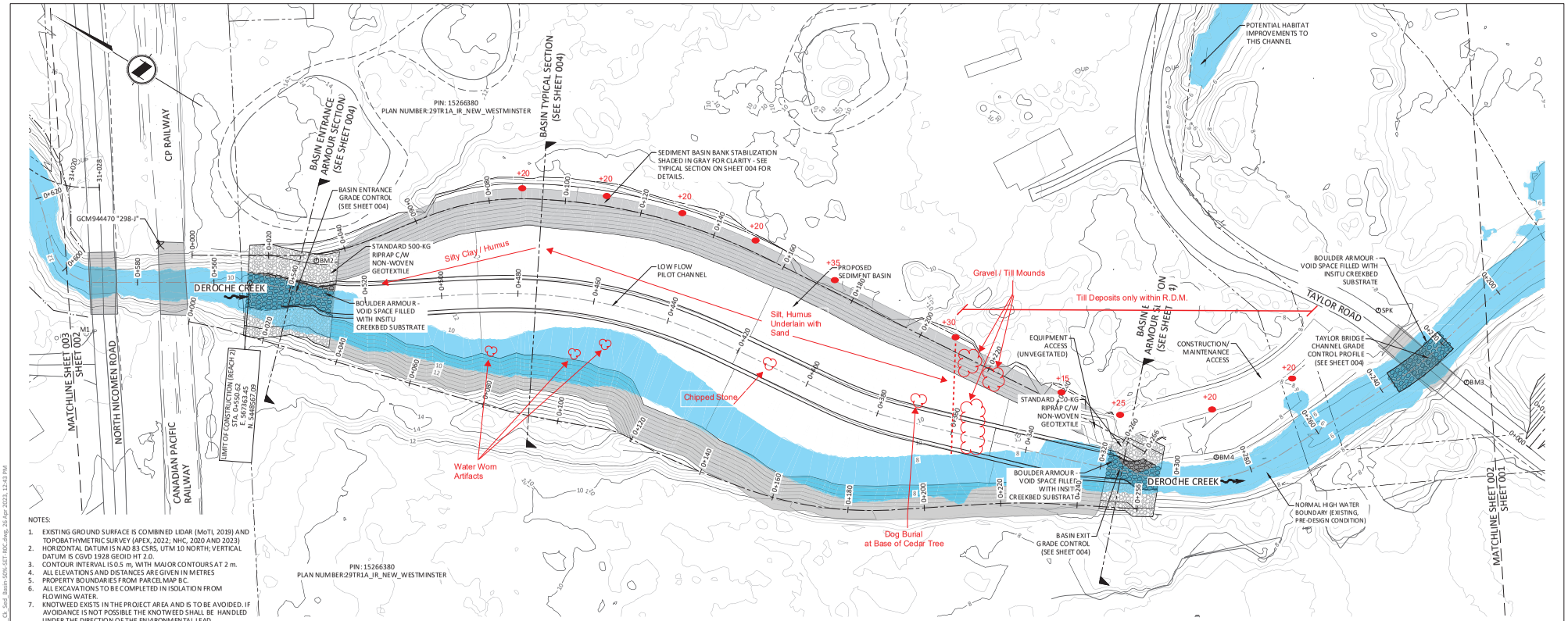


FIGURE 5: ARCHAEOLOGICAL ASSESSMENT FIELD MAP



NOTES:

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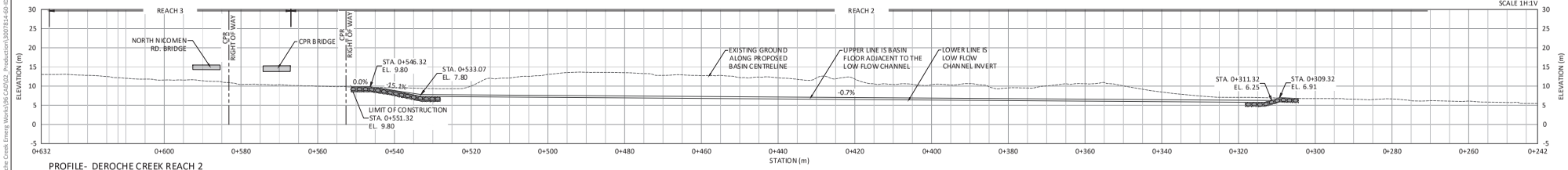
2. HORIZONTAL DATUM IS NAD 83 CSRS, UTM 10 NORTH; VERTICAL DATUM IS CGVD 1928 GEOID HT 2.0.
3. CONTOUR INTERVAL IS 0.5. m, WITH MAJOR CONTOURS AT 2 m.
4. ALL ELEVATIONS AND DISTANCES ARE GIVEN IN METRES
5. PROPERTY BOUNDARIES FROM PARCELMAP BC.
6. ALL EXCAVATIONS TO BE COMPLETED IN ISOLATION FROM FLOWING WATER.
7. KNOTWEED EXISTS IN THE PROJECT AREA AND IS TO BE AVOIDED. IF AVOIDANCE IS NOT POSSIBLE THE KNOTWEED SHALL BE HANDLED UNDER THE DIRECTION OF THE ENVIRONMENTAL LEAD.

PLAN VIEW
1:500

SCALE = 1:500



PROFILE- DEROCHE CREEK REACH 2
1:500

SCALE 1H:1V

CLIENT:

Ministry of Environment and Climate Change Strategy
BRITISH COLUMBIA

REV	DATE	DESCRIPTION
0	2304-18	50% INTERNAL DESIGN REIVEW

nhc northwest hydraulic consultants

SEAL:

LEGEND
DESIGN GRADE
EXISTING GROUND
NHWM
BOULDER ARMOUR
STANDARD RIPRAP

DEROCHE CREEK LONG-TERM SOLUTION
REACH 2 WORKS

PLAN AND PROFILE VIEWS

DESIGNED:	DJG	SHEET ID: 3007346-310.4-002	SHEET No: 002
DRAFTED:	CZZ	STATUS: 50% IDR	
CHECKED:	DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE: 26 APR 2023	REV No: R0

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nanlfile-van\Projects\Active\3007814 Deroche Creek Emerg Works\06 CAD\02_Production\3007814-60-IDR-Deroche_OL_Sed_Basin-50%-SET-R0C.dwg, 26 Apr 2023, 12:43 PM

LEQ'Á:MEL FIRST NATION
Investigative Use Permit

Permit No.:	**LFNIUP#2023-003**
Date of Issuance:	**October 2, 2023**
Expiration Date:	**October 1, 2024**
Permittee:	**Northwest Hydraulics Consultants Ltd.**
Permittee Representative:	**Des Goold, P. Eng. Principal - Northwest Hydraulic Consultants (NHC), 30 Gostick Place, North Vancouver BC, V7M 3G3. Email: DGoold@nhcweb.com. Phone: 604-969-3013.**

WHEREAS:

A. NHC (the "**Permittee**") is proposing to develop a sediment basin for Deroche Creek between Taylor Road and North Nicomen Road. The sediment basin is part of a long-term solution to manage sediment in Deroche Creek, and is being designed under the guidance of NHC Ltd and Kerr Wood Leidal Consultants Ltd. The Permittee is proposing to develop high flow deflection berms and sediment basin, erosion protection and bank stabilization works (the "**Proposed Development**") on certain Leq'á:mel First Nation ("**Leq'á:mel**") Lands, legally described as Deroche Creek Reach 1 and 2 between Canadian Pacific Kansas City Railway creek crossing and downstream to the confluence of the Nicomen Slough, and depicted in the maps enclosed in Schedule "B" to this Permit (the "**Permit Lands**");

B. The Permittee has submitted a request to Leq'á:mel Lands Department to access the area and conduct a preliminary archaeological investigation to ascertain if there are any obvious surface cultural/archaeological materials within the one (1) hectare area of the proposed sediment basin. Brush and other forest understory are proposed to be cleared to allow investigation, but no trees will be removed. Archaeological investigations are to be led by Gordon Mohs M.A., resident Archaeologist at Summit Earthworks Inc. (sub-contractor) with participation of the Leq'á:mel Guardians. Despite the resident Archaeologists association with Summit Earthworks, Leq'á:mel in no way implies, supports or guarantees any further work on the Deroche Creek project for Summit Earthworks Inc.

C. The Permittee may require access to the area to conduct other general field investigations necessary for the advancement of the Proposed Development, including environmental assessments, geotechnical investigations, topographic surveys, etc., which may be authorized under this permit, subject to the prior written approval of the Leq'á:mel Lands Department, in particular:

   i. preliminary investigations of archaeological chance finds in the Permit Lands, specifically in the areas of Reach 1 and Reach 2 of Deroche Creek;

   ii. preliminary investigations of proposed project footprint exceeding the present east top bank in Deroche Creek Reach 2 as identified in NHC Engineered Construction Drawings (also enclosed in Schedule "B" to this Permit); and

   iii. preliminary investigations of Reach 1 high flow deflection berm footprint south of Taylor Road and west of the present Deroche flow channel alluvial fan,

(collectively, the "**Investigative Works**"); and

D. The Leq'á:mel Lands and Natural Resources Department has considered the proposal for Investigative Works, and has determined after consultation with Chief & Council at a duly convened meeting on August 21, 2023, that the Permittee shall have the right to carry out the Investigative Works in accordance with the terms and conditions set out in this Investigative Use Permit, including the Schedules enclosed hereto, (collectively, the "**Permit**").

NOW THEREFORE:

1. This Permit is issued to the Permittee with a commencement date of October 2, 2023 and an expiry date of October 1, 2024, unless terminated earlier in accordance with this Permit.

2. Pursuant to this Permit. the Permittee is authorized to carry out only the Investigative Works authorized hereunder within the Permit Lands, which works must be carried out in strict compliance with both (i) the terms and conditions attached to this Permit, and (ii) all Leq'á:mel laws and all other applicable laws.

3. This Permit only grants the Permittee a right of access and use of the Permit Lands for the purposes of carrying out the Investigative Works in compliance with the Terms and Conditions of this Permit. For certainty, nothing herein grants the Permittee exclusive use or occupation of the Permit Lands.

4. The Terms and Conditions and Schedule "A" enclosed to this Permit form part of this Permit.

5. Leq'á:mel retains the right to terminate this Permit at any time, and in its sole discretion, effective on notice to the Permittee.

LEQ'Á:MEL FIRST NATION
Investigative Use Permit

Permit No.:	**LFNIUP#2023-003**
Date of Issuance:	**October 2, 2023**
Expiration Date:	**October 1, 2024**
Permittee:	**Northwest Hydraulics Consultants Ltd.**
Permittee Representative:	**Des Goold, P. Eng. Principal - Northwest Hydraulic Consultants (NHC), 30 Gostick Place, North Vancouver BC, V7M 3G3. Email: DGoold@nhcweb.com. Phone: 604-969-3013.**

Schedule "A" – Terms and Conditions

The following terms and conditions apply at all times to this Permit and the Permittee's rights and obligations hereunder:

a) The Permittee shall provide advance written notice for any investigative uses proposed under this permit and shall comply with any instructions provided by the Leq'á:mel Lands Department.

b) The Permittee expressly acknowledges that no development related work is approved under this permit, and may not proceed in relation to the project until Leq'á:mel First Nation has issued the required approvals.

c) The Permittee expressly acknowledges that they shall be jointly and severally liable and responsible for the cost of any future remedial work and restoration, any related expenses, if required as a result of any investigative uses, and administrative and professional fees and costs that may be incurred by Leq'á:mel or others in reviewing the related reports in accordance with Leq'á:mel law.

d) The Permittee shall comply with all applicable laws, including all Leq'á:mel laws, at all times, and shall immediately report to Leq'á:mel Lands Department any non-compliance or potential non-compliance, and comply with any corresponding instructions provided in respect thereof by the Leq'á:mel Lands Department.

e) The Permittee shall keep the Permit Lands safe, clean and in a sanitary condition, satisfactory to the Leq'á:mel Lands Department.

f) There will not be any environmental disturbances to the Permit Lands, and no hazardous materials may be brought onto or released on the Permit Lands at any time.

g) Equipment used on the Permit Lands must comply with all Leq'á:mel Laws, including the Leq'á:mel Land Code and Leq'á:mel Environmental Laws, and including, but not limited to, the following requirements:

   a. drip trays must be deployed while mechanized equipment is sitting idle;

   b. approved spill kits must be on the Permit Lands and within reach of equipment operators;

   c. all mechanised equipment must use environmentally approved lubrication.

h) In the event of a discovery of any historic, cultural, or archaeological materials, all activities are to be stopped immediately until further directions are provided to the Permittee by the Leq'á:mel Lands Department.

i) The Permittee shall always maintain a copy of this Permit on the Permit Lands.

j) Subject to conditions m) and n) below, the Permittee shall maintain access protocols throughout the term of this Permit to ensure only personnel engaged in the Investigative Works are present on the Permit Lands during the conduct of the Investigative Works.

k) If requested by the Leq'á:mel Lands Department, the Permittee shall provide written notice delivered to the doors of nearby residents informing them of the investigative works.

l) A Leq'á:mel Lands Department representative will attend the Permit Lands at any time before, during and after the Investigative Works are conducted.

m) The Permittee shall ensure that a Leq'á:mel monitor is present on the Permit Lands at all times that any Investigative Works are carried out, at the sole cost and expense of the Permittee.

n) The Permittee shall provide up to date contact information to the Leq'á:mel Lands Department for its key field personnel carrying out the Investigative Works.

o) Any incidents shall be promptly reported to the Leq'á:mel Lands Department, and the Permittee shall comply with all corresponding directions provided by the Leq'á:mel Lands Department.

p) The Permittee shall report to the Leq'á:mel Lands Department when the Investigative Works are completed, participate in a site inspection with the Leq'á:mel Lands Department, and share copies of all reports completed as a result of the Investigative Works within thirty (30) days of the expiry date of this Permit.

q) The Permittee shall indemnify and release Leq'á:mel First Nation for all claims and costs however incurred as a result of the issuance of this Permit.

r) This Permit is issued solely to the Permittee and is not transferable or assignable.

s) This Permit does not authorize any cutting or removal of timber, or excavation or removal of any soil or other materials, from the Permit Lands, without the prior written consent of the Leq'á:mel Lands Department.

t) The Permittee shall not commit any wilful or voluntary waste, spoil, or destruction on the Permit Lands, or do anything that may be or become a nuisance.

u) The Permittee shall not construct or affix any improvements on the Permit Lands, except as reasonably required to carry out the Investigative Works.

v) This Permit to the Permit Lands is granted on an "as is" basis

w) The Permittee shall make all payments when due and owing under this Permit and applicable laws.

The undersigned authorized signatory for Leq'á:mel Lands Department hereby issues this Investigative Use Permit to the Permittee as of the date of issuance indicated on the first page hereof.

Signed on behalf of the Leq'á:mel Lands Department

sept. 29

The Permittee hereby agrees and commits to comply with this Permit at all times:

Signed by an authorized representative of the Permittee

LEQ'Á:MEL FIRST NATION
Investigative Use Permit

Permit No.:	LFNIUP#2023-003
Date of Issuance:	October 2, 2023
Expiration Date:	October 1, 2024
Permittee:	Northwest Hydraulics Consultants Ltd.
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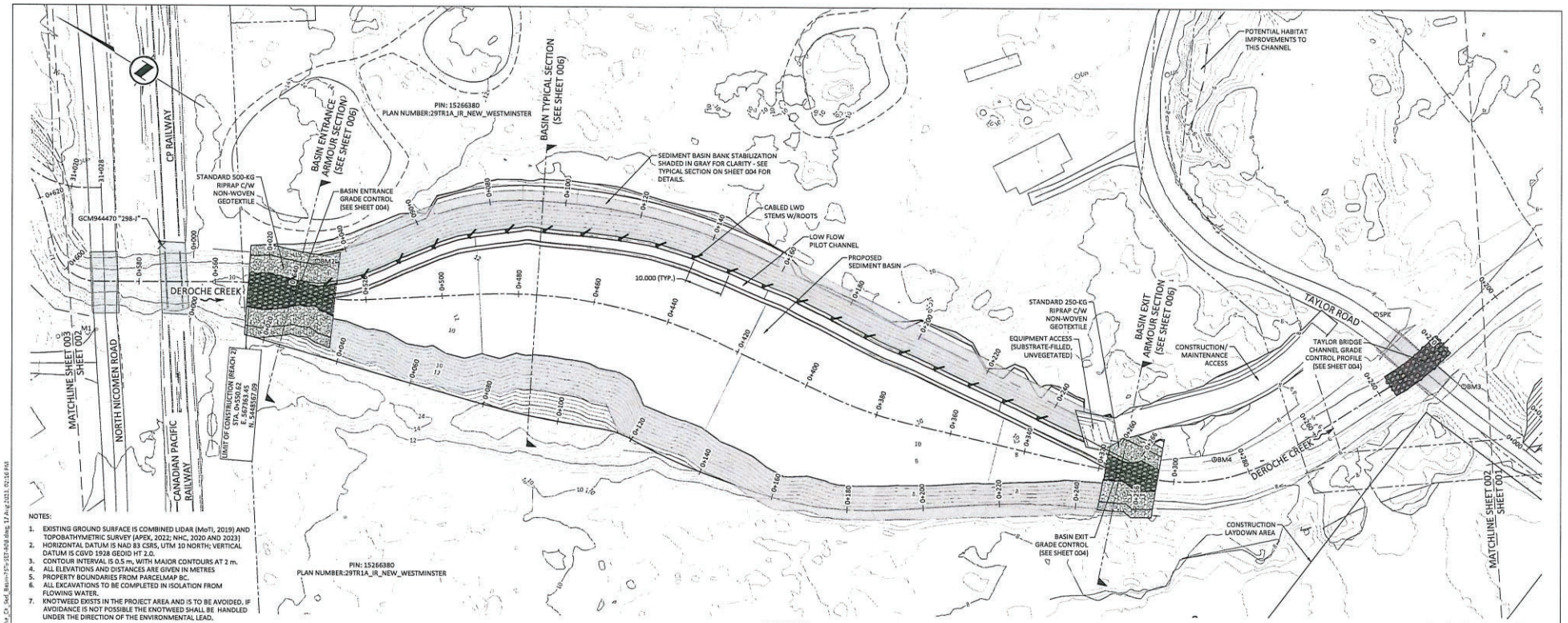
Schedule "B" – Map of Permit Lands



NOTES:

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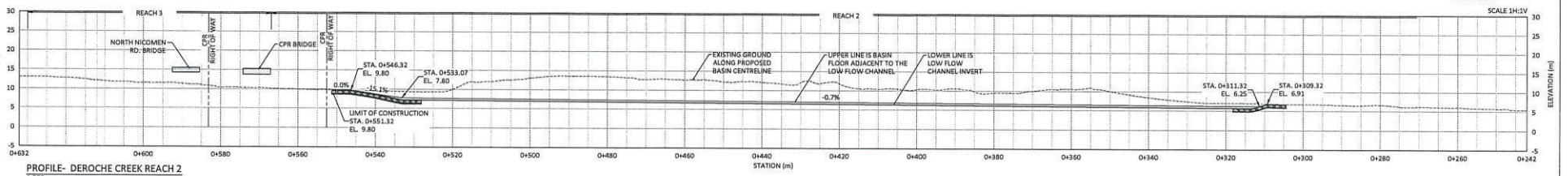
PLAN VIEW
1:500

0 5 10 15 20 25m
SCALE = 1:500



PROFILE- DEROCHE CREEK REACH 2
1:500

CLIENT:

BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
0	23-04-18	50% INTERNAL DESIGN REIVEW
1	23-08-16	75% INTERNAL DESIGN REIVEW

nhc northwest hydraulic consultants

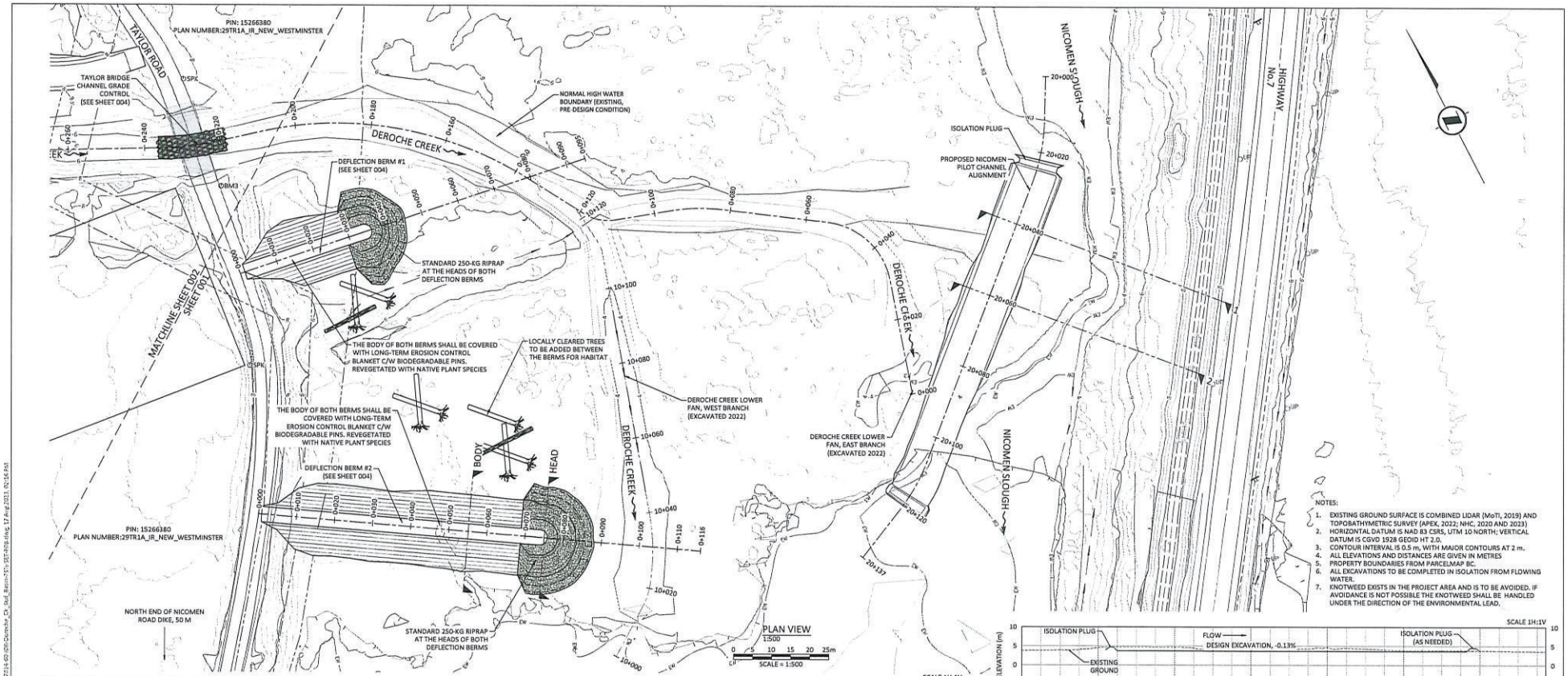
SEAL:

LEGEND
DESIGN GRADE
EXISTING GROUND
200 YEAR (TO COME)
BOULDER ARMOUR
STANDARD RIPRAP
SUBSTRATE-FILLED RIPRAP
CABLED LWD

DEROCHE CREEK LONG-TERM SOLUTION
REACH 2 WORKS
PLAN AND PROFILE VIEWS

DESIGNED: DJG	SHEET ID: 3007814-LTS-004	SHEET No: 004
DRAFTED: CZZ	STATUS: 75% IDR	
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED: DJG	DATE: 17 AUG 2023	REV No: R1

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING



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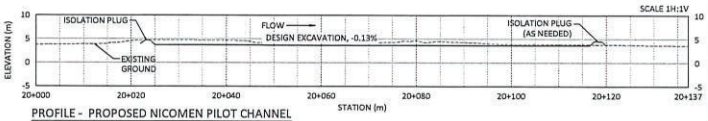
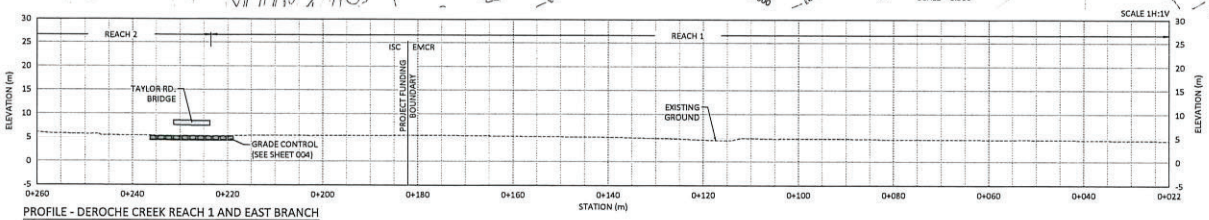
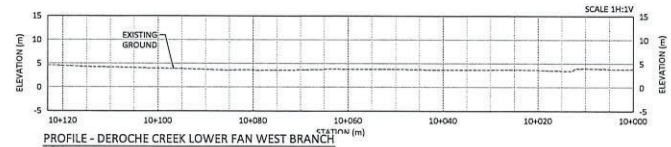


PROFILE - PROPOSED NICOMEN PILOT CHANNEL
1:500



PROFILE - DEROCHE CREEK REACH 1 AND EAST BRANCH
1:500



PROFILE - DEROCHE CREEK LOWER FAN WEST BRANCH
1:500

CLIENT:

BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
0	23-04-18	50% INTERNAL DESIGN REIVEW
1	23-08-16	75% INTERNAL DESIGN REIVEW

nhc northwest hydraulic consultants

SEAL:

LEGEND
DESIGN GRADE
EXISTING GROUND
200-YEAR (TO COME)
BOULDER ARMOUR
STANDARD RIPRAP

DEROCHE CREEK LONG-TERM SOLUTION
REACH 1 WORKS
PLAN AND PROFILE VIEWS

DESIGNED: DJG	SHEET ID: 3007814-LTS-003		SHEET No:
DRAFTED: CZZ	STATUS: 75% IDR		003
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 17 AUG 2023		REV No: R1

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

DEROCHE CREEK
ARCHAEOLOGICAL CHANCE FIND PROCEDURE

PREPARED FOR

Leq'á:mel First Nation Lands & Resources Department
Attention: Stephen McGlenn, Manager

&

Northwest Hydraulic Consultants
Attention: Des Goold P.Eng. | Principal

PREPARED BY
Gordon Mohs, M.A.
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August 15, 2023

SUMMIT EARTHWORKS

ARCHAEOLOGY CHANCE FIND PROCEDURES

To:	All Project Consultants & Contractors & Leq'á:mel First Nation representatives involved in Project Development
From:	Leq'á:mel First Nation Lands Department
Date:	August 15, 2023
Subject:	Leq'á:mel First Nation – 2023 Deroche Creek Spillway Archaeological Chance Find Procedures

For additional information or questions on this matter, contact:

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ARCHAEOLOGICAL/HERITAGE RESOURCE CHANCE FIND PROCEDURES

Background
The British Columbia Archaeology Branch, Ministry of Forests, states that a Chance Find Procedure (CFP) for development projects should include the following:

1. Scope of Work,

2. Overview of Potential for Discovery of previously unknown archaeological sites,

3. Explanation of the importance of properly implementing protocols and procedures laid out in the operation's Archaeological CFP,

4. Outlining the protocol for identifying a possible Archaeological Sites, including a list of common visible identifying features,

5. Outlining procedures to be followed in the event of discovery of what may be a possible

Archaeological Site, including contact information, and

6. Outlining procedures to be followed in the event of discovering what may be human remains, including contact information.

Key Contact Information in Event of Chance Find

(1) Leq'á:mel First Nation

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(4) Archaeology Branch, Ministry of Forests

a) Contact: Jillian Rousselle, Director

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Fax: (250) 953-3340
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Location Address: #3-1250 Quadra Street, Victoria BC
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b) Arch Branch Alternate:

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(1) PROJECT LOCATION

Deroche, British Columbia, within Deroche Creek between Taylor Road and North Nicomen Road on Lakahahmen IR 11 (**Figure 1**).

(2) PROJECT DESCRIPTION

Deroche Creek Reach 3 Development Project: Phase 2 Spillway Clearing & Excavation Project:

- 3007814 - Deroche Creek Long Term Solution Phase 2.2 Archaeological Assessment

This Chance Find Procedure has been developed at the request of Leq'á:mel First Nation Lands & Resources Department, in the event Archaeological Chance Finds are observed during the construction phase of the Deroche Creek Spillway Site & Long-Term Solution Reach 3 Development Project. The General Contractor for the Project is Northwest Hydraulic Consultants. Summit Earthworks is the Subcontractor responsible for conducting Archaeological Assessments associated with the Deroche Creek Spillway and other Long-Term Solution Reach 3 Project Works.

This Chance Find Procedure has been reviewed and approved by the Leq'á:mel First Nation Lands Department and by the General Contractor for the Project. Gordon Mohs M.A., Summit Earthworks, is the designated Senior Archaeologist overseeing Field Monitoring Activities for this Project and is the individual responsible for developing this Chance Find Procedure.

SCOPE OF WORK: BACKGROUND INFORMATION

The Archaeological Investigations described herein are for the Deroche Creek Long-Term Solution Project. Emergency sediment removals took place in the fall of 2022, at the request of Leq'á:mel First Nation and the BC Ministry of Environment and Climate Change Strategy. Summit Earthworks (Summit) was prime contractor for the emergency work and responded immediately to requests to mitigate damage caused to Deroche Creek from the atmospheric river weather storms that occurred in the fall of 2021. The 2022 Project involved clearing and grubbing along Deroche Creek, the creation of two access points north and south of the Deroche Creek Bridge on Taylor Road; embankment repairs within Deroche Creek, and in-stream removal of large amounts of flood-deposited fill from Deroche Creek to enable Chum Salmon migration and spawning within Deroche Creek; Chum Salmon were in Nicomen Slough waiting to spawn while Project Works were taking place. The emergency sediment removal was very successful.

CURRENT PROPOSED WORKS

The focus of current works is construction of a Sediment Basin within Deroche Creek between Taylor Road and North Nicomen Road on Lakahahmen IR 11 (**Figures 1 & 2**). The proposed sediment basin covers an area of approximately one (1) hectare and will be excavated to a depth between 3 and 6 meters below the existing east floodplain level. Design plans for the sediment basin are nearing the 75% stage of completion. The purpose of the sediment basin is to increase the capture of sediments during floods, thereby limiting the volume of sediment that reaches Nicomen Slough.

General Assessment

Summit Earthworks' resident archaeologist, Gordon Mohs, M.A., participated in a field visit to Deroche Creek Thursday, March 9, 2023, and again April 12, 2023. Gordon recommended to the Deroche Creek Task Force Committee that the area of the proposed sediment basin be thoroughly examined for archaeological/ cultural remains, prior to excavation of the basin proper and that all excavation works be monitored throughout construction. He ascertained a moderate to high probability of archaeological/cultural remains occurring within the area of the proposed sediment basin based on his observations and background knowledge of the area (see comments below). In this regard, Gordon recommended a 2-Phase Assessment

Plan, including the development of a comprehensive Chance Find Procedure (CFP), as well as a Monitoring Program & Training Plan involving Leq'á:mel First Nation Field Technicians.

It should be noted: There are other proposed features associated with the current Phase of remediation activities at Deroche Creek, including two Deflection Berms, a Cemetery Berm, and additional bank stabilization activities. Based on his preliminary field inspections, Mohs assessed these activities as having limited surface impact disturbances, as the focus is on 'capping' construction activities. Archaeological Monitoring of these areas will, however, occur as part of the current Assessment.

In summary, Archaeological Monitoring is the core activity proposed in the developed Chance Find Procedure. This is to occur in two phases designed to coincide with the construction activities.

ASSESSMENT & MONITORING

1) **Phase 1: Archaeological Assessment supported by light clearing.**

Phase 1 Archaeological Investigations will involve detailed inspections of the eastern portion of the proposed sediment basin, which lies outside the existing creek in a forested area. Brush and other forest understory will be cleared and grubbed to allow inspection.

- Estimated duration: 4.5 days
- Phase 1 activities are to include clearing of understory, primarily a heavy cover of blackberries, with a size 60 excavator.
    - There is to be no removal of trees greater than 6-inches diameter at breast height.
    - Further light excavation will occur, as warranted, without threatening trees.
- Archaeological Monitoring/Inspections will be conducted by a crew comprising a Senior Archaeologist (Gordon Mohs) and two Archaeological Assistants (Leq'á:mel FN).
- Procedures to be followed in the event that archaeological features or deposits are set ou in these Chance Find Procedures.
    - In summary… if archaeological deposits are identified during Project Works, all clearing/excavation activities in the immediate area of the Chance Find will be discontinued, until a thorough Archeological Assessment can be made by the Senior Project Archaeologist, in collaboration with First Nation Archaeological Field Technicians.
    - If significant deposits are identified, alternative design plans may be necessary (see Appendix 1, CFP Flow Diagram, for possible scenarios).
    - If deposits are deemed 'significant', all further clearing/excavation activities within the proposed spillway area will be halted.
        - Examples of significant archaeological features and deposits are illustrated in Appendix 2.

2) **Phase 2 Archaeological Monitoring: During Construction (Excavation) of the Sediment Basin**

Phase 2 Archaeological Monitoring will involve detailed inspections of the sediment basin during its construction (excavation). It is anticipated that little will be found during this phase of the Monitoring process, except within the first meter or so of the surface.

- **Estimated duration 16 weeks**
- The focus of Phase 2 is monitoring the removal of subsurface deposits by Excavator.
- Chance Find Procedures will apply, in the event significant subsurface deposits are identified.

- As with surface monitoring, inspections during this phase will be conducted by a crew of one Senior Archaeologist and two Leq'á:mel First Nation Archaeological Technicians.

CULTURAL BACKGROUND INFORMATION

Cultural background information was important in making assessments of the sediment basin area.

Lakahahmen IR 11: Place Name & Gathering Place

Lakahahmen IR 11 (Leq'á:mel) comprises the eastern part of the historic 1864 'Tlatwaas' (aka Tlat-whas, Klat-waas, Clatwass) Douglas Reserve. Although this Reserve no longer exists, the eastern portion was designated Lakahahmen IR 11.

In 1977, Sto:lo Linguist Brent Galloway recorded ….

> "*IR No. 11 is called "Lakahahmen." "The word for this place means "level place". It was an important gathering place for parties, dances, sports days, feasts, and other occasions. Another meaning is based on this use. The word "la:leq'el" means "visiting one another" and deals with a place where people go to have a big visit (from Elders meeting July 13, 1977)*".

Longhouse:

There is evidence that there used to be an old longhouse in the general area, as described to Gordon Mohs by Leq'á:mel Elder Sam Kelly, December 2nd, 1997. One of Sam's stories was about the old longhouse near to where the Big E Restaurant on Taylor Road is now located. Sam said that there used to be a big longhouse here that stretched downriver along the slough about 400 feet and that Jeff Paul's house sits on top of part of it. Sam said he remembered pulling out an old house post when he was younger and that the house post was over 2 feet in diameter. He also said the area has since been ploughed and bulldozed. Sam commented on how the house was constructed and organized. He described it as a shed-type longhouse that ran parallel to Nicomen Slough along Taylor Road. He said that family compartments stretched all along the back wall of the house; the whole front half running along the slough was the common area. Here is where the people did their dancing and where half-a-dozen or more fires were located. Sam said that the broken rock from the fires stretched in an elongated mound along the whole back of the house and that most of this had been leveled out over the years.

Burial Mounds:

A major component of archaeological sites in the immediate and regional area are burial mounds, several of which were identified and excavated by Anthropologist/Archaeologist Charles Hill-Tout at Hatzic and at Harrison Mills at the turn of the century (late 1800s – early 1900s). Further excavations of burial mounds occurred in the 1990s. These burial mounds were located on the right bank of the Harrison River at its confluence with the Fraser River and involved teams of archaeologists from the University of British Columbia and Simon Fraser University. These mounds date to about 1,400 years ago and are very complex burial structures for important tribal ancestors, rich in grave inclusions and elaborate burial features. Examples are showcased in *Appendix 2* of this Chance Find Procedure.

Recent Observations at Proposed Sediment Basin

At Lakahahmen IR 11, within—or in close proximity to—the proposed sediment basin is a relatively large mound, observed Thursday, March 9, 2023, during a site visitation by Summit Earthworks' resident archaeologist, Gordon Mohs. It is unknown if this mound is a cultural feature, a natural feature, or a more recent historic feature within the development zone. It should be noted that it was impossible to get anywhere near the mound during the March site visitation, as the entire area is heavily overgrown with blackberries.

CHANCE FIND PROCEDURES

As part of their training, First Nation Field Technicians will be provided with the Deroche Creek Sediment Basin Chance Find Procedure, as well as all relevant documents, maps, and diagrams. These will be reviewed with the Sr. Project Archaeologist. Complementing these documents are an orientation PowerPoint Program, for both First Nation Field Technicians and Consultants/Contractors working at the site, and '*Archaeological Monitoring Forms*', which require FN Field Technicians to document:

- Nature of activities
- Location of activities
- Description of project work activities
- Size of area impacted on a daily basis with project works
- Nature of deposits, if applicable, including subsurface profiles
- Depth of excavation activities
- Observation of fill deposits, including photographic records.

In addition, all on-site construction workers will be required to familiarize themselves with the Deroche Creek Sediment Basin Chance Find Procedures and associated protocols. All Construction personnel working on site will be provided a training session prior to any excavation activities occurring. This will include a PowerPoint presentation on Chance Finds.

(3) CONSTRUCTION SCHEDULE 2023/2024

Phase 1 archaeological investigations are proposed to begin and to be completed in August of 2023.
Phase 2 archaeological monitoring will take place during construction, which is proposed to take place between June 2024 and September 2024.

(4) POTENTIAL FOR DISCOVERY

The potential for discovery of archaeological deposits is deemed moderate – high, given that Deroche Creek is a salmon-bearing creek, a proximal location of a former longhouse site, and a gathering place utilized by the Leq'á:mel First Nation and their neighbours in pre-contact and early contact times.

(5) IMPORTANCE OF IMPLEMENTING PROCEDURES

These Chance Find Procedures are to be followed by all Project representatives, contractors, and subcontractors. Failure to follow protocols and procedures could seriously jeopardize the Project, severely harming fish migrations, and could seriously affect Leq'á:mel First Nation's reputation regarding protection of its cultural heritage resources. Moreover, given that a small part of this project is 'off-reserve', failure to follow procedures for Chance Finds could be deemed an offence under the *Heritage Conservation Act (1996)*.

(6) PROTOCOLS FOR SITE IDENTIFICATION

Identifying archaeological sites, features and objects requires a person or persons with archaeological training and, preferably, culture-specific training and knowledge of local First Nation cultural resources and cultural traditions. Normally, this includes an archaeologist approved by local First Nations, as well as First Nation Technicians with training and experience in archaeology and/or culture heritage resources management. The Sr. Project Archaeologist, Gordon Mohs, has extensive archaeological experience in the region as well as extensive experience involving Coast & Interior Salish Elders, cultural traditions, & cultural heritage resources management, including Heritage Policies development.

- Training will be offered to all First Nations representatives by Sr. Project Archaeologist Gordon

Mohs. A comprehensive program has been designed specifically for this purpose.

In the event Chance Finds are identified, the Sr. Project Archaeologist will make a preliminary assessment and the Leq'á:mel First Nation Lands & Resources Department will be contacted. If the cultural remains are deemed significant, the Provincial Archaeology Branch will also be notified, upon approval of Leq'á:mel First Nation.

(7) IDENTIFYING ARCHAEOLOGICAL/HERITAGE RESOURCES

Definition: For purposes of simplicity for current investigations, archaeological heritage resources include archaeological sites, features, objects, or other evidence of human occupation or human use before 1846 (*Heritage Conservation Act, 1996, Section 13(2)-d*), including, but not limited to artifacts, lithic materials, and cultural features, such as cache pits, roasting pits, house features, anthropogenic deposits, and evidence of human remains, examples of which are presented in Appendix 2. It is acknowledged that Cultural Heritage Resources also include cultural resource sites and materials of importance to local First Nation peoples, such as traditional use sites, historic artifacts, such as net-sinkers, culturally-modified trees, and other post-1846 cultural resources identified as important to First Nation peoples, some of which on-site contractors may not be familiar with.

(8) Archaeological Sites Protection

Archaeological sites in British Columbia are protected under the *Heritage Conservation Act [RSBC 1996] Chapter 187.* They cannot be disturbed, whether located on Crown lands or private property. Archaeological sites and Cultural Heritage Resources on First Nation lands, notably Indian Reserves, are not protected under provincial legislation, although many Nations have agreed to recognize provincial regulations, whereas others have developed their own Cultural Heritage Resources Policies and CHRM Protection Protocols.

Regarding the proposed Sediment Basin Project, all remediation activities are within the boundaries of Lakahahmen IR 11. It should also be noted there is a cemetery bordering Deroche Creek at the northwest corner of IR 11. Some remediation activities are to occur in this area and the team assembled for the Phase 2 Spillway Clearing & Excavation component of the Deroche Creek Reach 3 Development Project will be involved in Project Works in this area. This Chance Find Procedure will apply to any Project works in this area, as well as construction activities associated with the two Deflection Berms and additional embankment stabilization activities.

Some associated remediation activities for the greater Deroche Creek Reach 3 Development Project are located 'off-reserve'. Prior to any works occurring in these areas, a Provincial Heritage Investigation Permit will be required. For purposes of this Chance Find Procedure, the procedures outlined below are to be followed, if previously unknown archaeological/heritage resources are identified, exposed, or found during the life of the Project.

(9) Leq'á:mel First Nation Protocols in the Event of a Chance Find

a) In the event of a Chance Find discovery, all Project Works in the vicinity of the cultural heritage resource find will stop, until such time that a formal archaeological assessment is made by the Sr. Project Archaeologist and designated Leq'á:mel First Nation representatives. The Leq'á:mel Lands & Natural Resources Department and the General Contractor will both be notified, following a preliminary assessment by the Sr. Project Archaeologist.
    - A minimum 5 meter-diameter buffer-zone of the Chance Find will be implemented.

- This area will be flagged until a detailed assessment can be completed.

b) The Project's Site Superintendent(s) will acknowledge any assessment made by Field Technicians.

c) All on-site Contractors will respect Leq'á:mel First Nation heritage policies/protocols regarding Chance Find discoveries.

d) Leq'á:mel First Nation understands that Chance Find discoveries can seriously delay Project Works, depending on the nature of the Chance Finds. Discovery of Chance Finds may require a formal archaeological assessment (AIA), possibly including a Heritage Investigations Permit from the Provincial Government for areas not located 'on-reserve' (normally a minimum 6-month approval process), which could result in extensive archaeological investigations at the Project site.

e) In the event of a Chance Find, the Sr. Project Archaeologist will provide Leq'á:mel First Nation, the General Contractor and senior Project representatives with a detailed Chance Find Assessment, in collaboration with First Nation Field Technicians.
   - This assessment will include recommended mitigation alternatives, taking into consideration relevant First Nation community heritage policies/protocols.

(10) PROCEDURES TO BE FOLLOWED IN THE EVENT OF DISCOVERING WHAT MAY BE HUMAN REMAINS

a) If human remains, or what appear to be human remains, are encountered, all work on site will cease until such time that a comprehensive assessment is made and meaningful consultations with Leq'á:mel First Nation leadership occurs. Human remains will not to be handled, moved, or exhumed, until appropriate mitigation measures are approved by Leq'á:mel First Nation leadership (cultural & political), including LFN Lands & Resources Department.

b) Leq'á:mel First Nation leadership, including Leq'á:mel Lands & Resources Department, the General Contractor, all subcontractors working on-site, and appropriate Government representatives, will be notified immediately of the discovery of human remains and informed of Stop Work protocols and procedures.

c) Appropriate mitigation measures will be determined through negotiations between Leq'á:mel First Nation, Project representatives, including the Project Archaeologist and other qualified specialists, possibly including the Archaeology Branch.

d) In the event human remains are found, all on-site contractors will be sensitive to Leq'á:mel First Nation concerns and will recognize all Leq'á:mel cultural and spiritual protocols, which may be very different from mainstream protocols, regarding the handling & treatment indigenous human remains.

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FIGURE 1: DEROCHE CREEK PROPOSED SPILLWAY LOCATION

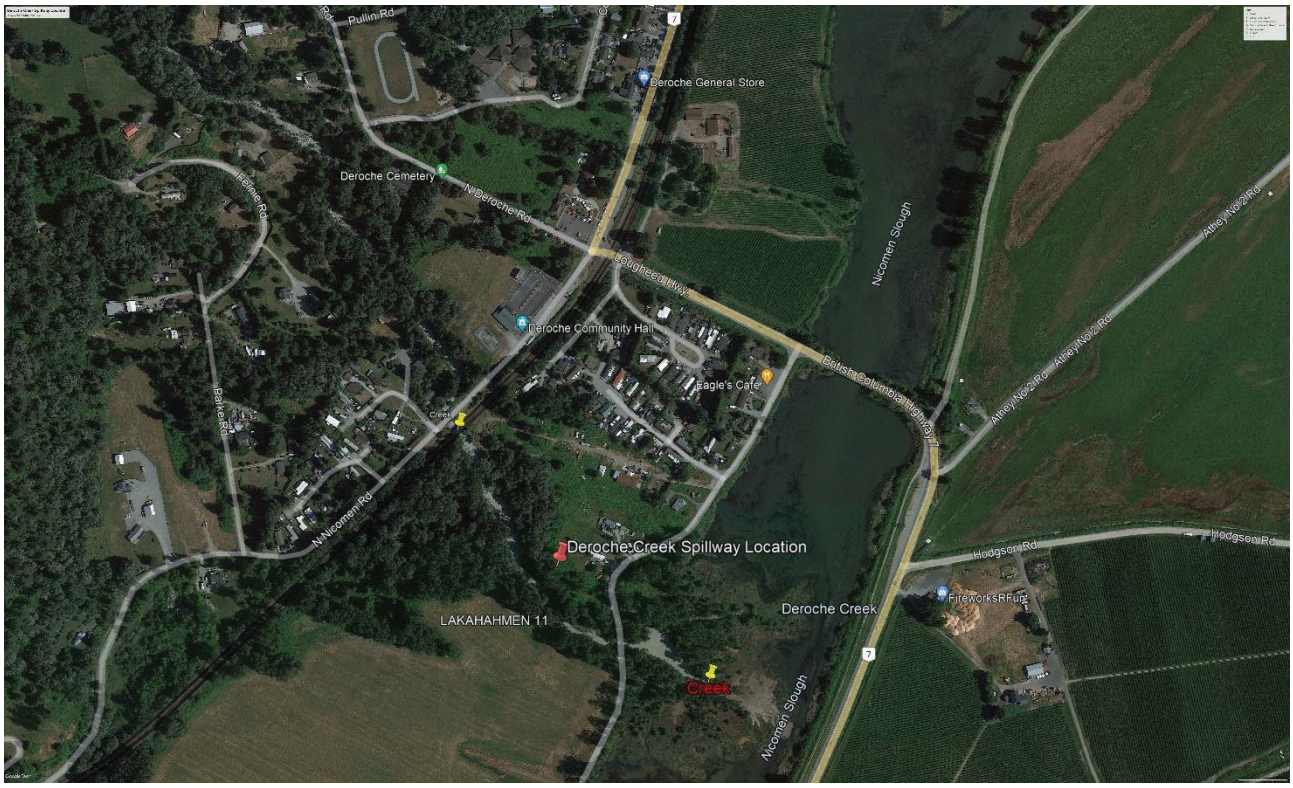
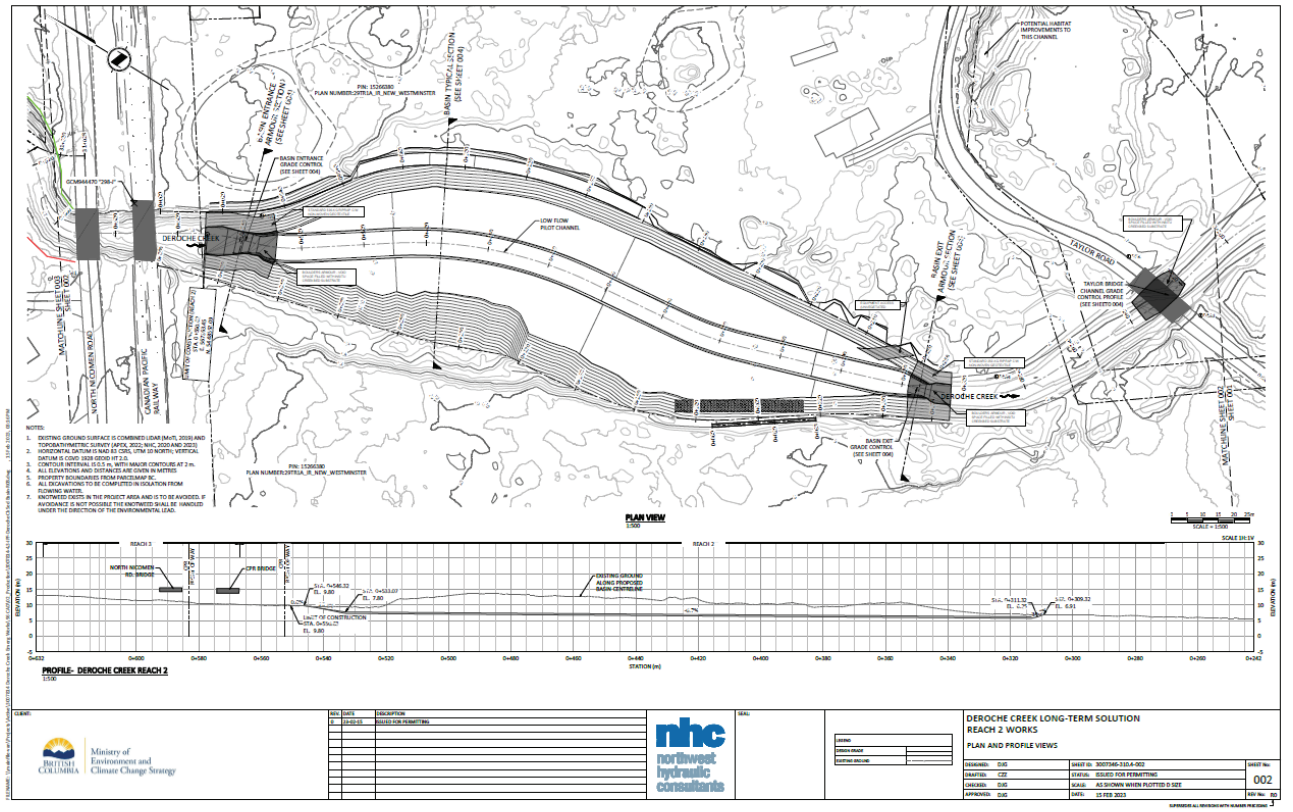
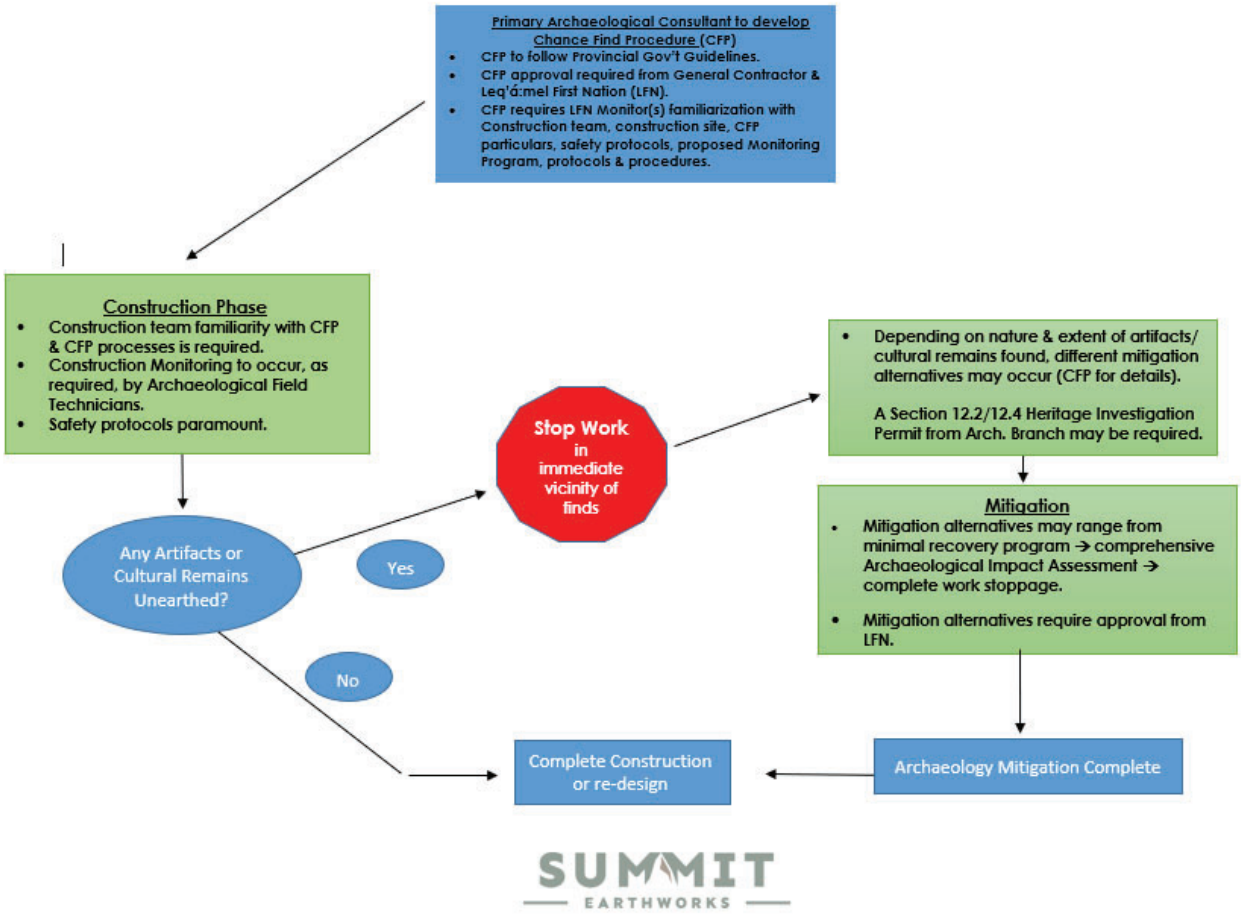


FIGURE 2: PROPOSED SPILLWAY DESIGN PLAN



APPENDIX 1

Deroche Creek Sediment Basin Archaeology CFP Flow Diagram



APPENDIX 2
WHAT TO LOOK FOR:
Common Visible Identifiable Features

The following are characteristics typical of cultural heritage & archaeological sites found within Stó:lō Region.

(a) Artifacts & Artifact Scatters:

Example of Artifact Scatter from beach on Fraser River at d'Herbomez Creek (below St. Mary's) and a large basalt biface found near Nelson Park (currently in Mission Museum)





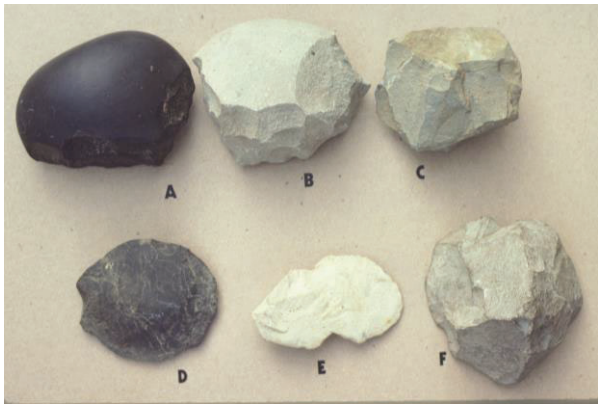
(b) Example of Ground stone artifacts

kw'éts'tel (slate fish knives), t'emq'ethel (jade adze), and tótesem (grinding stone)





(c) Cobble tools & Projectile Points (bifaces) from Xá:ytem (Hatzic Rock Site)



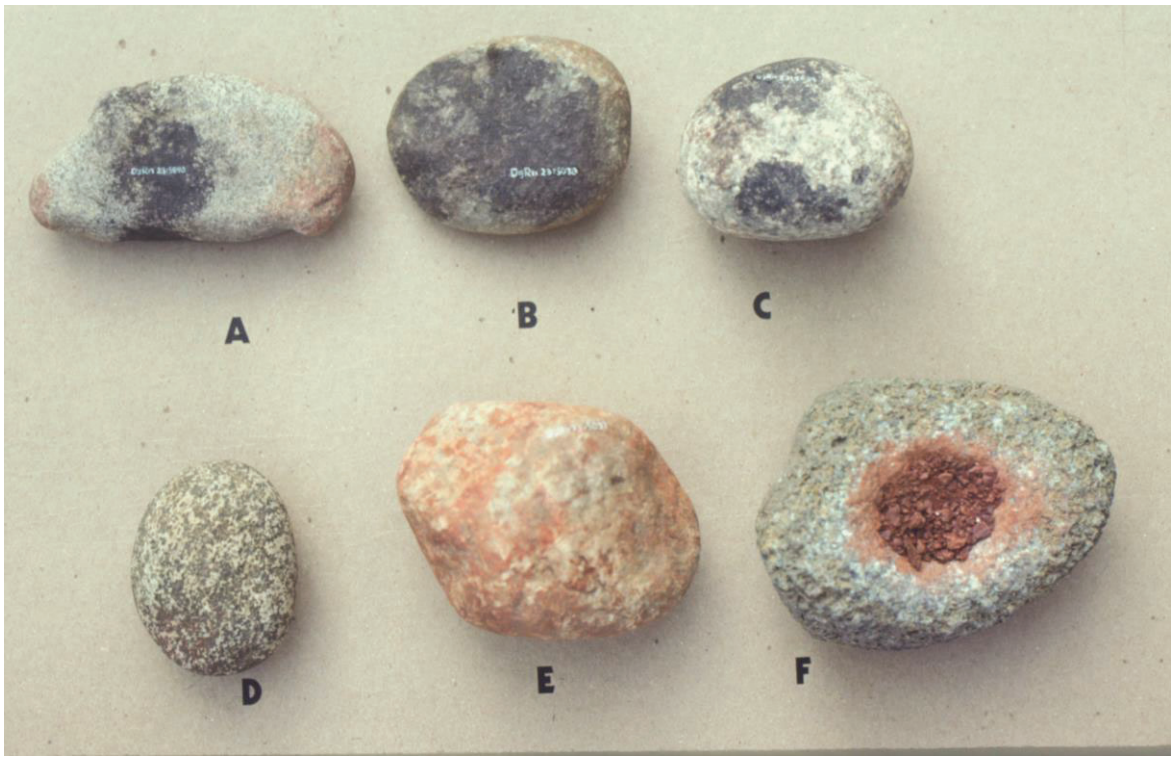


(d) More Xá:ytem Artifacts

Cobble tools, hammer stones, paint stones, stone club, boiling stones, projectile points, obsidian



(e) Paint Stones Xá:ytem (Hatzic Rock Site)



(f) Exotic Artifacts from the Hatzic Rock Site & Hatzic Lake

Obsidian (from Oregon), a segmented stone (earliest art in region) and a stone bowl (spiritual use)

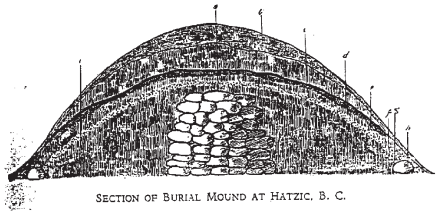




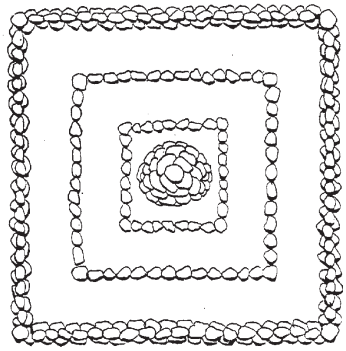


(g) Examples of Burial Mounds excavated by Charles Hill-Tout 1895

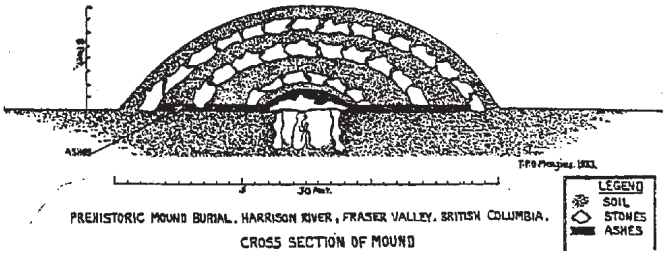
Image on left: burial mound excavated at Hatzic (near Shook Road).
Image on right: burial mound excavated at Harrison River (across from Sasquatch Inn).



SECTION OF BURIAL MOUND AT HATZIC, B. C.



PLAN OF BURIAL MOUNDS



Artifacts found by Hill-Tout (Hatzic) (currently in Royal BC Museum)





(h) Examples of Burial Mounds: Scowlitz (near Williams Reserve) at Mouth of Harrison River




Ancestral Burial Mound 1: Scowlitz at Mouth of Harrison River

***Mound 1: included over 3 tonnes of stone in complicated alignments encasing a middle-aged man with numerous exotic artifacts, including copper, over 7,000 dentalia shell beads, haliotis & abalone shell.




Artifacts associated with burial mounds

Left photo… sawn dentalia shell beads (from Nootka Sound), Copper (origin unknown), abalone (California)




Right photo… sawn stone beads, obsidian (Oregon), amber, crystal, and other tools…

(i) Cultural Depressions

Any depression seen on the ground surface that appears to have been excavated can be a cultural feature of archaeological and cultural historical significance. These “pits” were dug for a variety of reasons such as for food storage, food processing, cooking, roasting, or as a foundations for dwellings. These features can range in size from under a meter to over 10 meters in diameter, and are usually found associated with other artifacts such as hearths, fire broken rock and lithic scatters.

…below is a large cultural depression located at John Mac Slough, Sts’ailes

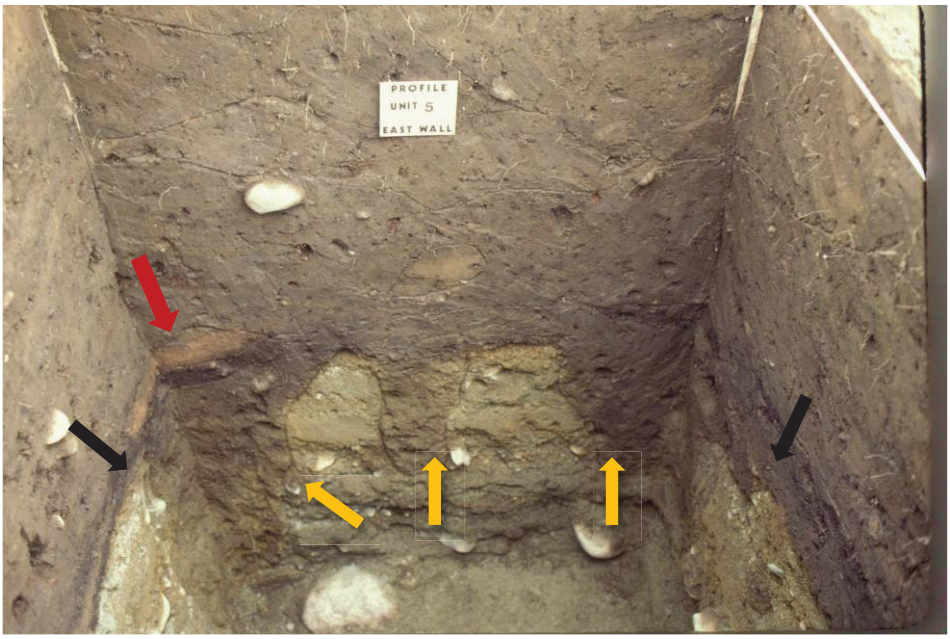


(j) Subsurface Stratigraphy what to look for:

Here is a bench feature in an underground house (sqémél) situated above river gravels.



Below: here we have 3 house post impressions (yellow arrows, the wood has decomposed), a hearth (red arrow) with orange-stained (burnt) soil & charcoal, and a house floor (black arrows) on sterile gravel deposits.



Fire Broken Rock, boiling stones, and Hearth features: Fire-broken rock (FBR) results from the use of fire during cooking, heating and processing activities, characterized by jagged edges and usually charcoal. Boiling stones are usually small, flat, rounded stones that are heated in a fire and dropped into a water-tight basket which has food to be cooked. Hearth features include old fires often characterized by black & orange/red-stained soils, charcoal and FBR.

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Deroche Creek Sediment Basin
Archaeological Assessment Project
Field Technician Orientation & Training Program

OVERVIEW

A comprehensive Field Technician and Equipment Operator Orientation & Training Program was developed by Summit Earthworks resident archaeologist, Gordon Mohs M.A. There were several components to this:

1. Overview of Deroche Creek Sediment Basin Archaeological Assessment Project 2023/2024.
2. Development & acquisition of Leq'á:mel First Nation Investigations Permit
3. Field Technician Meeting Outline.
4. Development of Chance Find Procedures (CFP) in the event that cultural historical artifacts and/or features were discovered in the course of field investigations.
5. CFP Orientation PowerPoint
6. Field Technician Monitoring Procedures & Protocol Development.
7. Orientation to local archaeological finds.
8. Field Monitoring Documentation and Field Technician orientation to field supplies and investigation protocols.
9. Safety Protocols.
10. Field Orientation Outline.

An Archaeological Technician Training Program occurred at the Leq'á:mel First Nation (LFN) Lands Department Office at 43101 Lougheed Highway, Deroche BC (V0M-1G0) October 4, 2023. In attendance were LFN Guardians: Erik Still, Melissa Friesen, Jason Thompson, and Guardian Coordinator Tina Pederson. Summit Earthworks Excavator Operator Brent Vanraamsdonk was also in attendance but a late arrival. Additional coaching with Brent occurred on site. LFN Guardian Megan Friesen, missed the formal training session at the Lands Office but was subsequently coached on-site. Erik and Megan were the primary Field Technicians for the duration of fieldwork between October 4 – 12.

1. **Field Technician Meeting**
    a. LFN Lands Department representatives (identified above) met Sr. Project Archaeologist, Gordon Mohs. A primary goal was introductions to one another and to review the 10 components of the Training/Orientation Program set out above.

2. **Field Technician Overview of Deroche Creek Sediment Basin Archaeological Assessment Project 2023/2024.**
    a. Project background information outlined re nature of work that occurred within Deroche Creek in 2022, notably in-stream work involving the removal of gravels, associated with Atmospheric River events of 2021 and relation to current Project.
    b. The scope of current Project outlined, including full scope of the proposed Sediment Basin and the reasons for an archaeological assessment.
    c. 2-Phase Archaeological Assessment outlined:
        - Phase 1: Current Assessment following surface grubbing and clearing of Sediment Basin area.
        - Phase 2: Future Archaeological Monitoring during deep excavation of Sediment Basin and with construction of other Project features (e.g., Berms).
    d. Long-Term Solution Deroche Creek Site Maps presented.
    e. Other components of the proposed Sediment Basin presented, including migrating birds, tree & stump removal.
    f. Other cultural features (e.g., cemetery) discussed.

3. **Leq'á:mel First Nation Heritage Investigations Permit**
    a. Leq'á:mel First Nation Heritage Investigations Permit (LFNIUP# 2023-003, October 2, 2023) reviewed with Guardians with focus on Schedule A 'Terms & Conditions.

4. **Deroche Creek Sediment Basin Chance Find Procedures (CFP)**
    a. Comprehensive Review of Chance Find Procedure document & Project Overview via PowerPoint with focus on Field Technician Authority to implement Work Stoppages. Brent also familiarized with process and Guardian authority.
    b. Review Field Technician responsibilities
    c. Review Deroche Creek Sediment Basin Archaeological Assessment Flow Diagram regarding potential outcomes.
    d. Hardcopy of CFP provided to Lands Department.

5. **Field Technician CFP Monitoring Procedures & Protocols**
    a. Field Technician review & familiarization with CFP Monitoring Procedures Document
    b. Field Technician review and familiarization with CFP Monitoring Forms
        - *forms were not needed with site investigations.
    c. Field Technician & Excavator Operator review of Site-Specific Health & Safety requirements.

d. Guardians & Excavator Operator informed that a copy of the LFN Heritage Investigations Permit, Chance Find Procedures & H&S Binder to remain on site at all times during permitted investigations.
e. Guardians informed that LFN Guardians presence was required on-site at all times during brushing, clearing & archaeological inspections.
f. A 'field-binder' was prepared containing copies of all relevant documents relating to investigations at the site.

6. Field Technician Familiarization with Local Archaeological Finds

a. This was a hands-on experience to familiarize Guardians with archaeological finds from the Fraser River shoreline at d'Herbomez Creek (adjacent the Mission Visitor Centre located below the St. Mary's Heritage Park).
    - Hands-on experience was very beneficial in familiarizing Guardians with scope of archaeological artifacts to look for at the site.

7. Archaeological Field Materials & Supplies

a. Field Technicians were presented with two archaeological Marshalltown pointing trowels. Both were partially sharpened with a good flat-blade file.
b. Trowel purposes were outlined: notably that they are used to clean-up excavation wall profiles to get better idea of subsurface sediment/soil layers in areas excavated (illustrated in CFP and PowerPoint).



c. Field Technicians were provided with flagging tape and metal tent stakes for marking the position of any artifacts identified in the field.
d. Laminated Field Maps presented to Guardians.

8. Site Orientation

a. Following the Boardroom Training Session, the LFN Guardians were provided a comprehensive site orientation, which was primarily a mapping exercise. A 5-meter rope-chain was prepared during the Lands Department Training session, but this quickly proved inadequate for locating the site flag-pegs bordering the east boundary of the Sediment Basin, which were apparently placed every 20 meters up-creek (north) of the Taylor Road bridge over Deroche Creek.

b. Erik macheted his way thru the blackberry jungle and eventually found the first peg on the floodplain east of Deroche Creek located at (0+280 meters).

c. Brent moved the excavator onto the dike immediately north of Taylor Road on the east bank (left bank) of Deroche Creek, then he and Erik investigated the north end of the Sediment Basin to determine which would be the better approach for the excavator. At the north end of the Sediment Basin, Erik and Brent found two stakes. It was decided it was best to begin clearing and grubbing at the south end of the proposed Sediment Basin.

d. On day 2, October 5th, an attempt at GIS Mapping utilizing Avenza Mapping failed. The following morning Gordon purchased 50meters of cotton rope and with the help of Megan Friesen marked off the rope in 5-meter lengths with pink flagging tape. This enable a fairly quick means to identify 'flagging stakes' along the entire eastern boundary of the proposed Sediment Basin, which made clearing and grubbing so much easier for Brent and his excavator. The 'rope-chain' is an old archaeological technique used by BC Field Archaeologist and it proved extremely valuable in identifying features on site. Erik and Megan became quite proficient utilizing the rope-chain on site.

***

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Appendix G

Environmental & Regulatory Approval Documents/Permits

KERR WOOD LEIDAL ASSOCIATES LTD.
consulting engineers

Request for Review

Please note that Guidance on Submitting a Request for Review is available at the end of this form. This guidance explains the requirements for a Request for Review by DFO under the fish and fish habitat protection provisions of the *Fisheries Act*. All information requested must be provided. If you attach documents to your application with additional information, you must still provide appropriate summaries in the spaces provided on the application document or your application will be considered incomplete.

A) Contact information

Name of Business/Company:

Ministry of Environment and Climate Change Strategy

Name of Proponent:

c/o Gulraiz Cheema, Senior Project Manager
Flood Debris Management Secretariat

Mailing address:

PO Box 9360 Stn Prov Govt

City/Town:

Victoria

Province/Territory:

British Columbia

Postal Code:

V8W 9M2

Tel. No. :

778-704-7278

Fax No.:

Email:

gulraiz.cheema@gov.bc.ca

Select additional contact:
Contractor/Agency/Consultant *(if applicable):*

Kerr Wood Leidal Associates Ltd. (KWL)

Mailing address:

200-4185A Still Creek Dr

City/Town:

Burnaby

Province/Territory:

British Columbia

Postal Code:

V5C 6G9

Tel. No. :

604-862-3390

Fax No.:

Email:

jkwo@kwl.ca

Is the Proponent the main/primary contact? ○ Yes ◉ No

**All definitions are provided in Section G of the Guidance on Submitting a Request for Review*

If no, please enter information for the primary contact or any additional contact.

Janice Kwo, R.P.Bio
Kerr Wood Leidal Associates Ltd.
jkwo@kwl.ca
604-862-3390

Patrick Lilley, R.P.Bio.
Kerr Wood Leidal Associates Ltd.
plilley@kwl.ca
604-812-2578

B) Description of Project

If your project has a title, please provide it.

Deroche Creek Sediment Long-Term Solution Project

Is the project in response to an emergency circumstance*? ○ Yes ◉ No

Does your project involve work in water? ◉ Yes ○ No

If yes, is the work below the High Water Mark*? ◉ Yes ○ No

What are you planning to do? Briefly describe all project components you are proposing in or near water.

The Deroche Creek Sediment Long-Term Removal Project (the Project) will address sediment accumulation and erosion concerns in the lower kilometer of Deroche Creek upstream of Nicomen Slough. Accumulated material has the potential to create channel erosion, road flooding, and infrastructure damage in the Leq'a:mel First Nation (Leq'a:mel FN) community located within Lakahahmen IR 11 and the neighbouring properties near Deroche in the Fraser Valley Regional District (FVRD). Emergency sediment removal was conducted in November 2022 to remove sediments introduced by the 2021 Atmospheric River Event (ARE) and repair bank erosion. The Project aims to provide a long-term solution to the sediment accumulation in Deroche Creek to mitigate future impacts on infrastructure and salmon habitat.

The proposed Project includes the following works:
1) Excavate a new channel through the Deroche Creek sediment fan to reduce the erosional pressure on the Highway 7 embankment during high flow events. The downstream end of this channel would connect into the existing overflow channel that was constructed last year;
2) Construction of two short deflection berms on the Deroche fan, perpendicular to Taylor Road to prevent high flows from eroding the Taylor Road embankment;
3) Bank stabilization on the left bank of Deroche Creek near the Leq'á:mel First Nation Cemetery to mitigate flood risks and property damage;
4) Construction of a sediment basin in Reach 2 to increase area available for sediment deposition and reduce infilling and smothering of spawning habitat downstream; and
5) Installation of a grade control structure under Taylor Road Bridge.

How are you planning to do it? Briefly describe the construction materials, methods and equipment that you plan to use.

1) New Channel
The new channel through the alluvial fan will be constructed in the dry. A small amount of material will be left at the upstream end of channel so that the Nicomen Slough can naturally breach during higher flows.

2) Deflection Berms
A small amount of vegetation will need to be removed to allow machine access from Taylor Road and within the foot print of the berms. Construction will occur during low flows when the area is dry. Fill for the berms will be placed by machine, and rip rap will be placed on the ends of the berms. Berms will be replanted with native riparian plant species and rip rap will be staked. Any cleared trees will be placed between the berms for fish cover during high water conditions.

All definitions are provided in Section G of the Guidance on Submitting a Request for Review

3) Bank Stabilization
Riparian vegetation along the machine access path from North Nicomen Road will be removed. Banks of the sediment basin will be stabilized using rip rap filled with appropriate growing substrate for vegetation. Cleared areas will be replanted with native riparian plant species, live stakes will be installed in the rip rap, and the site will be returned to its original conditions, taking advantage of opportunities for habitat enhancement.

4) Sediment Basin
Vegetation will be removed for access path from Taylor Road to the downstream extent of the sediment basin and on east bank of Deroche Creek within the basin footprint. Exclusion fencing will be installed around the construction area to prevent fish access; all fish, amphibians, and mammals will be salvaged from enclosed site. The footprint of the sediment basin will be excavated and graded. The west bank of Deroche Creek will act as the west wall of the sediment basin, therefore no excavation is proposed west of Deroche Creek. A low flow channel will be established to the east of the existing channel and will be lined with gravels and root wads will be installed to provide fish cover. Construction will occur in the dry and flows will be diverted into this channel when construction is complete. Banks of the sediment basin will be stabilized using rip rap filled with appropriate growing substrate for vegetation. The area to the east of the sediment basin will be planted with native riparian plant species and the banks of the basin will be planted with live stakes.

5) Taylor Bridge Grade Control

The work site will be isolated from flow and dewatered so that works can be conducted in the dry. Flow will bypassed around the work area. Sediment will be excavated to subgrade, boulders will be placed in a checkerboard pattern, and voids between boulders will be filled using excavated sediment. Access area will be seeded and replanted with native shrubs.

Include a site plan (figure/drawing) showing all project components in and near water.

Are details attached? (•) Yes ( ) No

Identify which work categories apply to your project.

- [ ] Aquaculture Operations
- [ ] Aquatic Vegetation Removal
- [ ] Beaches
- [x] Berms
- [ ] Blasting / Explosives
- [ ] Boat Houses
- [ ] Boat Launches / Ramps
- [ ] Breakwaters
- [ ] Bridges
- [ ] Cable Crossings
- [ ] Causeways
- [ ] Culverts
- [ ] Dams
- [ ] Dewatering / Pumping
- [ ] Docks
- [x] Dredging / Excavation
- [ ] Dykes
- [ ] Fishways / Ladders
- [ ] Flow Modification (hydro)
- [ ] Groundwater Extraction
- [ ] Groynes
- [x] Habitat Restoration
- [ ] Log Handling / Dumps
- [ ] Log Removal
- [ ] Moorings
- [ ] Open Water Disposal
- [ ] Piers
- [x] Riparian Vegetation Removal
- [ ] Seismic Work
- [x] Shoreline Protection
- [ ] Stormwater Management Facilities
- [ ] Surface Water Taking
- [ ] Tailings Impoundment Areas
- [ ] Temporary Structures
- [ ] Turbines
- [ ] Water Control Structures
- [ ] Water Intakes / Fish Screens
- [ ] Water Outfalls
- [x] Watercourse Realignment
- [ ] Weirs
- [ ] Wharves
- [ ] Wind Power Structures

**All definitions are provided in Section G of the Guidance on Submitting a Request for Review*

☐ Ice Bridges

☒ Other Please Specify: Sediment Basin

Was your project submitted for review to another federal or provincial department or agency? ◉ Yes ○ No

If yes, indicate to whom and associated file number(s).

A Water Sustainability Act (Section 11) Change Approval for Works In and About a Stream is also being submitted to Ministry of Forests for this project. DFO and provincial fish salvage permits and a provincial wildlife salvage permit will also be obtained. As the project is primarily located on First Nations land, the project is also being submitted to Leq'á:mel First Nation for their review and approval.

C) Location of the Project

Coordinates of the proposed project Latitude _____ N Longitude _____ W

OR UTM zone 10U ; 567551 Easting

5448285 Northing

Include a map clearly indicating the location of the project as well as surrounding features.

Name of Nearest Community (City, Town, Village): Deroche

Municipality, District, Township, County, Province: British Columbia

Name of watershed (if applicable): Deroche Creek

Name of watercourse(s) or waterbody(ies) near the proposed project: Deroche Creek

Provide detailed directions to access the project site:

From Highway 7 (Lougheed Highway) immediately north of the Nicomen Slough Bridge, head west on Taylor Road for approximately 200 m.

D) Description of the Aquatic Environment

Identify the predominant type of aquatic habitat where the project will take place.

○ Estuary (Estuarine)
○ Lake (Lacustrine)
○ On the bank/shore at the interface between land and water (Riparian)
◉ River or stream (Riverine)
○ Salt water (Marine)
○ Wetlands (Palustrine)

All definitions are provided in Section G of the Guidance on Submitting a Request for Review

Provide a detailed description of biological and physical characteristics of the proposed project site. This description should include information on aquatic species at risk* (https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html), their residence* and critical habitat* if found in the area. An overview of the distribution of aquatic species at risk and the presence of their critical habitat within Canadian waters can be found here http://dfo-mpo.gc.ca/species-especes/sara-lep/map-carte/index-eng.html

There were no observations of fish in Deroche Creek or Nicomen Slough during the site visit in March. In the fall of 2022, spawning chum and coho were observed in the lower reaches of Deroche Creek (below the CP Rail bridge). Rearing salmon fry have also been observed in Deroche Creek. The assessed area does not contain critical habitat for any aquatic species protected under Schedule 1 of Canada's Species at Risk Act.

Reaches 1 and 2a (see attached map for reach delineation) are located within the footprint of the Emergency Sediment Removal project which occurred in Fall 2022. Sediment deposition, minor bank erosion, and intermittent flows were observed in these areas. Flows went subsurface approximately 15 meters above Taylor Road and resurfaced approximately 50 meters downstream of Taylor Road. Sediment deposition was also observed at the southeast edge of the alluvial fan, which appears to have caused the flow path of Nicomen Slough to undercut the embankment of Highway 7.
The main channel of Deroche Creek was more defined in Reaches 2b and 3 with no intermittency. The morphology ranged from shallow riffle-glide sequences in Reach 2b to riffle-cascade sequences in Reach 3. There were many disturbance indicators and flood signs throughout these reaches including cut eroding banks, uprooted vegetation, large sediment deposits, and little to no pool area.
Suitable spawning substrate and flow for chum and coho were observed in all three reaches of the assessment area. However, based on site visit observation, Deroche Creek is an unstable system, and the frequent movement and deposition of sediment poses a high risk of sedimentation of any viable spawning sites. Please refer to attached report for more details and site photos.

Include representative photos of affected area (including upstream and downstream area) and clearly identify the location of the project.

E) Potential Effects of the Proposed Project

Have you reviewed the Pathways of Effects (PoE) diagrams (http://www.dfo-mpo.gc.ca/pnw-ppe/pathways-sequences/index-eng.html) that describe the type of cause-effect relationships that apply to your project?

(●) Yes ( ) No

If yes, select the PoEs that apply to your project.

- ☐ Addition or removal of aquatic vegetation
- ☒ Change in timing, duration and frequency of flow
- ☐ Cleaning or maintenance of bridges or other structures
- ☐ Dredging
- ☒ Excavation
- ☐ Fish passage issues
- ☒ Grading
- ☐ Marine seismic surveys
- ☐ Organic debris management
- ☐ Placement of marine finfish aquaculture site
- ☒ Placement of material or structures in water
- ☒ Riparian Planting
- ☐ Streamside livestock grazing
- ☐ Structure removal
- ☐ Use of explosives
- ☒ Use of industrial equipment
- ☒ Vegetation Clearing
- ☐ Wastewater management
- ☐ Water extraction

Will there be changes (i.e., alteration) in the fish habitat*? (●) Yes ( ) No ( ) Unknown

If yes, provide a description.

For a detailed description of potential effects on fish and fish habitat, please refer to Section 4 of the attached report.

Is there likely to be a harmful alteration, disruption or destruction of habitat used by fish? ( ) Yes (●) No ( ) Unknown

Is there likely to be destruction or loss of habitat used by fish? ( ) Yes (●) No ( ) Unknown

All definitions are provided in Section G of the Guidance on Submitting a Request for Review

What is the footprint (area in square meters) of your project that will take place below the high water mark*?

5,910

Is your project likely to change water flows or water levels? (•) Yes ( ) No ( ) Unknown

If your project includes withdrawing water, provide source, volume, rate and duration.

N/A

If your project includes a water control structure, provide the % of flow reduction.

N/A

If your project includes discharge of water, provide source, volume and rate.

N/A

Will your project cause death of fish? ( ) Yes (•) No ( ) Unknown

If yes, how many fish will be killed (for multi-year project, provide average)? What species and lifestages?

N/A

What is the time frame of your project?

The construction will start on 02/01/2024 and end by 12/31/2024

If applicable, the operation will start on N/A and end by N/A

If applicable, provide schedule for the maintenance

If applicable, provide schedule for decommissioning

N/A

Are there additional effects to fish and fish habitat that will occur outside of the time periods identified above? (•) Yes ( ) No

(If yes, provide details)

All works will result in the permanent placement of structures or materials below the high water mark.

Can you follow appropriate Timing Windows (http://www.dfo-mpo.gc.ca/pnw-ppe/timing-periodes/index-eng.html) for all your project activities below the High Water Mark*? (•) Yes ( ) No

(If no, provide explanations.)

Vegetation clearing and riparian planting and work outside of the stream channel may occur outside of the window, but all in stream works will occur between August 1, 2024 and September 15, 2024, with extension to September 30, 2024 if required

Have you considered and incorporated all options for redesigning and relocating your project to avoid negative effects to fish and fish habitat?

(•) Yes ( ) No

If yes, describe.

This project cannot be relocated because the goal is to address the sediment issues at this particular area of Deroche Creek.

All definitions are provided in Section G of the Guidance on Submitting a Request for Review

Have you consulted DFO's Fish and Fish Habitat Protection Measures Habitat (https://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures-eng.html) to determine which measures apply to your project? (●) Yes ( ) No

Will you be incorporating applicable measures into your project? (●) Yes ( ) No

If yes, identify which ones. If No, identify which ones and provide reasons.

-Protection of fish
-Protection of fish passage
-Protection of the riparian zone
-Protection of fish habitat from sedimentation
-Protection of fish and fish habitat from deleterious substances

Have you considered whether DFO standards and codes of practice apply to your project? ( ) No (●) Yes

If Yes, include a list.

Timing
• Instream work will occur within the least risk window for Cutthroat Trout and Pacific salmon in the Lower Mainland (August 1 to September 15) (MOE 2006).
• Project works will be scheduled for dry weather conditions whenever possible to reduce risk of erosion and sedimentation of Deroche Creek.
• Project works will be completed as quickly as possible.
Site Access
• Access to the work areas will be planned to minimize disturbance to the riparian vegetation and utilize one access route whenever possible.

Fish and Fish Habitat Protection and Pollution Prevention
• Measures to avoid death of fish include:
o If required, site isolation and a fish salvage will be carried out by a QEP at the sediment basin site and the Taylor Bridge grade control site prior to any instream work. Other works will be completed in the dry.
o Fish salvage operations will be completed according to the appropriate fish collection permit and Fish Collection Methods and Standards (Resource Inventory Committee, 1997). This may include humane euthanasia of any invasive species captured.
o Salvaged fish (native species) will be released downstream of the project site.
o Pumps utilized for dewatering of the site will be screened in accordance with the DFO Interim Code of Practice: End-of-pipe fish protection screens for small water intakes in freshwater with screen material not exceeding 2.54 mm openings (DFO 2020b).

• Measures to manage surface water and sediment include:
o Erosion and sediment control (ESC) measures (e.g., straw wattles, silt fencing) will be installed as required during construction work to keep silt, sediment, turbid water, and all other deleterious substances from entering Deroche Creek and the Nicomen Slough. Measures will be monitored regularly by a Qualified Environmental Professional (QEP) and maintained until all disturbed ground has been stabilized.
o All excavated will be located in an area to prevent the release of any sediment into Deroche Creek and Nicomen Slough.
o Plastic sheeting will be used to temporarily cover any stockpiles of material if sediment migration is anticipated or if precipitation events are likely.
o All exposed sloped areas will be seeded to stabilize areas of exposed soil upon completion before riparian planting in late autumn.
o The pilot channel in the alluvial fan will be excavated in the dry.
o Sediment basin works will be constructed in the dry.

• Measures to control and manage deleterious substances include:
o Before arrival on site, all equipment and machinery will be in good working condition and free of leaks, excess oil, and grease.
o Equipment (e.g., excavator) will operate primarily in the vicinity of the pond and not enter the Salmon River.
o Biodegradable hydraulic fluids will be used by construction equipment operating in the vicinity of the pond or connection channel.
o Equipment refuelling, washing, and servicing locations will be sited at least 30 m or more from the high water mark of the Salmon River and pond.
o A spill kit will remain on site during construction. Staff will be trained in the proper use of the kit. Any spill of a toxic or deleterious substance over the reportable limits as outlined in the Ministry of Environment and Climate Change Strategy Spill Reporting Factsheet (MOE, 2019) will be reported immediately to the BC Provincial Emergency Program 24–hour phone line at 1-800-663-3456. If a spill of toxic or deleterious substances occurs within a watercourse or waterbody both MFLNRORD and DFO will be notified immediately. All spills will be reported to the QEP immediately.

**All definitions are provided in Section G of the Guidance on Submitting a Request for Review*

o Generators, pumps, and other stationary equipment will be placed on spill trays when located less than 30 m away from the high water mark of Deroche Creek and Nicomen Slough.

Wildlife Protection
• Encountering species at risk is not anticipated at the Project site. However, upon project start up the QEP will determine whether the installation of exclusion fencing (e.g., silt fencing) is required. Following the installation of exclusion fencing, the Project area will be surveyed for presence of any wildlife including species at risk (e.g., Pacific Water Shrew, Red-Legged Frog, Oregon Forestsnail). Any wildlife encountered will be handled and relocated outside of the exclusion area following species-specific BMPs where available.
• Vegetation removal is proposed for outside the general nesting period for the South Coast of BC (1 April to 15 August).
• The EM will be notified of any wildlife sightings at the Project site.

Invasive Species Management
• All equipment and machinery will be clean and visually inspected for invasive species and noxious weeds, before arriving on and leaving the site.
• All disturbed areas will be seeded with a native grass seed mix until redevelopment of the property occurs.

Site Restoration
• All construction materials and garbage will be removed from site after the project is complete.
• Erosion and sediment control devices and measures will be removed following stabilization of all disturbed areas.
• All disturbed soil will be seeded with fall rye prior to riparian planting in the late autumn following construction.
• The contractor will be responsible for leaving the site in compliance with all Permits, Approvals, and Authorizations.

Archaeological Chance Find Management Procedure
• Should the Contractor discover any unanticipated archaeological, historical, or paleontological finds during construction, the Contractor shall cease construction activities in the affected area immediately and notify Rivershed Society of BC and the BC Archaeological Branch.
• Working under contract with KFN, Cordillera Archaeology will be completing all required permitting and an Archeological Impact Assessment to determine if protected archaeological sites are located within the proposed project area and any additional mitigation measures that may be required.

Environmental Monitoring
• An Environmental Monitor (EM), who is a QEP, will be on site for Project start-up, full-time during any instream work and periodically during other construction activity associated with the Project. Responsibilities of the EM will include, but are not limited to, the following:
o Review all permits, this AEA, CEMP, and Implementation and Effectiveness Monitoring Report and meet with the contractor before construction to explain all mitigation and environmental protection measures. Request changes as necessary;
o Inspect all mitigation and ESC measures to ensure they are appropriate and working properly.
o Have written authority to halt any construction activity if it is deemed necessary to protect fish, wildlife, and fish habitat.
o Prepare a post-construction monitoring report.
Post-construction Monitoring Report
• A post-construction monitoring report will be completed by the EM and submitted within 60 days of project completion or sooner according to conditions outlined in any issued regulatory permits (e.g., Letter of Advice issued by DFO).
• The report will include the following components as outlined in Section 5.4 of the Guidance for Applications or Notifications for Changes in and about a Stream under the Water Sustainability Act in the South Coast Region (MFLNRORD 2019) and any additional components as required by issued regulatory agencies (e.g., DFO).

Have you considered other avoidance and mitigation measures? ○ No ◉ Yes

If Yes, include a list.

N/A

All definitions are provided in Section G of the Guidance on Submitting a Request for Review

Are there any relevant measures that you are unable to incorporate? ○ Yes ◉ No

(If yes, identify which ones.)

N/A

What harmful effects to fish and fish habitat do you foresee after taking into account the avoidance and mitigation measures described above?

The following measures will be applied to the project:
• using existing trails, roads or cut lines wherever possible
• using methods to prevent soil compaction, such as swamp mats or pads
• maintain fish passage by avoiding changing flow or water level obstructing or interfering with the movement and migration of fish
• developing and implementing an erosion and sediment control plan
• installing effective erosion and sediment control measures to stabilize all erodible and exposed areas
• regularly inspecting and maintaining the erosion and sediment control measures during all phases of the project
• keeping the erosion and sediment control measures in place until all disturbed ground has been permanently stabilized
• installing settling basin and/or filtration system for water flowing onto the site and water being pumped or diverted from the site, including:
• holding back runoff water until suspended sediment has resettled in the settling basin and runoff water is clear
• disposing of and stabilizing all excavated material above the high water mark or top of bank of nearby waterbodies and ensuring sediment re-entry to the watercourse is prevented
• heeding weather advisories and scheduling work to avoid wet, windy and rainy periods that may result in high flow volumes and/ or increase erosion and sedimentation
• regularly monitoring the watercourse for signs of sedimentation during all phases of the work, undertaking or activity and taking corrective action if required
• using biodegradable erosion and sediment control materials whenever possible and removing all exposed non-biodegradable erosion and sediment control materials once site is stabilized
• operating machinery on land in stable dry areas
• stopping work and containing sediment-laden water to prevent dispersal
• limiting the impacts to stream or shoreline banks
• avoiding depositing any deleterious substances in the watercourse
• developing a response plan to be implemented immediately in the event of a spill of a deleterious substance
• keeping an emergency spill kit on site
• stopping work and containing deleterious substances to prevent dispersal
• reporting any spills of sewage, oil, fuel or other deleterious material whether near or directly into a water body
• ensuring clean-up measures are suitably applied so as not to result in further alteration of the bed and/or banks of the watercourse
• cleaning up and appropriately disposing of the deleterious substances
• planning activities near water such that materials and chemicals don't enter the watercourse
• maintaining all machinery on site in a clean condition and free of fluid leaks to prevent any deleterious substances from entering the water
• washing, refueling and servicing machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the water
• disposing all waste materials (including construction, demolition, excavation, commercial logging) above the high water mark of nearby waterbodies to prevent entry
• ensuring that building material used in a watercourse is handled and treated in a manner to prevent the release or leaching of substances into the water that may be deleterious to fish

The following applicable measures to protect fish and fish habitat will not be incorporated into the project:
• avoiding conducting any work, undertaking or activity in water
• avoiding placing fill or other temporary or permanent structures below the high water mark
• maintaining an undisturbed vegetated buffer zone between areas of on-land activity and the high water mark of any water body
• disturbing or removing materials from the banks, shoreline or waterbody bed

Do these include effects on aquatic species at risk*? ○ Yes ◉ No

If yes, please describe, including how many individuals will be harmed, harassed, or otherwise affected by the project, and how?

N/A

Do these include effects on areas identified as their residence or critical habitat? ○ Yes ◉ No

If yes, please describe

N/A

Are there any aquatic invasive species in the vicinity of your project area? ◉ Yes ○ No

(If yes, identify which ones.)

Carp (Cyprinus carpio)
Black Crappie (Pomoxis nigromaculatus)
Largemouth Bass (Micropterus salmoides)
Pumpkinseed (Lepomis gibbosus)

Does your project aim to, or will it be likely to, effect any of these aquatic invasive species? ○ Yes ◉ No

If yes, how?

N/A

F) Signature

I, Janice Kwo (print name) certify that the information given on this form is to the best of my knowledge, correct and completed.



Signature

15/09/2024
Date

Information about the above-noted proposed work or undertaking is collected by DFO under the authority of the *Fisheries Act* for the purpose of administering the Fish and Fish Habitat protection provisions of the *Fisheries Act*. Personal information will be protected under the provisions of the *Privacy Act* and will be stored in the Personal Information Bank DFO-PPU-680. Under the *Privacy Act*, Individuals have a right to, and on request shall be given access to any personal information about them contained in a personal information bank. Instructions for obtaining personal information are contained in the Government of Canada's Info Source publications available at www.infosource.gc.ca or in Government of Canada offices. Information other than "personal" information may be accessible or protected as required by the provision of the *Access to Information Act*.

**All definitions are provided in Section G of the Guidance on Submitting a Request for Review*

**All definitions are provided in Section G of the Guidance on Submitting a Request for Review*

Co-Applicant Approval Form

ge Approval and Notification (Changes In and About a Str

Date: September 29, 2023

Dear Leq'a:mel First Nation:

RE: Change Approval and Notification (Changes In and About a Stream) Application, Tracking #: 100427131

BC Ministry of Environment and Climate Change Strategy is proposing to apply for a Change Approval and Notification (Changes In and About a Stream) Application and has identified you as a co-applicant. In order for the application to be accepted by government, you are required to provide your authorization to apply as a named party.

For your approval, the following document(s) are attached to this letter:

Type of Document	Description	Filename
Drawing to Scale	Restoration Areas	2838003_Fig2_RestorationA
Drawing to Scale	Project Location	2838003_Fig1_ProjectLocat.
Engineering Drawings	75% Engineering Drawings	3007814-60-IDR-Deroche_Cl
Other	Environmental Assessment	20230915_DerocheCkLTS_EA
Other	Construction Environmental Management Plan	20230929_DerocheCkLTS_CE
Application Form	PDF of the Application Form	ApplicationForm.pdf

Please ensure that you review these materials before completing and signing this form. Once signed, this letter is to be returned to the applicant identified below as the applicant is responsible for submitting this letter as part of the application package to government.

BC Ministry of Environment and Climate Change Strategy
Gulraiz Cheema
PO Box 9360 Stn Prov Govt
Victoria British Columbia V8W 9M2
Canada

Please also review the following important notices for this application:

- I understand that the submission of this application does not provide authority under the Water Sustainability Act to construct works in and about a stream. I also understand that my application must be reviewed before a decision is made as to whether an approval may be granted and that, as part of that review, additional information may be requested of me.
- The application may be subject to further requirements under the federal Fisheries Act. Please refer to Fisheries and Oceans Canada Projects Near Water webpage (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html) for information on how to ensure your project complies with the Fisheries Act.

By signing this form, you are agreeing to the terms and conditions as specified in the application form that the applicant will be submitting on your behalf. If there are any errors, omissions, or statements you do not agree with, please advise the applicant and address your concerns through them.

If you concur with the application information, then please sign, date, and return this completed form to the applicant.

Name: Peter Pynacker
(please print)

Signature: _____ **Date:** October 4, 2023

Please verify your contact information by making any required changes.

* Legal Name of Organization		Doing Business As	
Leq'a:mel First Nation			
* Phone Number	Fax	Email	
(604) 826-7976 Ext.	**( )**	**stephen@leqamel.ca**	
Incorporation Number	Business Registration Number	Society Number	GST Registration Number
n/a	892038431	n/a	892038431 RT0001
* Contact Name			
Stephen McGlenn			
* Mailing Address			
43101 Lougheed Hwy, Deroche British Columbia V0M 1G(			
* City / Town		* Province	* Postal Code
Deroche		**BC**	**V0M 1G0**

*Items marked * are mandatory*

Application Form for the Issuance of an Authorization under Paragraphs 34.4(2)(b) and 35(2)(b) of the *Fisheries Act* (Non-Emergency Situations)

I, the undersigned, hereby request an authorization for the purpose of paragraphs 34.4(2)(b) and 35(2)(b) of the *Fisheries Act* . I understand that this authorization, if granted, is only from the standpoint of the Minister of Fisheries and Oceans in regards to the above named provisions and does not release me from my obligation to obtain permission from other concerned regulatory agencies or from other act or regulations such as *Species at Risk Act* or the *Aquatic Invasive Species Regulations*.

Texts in brackets refer to the provisions of the *Authorizations Concerning Fish and Fish Habitat Protection Regulations* (hereafter "the Regulations") or of their Schedules.

1. Applicant Contact Information

Applicant's Name:	**If applicable:** Authorized Representative's Name:
Gulraiz Cheema, Senior Project Manager Ministry of Environment and Climate Change Strategy	Janice Kwo, Biologist Kerr Wood Leidal Associates Ltd. (KWL)
Address:	Address:
PO Box 9360 Stn Prov Govt Victoria, BC, V8W 9M2	200-4185A Still Creek Dr Burnaby, BC, V5C6C9
Telephone No.:	Telephone No.:
778-704-7278	604-862-3390
Fax No.:	Fax No.:
E-mail:	E-mail:
gulraiz.cheema@gov.bc.ca	jkwo@kwl.ca

DFO File Referral No. (if known):

23-HPAC-00945

2. Checklist for Prescribed Information [schedule 1]

An applicant does not need to re-submit documents that have already been submitted to DFO for review. An applicant may reference documents such as Environmental Impact Statements, technical supplements, etc. in their application but must provide the appropriate reference to any document cited, including the chapter, section, page reference and date of submission.

Type of Information/ Documentation	Have you submitted the following? (Yes/No)	Identify the appropriate reference document: Title, Chapter, Section, Page Number and Date of Submission	DFO Comments (For official use only)
Financial Guarantee **[paragraph 2(1)(b)]**	No		
Description of Proposed work, undertaking or activity **[schedule 1, section 2]**	Yes	Deroche Creek Environmental Assessment and Offsetting Plan, Section 2.2, Page 7-8	

Project engineering specifications, scale drawings and dimensional drawings (for physical works) **[schedule 1, section 3]**	Yes	Deroche Creek Environmental Assessment and Offsetting Plan, Appendix B, Pages 49-56	
Phases and schedule information **[schedule 1, section 4]**	Yes	Deroche Creek Environmental Assessment and Offsetting Plan, Section 2.3, Page 9	
Location information **[schedule 1, sections 5& 6]**	Yes	Deroche Creek Environmental Assessment and Offsetting Plan, Section 2.1, Page 7	
Descriptions of any consultations undertaken prior to application (if any) **[schedule 1, section 7]**	Yes	BC Ministry of Environment and Climate Change Strategy -- Flood Debris Management Secretariat -- First Nations Record of Consultation	
Description of Fish and Fish Habitat (Aquatic Environment) **[schedule 1, section 8]**	Yes	Deroche Creek Environmental Assessment and Offsetting Plan, Section 3, Pages 11-13	
Description of Effects on Fish and Fish Habitat **[schedule 1, section 9]**	Yes	Deroche Creek Environmental Assessment and Offsetting Plan, Section 4, Pages 14-15	
Description of Measures and Standards to Avoid or Mitigate death of fish or harmful alteration, disruption or destruction of fish habitat **[schedule 1, section 10]**	Yes	Deroche Creek Environmental Assessment and Offsetting Plan, Section 5, Pages 16-19 Deroche Creek Construction Environmental Management Plan, Section 5, Pages 12-16	
Description of monitoring measures to assess effectiveness of measures and standards described in section 10 **[schedule 1, section 11]**	Yes	Deroche Creek Environmental Assessment and Offsetting Plan, Section 7.2, Pages 29 - 30 Deroche Creek Construction Environmental Management Plan, Section 5.1, Page 12	
Description of contingency measures that will be implemented if measures and standards (section 10) do not meet their objectives **[schedule 1, section 12]**	Yes	Deroche Creek Environmental Assessment and Offsetting Plan, Section 8, Page 37	
Description of the death of fish after measures and standards are implemented **[schedule 1, section 13]**	Yes	Deroche Creek Environmental Assessment and Offsetting Plan, Section 5.3, Page 19	
Description of the Residual harmful alternation, disruption or destruction of fish habitat after measures and standards are implemented **[schedule 1, section 14]**	Yes	Deroche Creek Environmental Assessment and Offsetting Plan, Section 5.3, Page 19	
Habitat Credits **[schedule 1, section 15]**	Yes	Deroche Creek Environmental Assessment and Offsetting Plan, Section 6.3, Page 28	
Offsetting Plan (including geographic coordinates and small scale site plan) **[schedule 1, section 16]**	Yes	Deroche Creek Environmental Assessment and Offsetting Plan, Section 6, Page 20 - 28	

3. Fisheries Management Objectives

Did you consider local Fisheries Management Objectives in your planning process? (•) Yes ( ) No

If yes, please identify the Fisheries Management Objective(s)/Plan considered and, if applicable, reference the relevant sections.

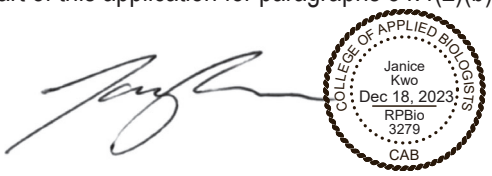
To inform the development of the offsetting plan and determine enhancement objectives, KWL has developed the offsetting plan with input from Leq'a:mel First Nation.

Please identify any effects that the proposed work, undertaking or activity may have on achieving these objectives.

Proposed offsetting measures are designed to enhance rearing habitat for juvenile salmonids in the watershed.

Applicant Declaration

I solemnly declare the that information provided for this application are true, complete and correct, and I make this declaration conscientiously believing it to be true knowing that it is of the same force and effect as if made under oath. This declaration applies to all material submitted as part of this application for paragraphs 34.4(2)(b) and 35(2)(b) *Fisheries Act* Authorization.



Applicant's signature (and corporate seal):

18/12/2023

Date

Information about the above-noted proposed work, undertaking or activity is collected by DFO under the authority of the *Fisheries Act* for the purpose of administering the Fish and Fish Habitat Protection Provisions of the *Fisheries Act*. Personal information will be protected under the provisions of the *Privacy Act* and will be stored in the Personal Information Bank number DFO PPU 680. Under the provisions of the *Privacy Act*, individuals have a right to, and on request shall be given access to, any personal information about them contained in a personal information bank. Instructions for obtaining personal information are contained in the Government of Canada's Info Source publications available at www.infosource.gc.ca or in Government of Canada offices. Information other than “personal” information may be accessible or protected as required by the provision of the *Access to Information Act*.

If you require additional space to provide relevant information, please attach that information and indicate the title of the form being used and the section to which you are responding.

Form for Authorization Holders to Request an Amendment to an Authorization

I, the undersigned, hereby request an amendment to an authorization for the purpose of paragraphs 34.4(2)(b) and 35(2)(b) of the *Fisheries Act* . I understand that this amendment, if granted, is only from the standpoint of the Minister of Fisheries and Oceans in regards to the above named provisions and does not release me from my obligation to obtain permission from other concerned regulatory agencies or from other act or regulations such as *Species at Risk Act* or the *Aquatic Invasive Species Regulations*.

Texts in brackets refer to the provisions of the *Authorizations Concerning Fish and Fish Habitat Protection Regulations* (hereafter "the Regulations") or of their Schedules.

1. Applicant Contact Information

Applicant's Name:

Amy Vallarino, Senior Project Manager
Ministry of Environment and Climate Change Strategy

Address:

PO Box 9360 Stn Prov Govt
Victoria, BC, V8W 9M2

Telephone No.:

250-804-5438

Fax No.:

E-mail:

amy.vallarino@gov.bc.ca

If applicable:

Authorized Representative's Name:

Janice Kwo, Biologist
Kerr Wood Leidal Associates Ltd. (KWL)

Address:

300-4185 Still Creek Drive
Burnaby, BC, V5C6C9

Telephone No.:

604-862-3390

Fax No.:

E-mail:

jkwo@kwl.ca

DFO File Referral No. (if known):

Original Authorization File Numbers [paragraph 5(a)]:

23-HPAC-01232

2. Description of the amendment [paragraph 5(b)]

Provide a detailed description of the amendment(s) being made to the original authorization.

Due to issues sourcing wood for the timber piles for the LWD reef structure and the timber deflectors, there has been a delay to the construction schedule. We are requesting a extension of the in stream work window until September 30. In stream construction of the sediment basin and Taylor Road bridge grade control structure will be completed by September 15.

3. Checklist for Updated Prescribed Information [paragraph 5(c)]

An applicant does not need to re-submit documents that have already been submitted along with the original authorization to DFO for review. However, updated information and documents set out in Schedule 1 or 2 that are necessary to support the request must be re-submitted. An applicant may reference documents such as Environmental Impact Statements, technical supplements, etc. in their application but must provide the appropriate reference to any document cited, including the chapter, section, page reference and date of submission.
Please refer to the Regulations and the initial application forms for the issuance of an authorization for the lists of prescribed information under schedules 1 and 2.

There are no additional documents to be submitted.

4. Effects on fish and fish habitat [paragraph 5(d)]

Provide a detailed description of the likely effects of the amendment on fish and fish habitat, if not otherwise submitted under paragraph 5(c).

Based on previous years, it is unlikely that Deroche Creek will be wetted by the end of September. In the unlikely event that Deroche Creek becomes wetted, isolation fencing will be set up to prevent any migrating salmon from entering the construction area and works will be completed as quickly as possible. Fish passage will be maintained in the Nicomen Slough.

Applicant Declaration

I solemnly declare the that information provided for this application are true, complete and correct, and I make this declaration conscientiously believing it to be true knowing that it is of the same force and effect as if made under oath. This declaration applies to all material submitted as part of this application for paragraphs 34.4(2)(b) and 35(2)(b) *Fisheries Act* Authorization.

Applicant's signature (and corporate seal):

19/08/2025

Date

Information about the above-noted proposed work, undertaking or activity is collected by DFO under the authority of the *Fisheries Act* for the purpose of administering the Fish and Fish Habitat Protection Provisions of the *Fisheries Act*. Personal information will be protected under the provisions of the *Privacy Act* and will be stored in the Personal Information Bank number DFO PPU 680. Under the provisions of the *Privacy Act*, individuals have a right to, and on request shall be given access to, any personal information about them contained in a personal information bank. Instructions for obtaining personal information are contained in the Government of Canada's Info Source publications available at www.infosource.gc.ca or in Government of Canada offices. Information other than “personal” information may be accessible or protected as required by the provision of the *Access to Information Act*.

If you require additional space to provide relevant information, please attach that information and indicate the title of the form being used and the section to which you are responding.

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Appendix H

Contractor Assessment

KERR WOOD LEIDAL ASSOCIATES LTD.
consulting engineers

KERR WOOD LEIDAL
consulting engineers

Okanagan
202 - 3334 30th Avenue
Vernon, BC V1T 2C8
T 250 503 0841
F 250 503 0847

January 22, 2025

Rick McKamey
Leq'a:mel First Nation
43101 Leq'a:mel Way
Deroche, BC V0M 1G0

Dear Mr. McKamey:

RE: LEQ'A:MEL FIRST NATION
Deroche Creek Recovery Solution – Project No. 2900712
Tender Review - Final
Our File: 2838.003

Introduction

On January 17, 2025, a total of 10 tenders for the above-noted project were received by email on behalf of the Leq'a:mel First Nation at the offices of Kerr Wood Leidal Associates Ltd. (KWL) and opened in front of a witness. Tenders were solicited based on an open bid process on Bid Central, which closed January 17, 2025, at 2:00 pm local time. All 10 tenders were submitted well before closing. The opening results (unaudited dollar value) were compiled in a list and sent out to each Tenderer who submitted a bid. The results were also sent to the Owner and project team.

Total Tender Price Analysis

Tenders received were checked for arithmetic accuracy with regards to bid prices. Mathematical rounding and addition errors were noted in 4 tenders. Errors were adjusted according to Div.0, Sec. 00200 Instructions to Tenders para 15. One tenderer had a major math error which changed their ranking from 3rd place to last place. Errors in other 3 tenders were not significant and did not alter the ranking of these tenders in relation to other tenders other than the 3rd place tender moving to last place.

Table 1: Total Tender Price Summary below summarizes the tenderers, tender price submitted, and tender price adjusted. ** denotes an adjustment.

Table 1: Total Tender Price Summary Ranked by Adjusted Tender Price

Rank	Tenderer	Total Tender Price	Total Tender Price Adjusted
1	Timbro Contracting Ltd.	$2,986,917.58	$2,986,917.58
2	Jakes Construction Ltd.	$3,051,300.00	$3,051,300.00
3	Tuya Construction Ltd.	$3,414,882.65	$3,410,547.80**
4	Landmark Solutions Ltd.	$3,708,209.30	$3,708,209.30
5	Matcon Environmental Ltd.	$3,832,009.43	$3,832,009.43
6	Lafarge Canada Ltd.	$4,083,598.00	$4,103,647.00**
7	Infracon Construction Inc.	$4,350,884.63	$4,350,884.63
8	Drake Excavating Ltd.	$4,519,815.50	$4,519,815.50
9	Metric Civil Contractors Ltd.	$4,873,377.20	$4,853,076.20**
10	Ballina Contracting Ltd. (originally 3rd place unaudited/unadjusted)	$3,351,377.00	$12,142,577.00**
** denotes an adjustment			

A detailed tender evaluation of each tenderers tender price and tender price adjustments is attached as Table 2- Tender Evaluation.

Tender Submittal Analysis

The first place (low bid) tender (ranking by Total Tender Price) was Timbro Construction Ltd. Tender was submitted in accordance with the tender expectations, with no abnormalities noted. A detailed review and recommendation follows.

The second place tender (ranking by Total Tender Price) was submitted by Jakes Construction Ltd. Tender was submitted in accordance with the tender expectations, with no abnormalities noted. No detailed review will be provided for Jakes Construction Ltd.

Timbro Construction Ltd. Review:

1. **Form of Tender (FOT) Front End (Pages 1 to 4)**

   - Pages initialed;
   - Fully filled out complete with Addenda and Price listed; and
   - Signed and sealed.

This section is compliant with tender submission requirements.

2. **FOT Schedule 1 – Schedule of Quantities and Prices (Pages 5 to 7)**

   - Pages initialed;
   - Schedule fully filled out with no errors noted; and
   - Quantity changes for 04.01.01 Live staking and 04. 01. 02 Riparian Planting properly updated; no correction required.

This section is compliant with tender submission requirements.

3. FOT Schedule 2 – Hourly Rates for Labour and Equipment (Pages 8 to 10)

- Pages initialed;
- Schedule 2A and 2B fully filled out. Rates look to comply with tender requirements; and
- With comparison to 4 other tenderers Labour Rates appear to be on average 10% - 20% higher. Rates are consistently higher however not unreasonable.

This section is compliant with tender submission requirements.

4. FOT Schedule 3- Tenderers Qualifications (pages 11 to 13)

- Pages initialed;
- Schedule 3A fully filled out listing similar projects c/w references;
- Schedule 3B fully filled out listing experience of the project team; and
- 3 references were contacted, all provided a favourable response indicating no reservations working with this Contractor again

This section is compliant with tender submission requirements.

5. FOT Schedule 4 – List of Subcontractors (page 14)

- Pages initialed;
- Document fully filled out; and
- Two sub-contractor listed one for Timber Piling and another for Revegetation.

This section is compliant with tender submission requirements.

6. FOT Schedule 5 – Preliminary Construction Schedule (page 15)

- Page initialed;
- Document fully filled out; and
- Document meets date expectations as detailed in the Contract Documents.

This section is compliant with tender submission requirements.

7. FOT Schedule 6 – Tenders Proposed Variations (page 16)

- Page initialed;
- A few Proposed Variations offered however they potentially conflict with intended design. There is no requirement to accept a Proposed Variation; and
- This document can be explored further once Award is made.

This section is compliant with tender submission requirements.

8. Bonding

- 10% Bid Bond provided;
- Surety consent provided; and
- Electronically verifiable seal/signature/documents.

This section is compliant with tender submission requirements.

Recommendation

Timbro Construction Ltd. tender submission is compliant and is low bid. A review of 3 other low bids indicates that Timbro's bid is competitive and not unreasonably less than the other bidders.

We recommend that the Leq'a:mel First Nation accept the tender from Timbro Construction Ltd. and subject to various pending approvals for funding and construction, we recommend, once all approvals are in place, that a Notice of Award be granted to Timbro Construction Ltd.

We trust that this provides a clear and reasonable analysis of the bids. We would be pleased to discuss the matter to elaborate on any points for which you have questions. We await your instructions to act on your behalf in award of this contract.

Yours truly,

KERR WOOD LEIDAL ASSOCIATES LTD.



Brett Barker, Dip BAdm, AScT
Owners Representative

BB/tdl

Encl.: Tender Evaluation

LEQ'A:MEL FIRST NATION
DEROCHE CREEK RECOVERY SOLUTION
PROJECT NO.: 2900712
KWL FILE NO.: 2838.003
TABLE 2 - TENDER EVALUATION

January 17, 2025

Item No.	Description of Work	Unit	Estimated Quantity	Timbro Contracting Ltd.		Jakes Construction Ltd.		Ballina Contracting Ltd.		Tuya Construction Ltd.		Landmark Solutins Ltd.		Maticon Environmental Ltd.		Lafarge Canada Ltd.		Infracon Construction Inc.		Drake Excavating Ltd.		Metric Civil Contractors Ltd.	
				Unit Price ($)	Total ($)	Unit Price ($)	Total ($)	Unit Price ($)	Total ($)	Unit Price ($)	Total ($)	Unit Price ($)	Total ($)	Unit Price ($)	Total ($)	Unit Price ($)	Total ($)	Unit Price ($)	Total ($)	Unit Price ($)	Total ($)	Unit Price ($)	Total ($)
01	**SECTION 01 - GENERAL**																						
01.03	Bonding and Insurance	L.S.	100%	$ 29,869.00	$ 29,869.00	$ 35,400.00	$ 35,400.00	$ 15,000.00	$ 15,000.00	$ 35,990.00	$ 35,990.00	$ 68,224.00	$ 68,224.00	$ 71,591.34	$ 71,591.34	$ 17,017.00	$ 17,017.00	$ 51,420.90	$ 51,420.90	$ 67,700.00	$ 67,700.00	$ 48,750.00	$ 48,750.00
01.04	Construction Quality Management	L.S.	100%	$ 48,929.00	$ 48,929.00	$ 35,000.00	$ 35,000.00	$ 105,000.00	$ 105,000.00	$ 29,890.00	$ 29,890.00	$ 3,573.00	$ 3,573.00	$ 9,817.40	$ 9,817.40	$ 9,146.00	$ 9,146.00	$ 26,665.73	$ 26,665.73	$ 258,000.00	$ 258,000.00	$ 18,550.00	$ 18,550.00
01.07	Traffic Management	L.S.	100%	$ 9,174.00	$ 9,174.00	$ 50,000.00	$ 50,000.00	$ 138,000.00	$ 138,000.00	$ 66,612.00	$ 66,612.00	$ 5,735.00	$ 5,735.00	$ 70,925.25	$ 70,925.25	$ 10,514.00	$ 10,514.00	$ 42,242.03	$ 42,242.03	$ 160,000.00	$ 160,000.00	$ 26,900.00	$ 26,900.00
01.15	Mobilization & Demobilization	L.S.	100%	$ 23,427.00	$ 23,427.00	$ 75,000.00	$ 75,000.00	$ 111,500.00	$ 111,500.00	$ 31,537.00	$ 31,537.00	$ 174,879.00	$ 174,879.00	$ 52,383.51	$ 52,383.51	$ 209,052.00	$ 209,052.00	$ 48,473.40	$ 48,473.40	$ 225,900.00	$ 225,900.00	$ 18,710.00	$ 18,710.00
01.16	Site Office	L.S.	100%	$ 24,603.00	$ 24,603.00	$ 30,000.00	$ 30,000.00	$ 125,000.00	$ 125,000.00	$ 34,587.00	$ 34,587.00	$ 20,392.00	$ 20,392.00	$ 40,873.49	$ 40,873.49	$ 32,942.00	$ 32,942.00	$ 50,283.94	$ 50,283.94	$ 39,000.00	$ 39,000.00	$ 16,950.00	$ 16,950.00
01.17	Protection of the Environment	L.S.	100%	$ 28,104.00	$ 28,104.00	$ 65,000.00	$ 65,000.00	$ 140,000.00	$ 140,000.00	$ 69,405.80	$ 69,405.80	$ 57,172.00	$ 57,172.00	$ 19,705.58	$ 19,705.58	$ 36,683.00	$ 36,683.00	$ 19,339.98	$ 19,339.98	$ 45,000.00	$ 45,000.00	$ 223,900.00	$ 223,900.00
01.24 (a)	Maintenance of Taylor Road (Conditional Work)	L.S.	100%	$ 17,874.00	$ 17,874.00	$ 35,000.00	$ 35,000.00	$ 105,000.00	$ 105,000.00	$ 26,184.25	$ 26,184.25	$ 18,526.00	$ 18,526.00	$ 17,278.51	$ 17,278.51	$ 24,391.00	$ 24,391.00	$ 64,702.13	$ 64,702.13	$ 9,000.00	$ 9,000.00	$ 7,926.00	$ 7,926.00
01.24 (b)	Resurfacing of Taylor Road (Conditional Work)	L.S.	100%	$ 126,625.00	$ 126,625.00	$ 90,000.00	$ 90,000.00	$ 129,000.00	$ 129,000.00	$ 174,338.00	$ 174,338.00	$ 100,832.00	$ 100,832.00	$ 46,534.37	$ 46,534.37	$ 80,229.00	$ 80,229.00	$ 287,718.26	$ 287,718.26	$ 30,000.00	$ 30,000.00	$ 74,400.00	$ 74,400.00
01.25	Provisional Sum for Site Modifications (Conditional Work)	P.S.	N/A	$ 150,000.00	$ 126,625.00	$ 150,000.00	$ 150,000.00	$ 150,000.00	$ 150,000.00	$ 150,000.00	$ 150,000.00	$ 150,000.00	$ 150,000.00	$ 150,000.00	$ 150,000.00	$ 150,000.00	$ 150,000.00	$ 150,000.00	$ 150,000.00	$ 150,000.00	$ 150,000.00	$ 150,000.00	$ 150,000.00
	Subtotal Section 01 - General				$ 458,605.00		$ 565,400.00		$ 1,018,500.00		$ 618,544.05		$ 599,333.00		$ 479,109.45		$ 569,974.00		$ 740,846.37		$ 984,600.00		$ 586,086.00
02	**SECTION 02 - MAJOR WORKS**																						
02.01	**Access, Laydown, Clearing and Grubbing**																						
02.01.01	Access and Laydown	L.S.	100%	$ 160,452.00	$ 160,452.00	$ 40,000.00	$ 40,000.00	$ 210,000.00	$ 210,000.00	$ 81,282.50	$ 81,282.50	$ 57,950.00	$ 57,950.00	$ 190,698.18	$ 190,698.18	$ 138,906.00	$ 138,906.00	$ 42,387.89	$ 42,387.89	$ 128,500.00	$ 128,500.00	$ 139,700.00	$ 139,700.00
02.01.02	Clearing and Grubbing	Ha.	1.5	$ 37,347.00	$ 56,020.50	$ 35,000.00	$ 52,500.00	$ 45,000.00	$ 67,500.00	$ 9,943.00	$ 14,914.50	$ 28,883.00	$ 43,324.50	$ 86,580.30	$ 129,870.45	$ 66,760.00	$ 100,140.00	$ 60,895.29	$ 91,342.94	$ 31,000.00	$ 46,500.00	$ 67,670.00	$ 101,505.00
02.02	**Treatment of Trees by Species**																						
02.02.02	WRC Stems for Timber Piling	ea.	20	$ 1,161.00	$ 23,220.00	$ 500.00	$ 10,000.00	$ 530.00	$ 10,600.00	$ 430.05	$ 8,601.00	$ 637.00	$ 12,740.00	$ 1,074.12	$ 21,482.40	$ 3,676.00	$ 73,520.00	$ 1,055.48	$ 21,109.60	$ 900.00	$ 18,000.00	$ 582.50	$ 11,650.00
02.02.03	WRC Stems and Stumps for Onsite Use	L.S.	100%	$ 64,922.00	$ 64,922.00	$ 6,000.00	$ 6,000.00	$ 72,000.00	$ 72,000.00	$ 7,368.80	$ 7,368.80	$ 12,747.00	$ 12,747.00	$ 29,874.72	$ 29,874.72	$ 26,713.00	$ 26,713.00	$ 20,720.01	$ 20,720.01	$ 21,000.00	$ 21,000.00	$ 10,480.00	$ 10,480.00
02.02.04	Other Species for Onsite Use	L.S.	100%	$ 13,067.00	$ 13,067.00	$ 17,000.00	$ 17,000.00	$ 72,000.00	$ 72,000.00	$ 7,368.80	$ 7,368.80	$ 16,996.00	$ 16,996.00	$ 24,664.98	$ 24,664.98	$ 26,713.00	$ 26,713.00	$ 27,515.15	$ 27,515.15	$ 10,000.00	$ 10,000.00	$ 23,290.00	$ 23,290.00
02.03	**Reach 1 Timber Pile Deflectors**																						
02.03.01	Timber Piling	ea.	22	$ 1,571.00	$ 34,562.00	$ 4,300.00	$ 94,600.00	$ 1,000.00	$ 22,000.00	$ 2,276.59	$ 50,084.98	$ 1,551.00	$ 34,122.00	$ 4,183.43	$ 92,035.46	$ 1,137.00	$ 25,014.00	$ 2,434.32	$ 53,555.04	$ 4,000.00	$ 88,000.00	$ 1,783.00	$ 39,226.00
02.03.02	LWD Fill and Bracing Logs	L.S.	100%	$ 53,904.00	$ 53,904.00	$ 40,000.00	$ 40,000.00	$ 40,000.00	$ 40,000.00	$ 15,494.00	$ 15,494.00	$ 11,892.00	$ 11,892.00	$ 42,739.75	$ 42,739.75	$ 42,740.00	$ 42,740.00	$ 16,509.06	$ 16,509.06	$ 79,000.00	$ 79,000.00	$ 53,890.00	$ 53,890.00
02.03.03	Imported Logs (Conditional Work)	Per Log	25	$ 1,015.00	$ 25,375.00	$ 350.00	$ 8,750.00	$ 800.00	$ 20,000.00	$ 1,685.43	$ 42,135.75	$ 1,977.00	$ 49,425.00	$ 1,186.03	$ 29,650.75	$ 801.00	$ 20,025.00	$ 1,963.30	$ 49,082.50	$ 250.00	$ 6,250.00	$ 817.50	$ 20,437.50
02.04	**Reach 2 Taylor Bridge Bed Armour**																						
02.04.01	Excavation to Lot 8-3-3	m3	186	$ 27.00	$ 5,022.00	$ 27.00	$ 5,022.00	$ 23.00	$ 4,278.00	$ 42.19	$ 7,847.34	$ 36.00	$ 6,696.00	$ 71.58	$ 13,313.88	$ 99.00	$ 18,414.00	$ 141.63	$ 26,343.18	$ 125.00	$ 23,250.00	$ 38.40	$ 7,142.40
02.04.02	Excavation for On-Site Use	m3	26	$ 113.00	$ 2,938.00	$ 15.00	$ 390.00	$ 27.00	$ 702.00	$ 15.66	$ 407.16	$ 104.00	$ 2,704.00	$ 45.73	$ 1,188.98	$ 117.50	$ 3,055.00	$ 171.20	$ 4,451.20	$ 61.00	$ 1,586.00	$ 23.90	$ 621.40
02.04.03	Void-Filled 500 mm Boulders	m3	53	$ 451.00	$ 23,903.00	$ 190.00	$ 10,070.00	$ 160.00	$ 8,480.00	$ 269.56	$ 14,286.68	$ 130.00	$ 6,890.00	$ 210.13	$ 11,136.89	$ 283.00	$ 14,999.00	$ 309.21	$ 16,388.13	$ 445.00	$ 23,585.00	$ 352.50	$ 18,682.50
02.04.04	500 mm Minus Fill	m3	52	$ 185.00	$ 9,620.00	$ 70.00	$ 3,640.00	$ 46.00	$ 2,392.00	$ 179.34	$ 9,325.68	$ 82.00	$ 4,264.00	$ 101.38	$ 5,271.76	$ 197.50	$ 10,270.00	$ 240.78	$ 12,520.56	$ 435.00	$ 22,620.00	$ 23.80	$ 1,237.60
02.05	**Reach 2 Sediment Basin**																						
02.05.01	Excavation to Lot 8-3-3 Berms	m3	10540	$ 17.00	$ 179,180.00	$ 15.00	$ 158,100.00	$ 12.00	$ 126,480.00	$ 24.13	$ 254,330.20	$ 28.00	$ 295,120.00	$ 13.41	$ 141,341.40	$ 21.40	$ 225,556.00	$ 24.77	$ 261,075.80	$ 60.00	$ 632,400.00	$ 38.40	$ 404,736.00
02.05.02	Excavation for On-Site Use	m3	2960	$ 8.90	$ 26,344.00	$ 12.00	$ 35,520.00	$ 14.00	$ 41,440.00	$ 17.23	$ 51,000.80	$ 24.00	$ 71,040.00	$ 3.82	$ 11,307.20	$ 32.10	$ 95,016.00	$ 17.29	$ 51,178.40	$ 30.00	$ 88,800.00	$ 23.80	$ 70,448.00
02.05.03	Excavation to Off-Site Disposal (Conditional Work)	m3	10000	$ 32.00	$ 320,000.00	$ 27.00	$ 270,000.00	$ 4.00	$ 40,000.00	$ 27.96	$ 279,600.00	$ 54.00	$ 540,000.00	$ 36.63	$ 366,300.00	$ 48.10	$ 481,000.00	$ 55.88	$ 558,800.00	$ 60.00	$ 600,000.00	$ 73.40	$ 734,000.00
02.05.04	Excavation to Off-Site Disposal - Contaminated (Conditional Work)	m3	5000	$ 79.00	$ 395,000.00	$ 125.00	$ 625,000.00	$ 115.00	$ 575,000.00	$ 165.62	$ 828,100.00	$ 75.00	$ 375,000.00	$ 156.59	$ 782,950.00	$ 150.50	$ 752,500.00	$ 157.95	$ 789,750.00	$ 121.00	$ 605,000.00	$ 182.50	$ 912,500.00
02.05.05	Substrate-filled Type I Rock	m3	4233	$ 116.00	$ 491,028.00	$ 95.00	$ 402,135.00	$ 107.00	$ 452,931.00	$ 106.42	$ 450,475.86	$ 194.00	$ 821,202.00	$ 145.42	$ 615,562.86	$ 158.50	$ 670,930.50	$ 167.97	$ 711,017.01	$ 40.00	$ 169,320.00	$ 210.00	$ 888,930.00
02.05.06	500-kg Riprap	m3	511	$ 114.00	$ 58,254.00	$ 160.00	$ 81,760.00	$ 100.00	$ 51,100.00	$ 128.36	$ 65,591.96	$ 194.00	$ 99,134.00	$ 285.57	$ 145,926.27	$ 351.00	$ 179,361.00	$ 210.42	$ 107,524.62	$ 260.00	$ 132,860.00	$ 221.50	$ 113,186.50
02.05.06	250-kg Riprap	m3	185	$ 156.00	$ 28,860.00	$ 160.00	$ 29,600.00	$ 103.00	$ 19,055.00	$ 133.69	$ 24,732.65	$ 312.00	$ 57,720.00	$ 268.53	$ 49,678.05	$ 289.50	$ 53,557.50	$ 206.15	$ 38,137.75	$ 260.00	$ 48,100.00	$ 208.00	$ 38,480.00
02.05.07	Void-filled 900 mm Boulders	m3	291	$ 273.00	$ 79,443.00	$ 160.00	$ 46,560.00	$ 90.00	$ 26,190.00	$ 77.09	$ 22,433.19	$ 270.00	$ 78,570.00	$ 246.09	$ 71,612.19	$ 362.00	$ 105,342.00	$ 194.94	$ 56,727.54	$ 280.00	$ 81,480.00	$ 274.50	$ 79,879.50
02.05.08	Grade Control Spines	m3	428	$ 142.00	$ 60,776.00	$ 130.00	$ 55,640.00	$ 105.00	$ 44,940.00	$ 131.76	$ 56,393.28	$ 275.00	$ 117,700.00	$ 19.18	$ 8,209.04	$ 82.00	$ 35,096.00	$ 205.71	$ 88,043.88	$ 130.00	$ 55,640.00	$ 228.00	$ 97,584.00
02.05.09	Anchored WRC Rootwads	ea.	20	$ 2,151.00	$ 43,020.00	$ 1,400.00	$ 28,000.00	$ 450.00	$ 9,000.00	$ 1,033.54	$ 20,670.80	$ 1,699.00	$ 33,980.00	$ 604.42	$ 12,088.40	$ 1,603.00	$ 32,060.00	$ 989.59	$ 19,791.80	$ 1,500.00	$ 30,000.00	$ 1,096.00	$ 21,920.00
02.05.10	500 to 1200 mm Complexing Boulders	ea	50	$ 374.00	$ 18,700.00	$ 200.00	$ 10,000.00	$ 176,000.00	$ 8,800,000.00	$ 76.25	$ 3,812.50	$ 234.00	$ 11,700.00	$ 143.37	$ 7,168.50	$ 267.00	$ 13,350.00	$ 532.99	$ 26,649.50	$ 400.00	$ 20,000.00	$ 243.00	$ 12,150.00
02.05.11	Access Ramp	m2	72	$ 197.00	$ 14,184.00	$ 200.00	$ 14,400.00	$ 72.00	$ 5,184.00	$ 191.69	$ 13,801.68	$ 135.00	$ 9,720.00	$ 88.17	$ 6,348.24	$ 213.50	$ 15,372.00	$ 380.38	$ 27,387.36	$ 360.00	$ 25,920.00	$ 113.00	$ 8,136.00
02.05.12	Basin Access Gate	L.S.	100%	$ 7,951.00	$ 7,951.00	$ 5,945.00	$ 5,945.00	$ 13,000.00	$ 13,000.00	$ 14,701.00	$ 14,701.00	$ 8,898.00	$ 8,898.00	$ 5,107.78	$ 5,107.78	$ 5,300.00	$ 5,300.00	$ 6,446.66	$ 6,446.66	$ 7,500.00	$ 7,500.00	$ 4,517.00	$ 4,517.00
	Subtotal Section 02 - Major Works				$ 2,195,745.50		$ 2,050,632.00		$ 10,734,272.00		$ 2,344,761.11		$ 2,779,534.50		$ 2,815,528.13		$ 3,164,950.00		$ 3,124,455.58		$ 2,965,311.00		$ 3,814,329.40

LEQ'A:MEL FIRST NATION
DEROCHE CREEK RECOVERY SOLUTION
PROJECT NO.: 2900712
KWL FILE NO.: 2838.003
TABLE 2 - TENDER EVALUATION

January 17, 2025

Item No.	Description of Work	Unit	Estimated Quantity	Timbro Contracting Ltd.		Jakes Construction Ltd.		Ballina Contracting Ltd.		Tuya Construction Ltd.		Landmark Solutins Ltd.		Maticon Environmental Ltd.		Lafarge Canada Ltd.		Infracon Construction Inc.		Drake Excavating Ltd.		Metric Civil Contractors Ltd.	
				Unit Price ($)	Total ($)	Unit Price ($)	Total ($)	Unit Price ($)	Total ($)	Unit Price ($)	Total ($)	Unit Price ($)	Total ($)	Unit Price ($)	Total ($)	Unit Price ($)	Total ($)	Unit Price ($)	Total ($)	Unit Price ($)	Total ($)	Unit Price ($)	Total ($)
03	SECTION 03 - OFF-SETTING WORKS																						
03.01	Reach 1 LWD Reef																						
03.01.01	Timber Piling	ea.	32	$ 1,391.00	$ 44,512.00	$ 4,100.00	$ 131,200.00	$ 1,000.00	$ 32,000.00	$ 2,297.67	$ 73,525.44	$ 1,186.00	$ 37,952.00	$ 5,564.33	$ 178,058.56	$ 587.50	$ 18,800.00	$ 3,464.95	$ 110,878.40	$ 4,000.00	$ 128,000.00	$ 2,697.00	$ 86,304.00
03.01.02	LWD Fill and Bracing Logs	L.S.	100%	$ 53,904.00	$ 53,904.00	$ 115,000.00	$ 115,000.00	$ 66,000.00	$ 66,000.00	$ 43,066.00	$ 43,066.00	$ 47,566.00	$ 47,566.00	$ 131,790.61	$ 131,790.61	$ 58,768.00	$ 58,768.00	$ 53,486.62	$ 53,486.62	$ 105,000.00	$ 105,000.00	$ 102,400.00	$ 102,400.00
03.01.03	Imported Logs	Per Log	50	$ 1,015.00	$ 50,750.00	$ 350.00	$ 17,500.00	$ 800.00	$ 40,000.00	$ 1,578.68	$ 78,934.00	$ 1,148.00	$ 57,400.00	$ 1,232.33	$ 61,616.50	$ 801.50	$ 40,075.00	$ 1,963.30	$ 98,165.00	$ 250.00	$ 12,500.00	$ 817.50	$ 40,875.00
03.02	Reach 1 Habitat Channels																						
03.02.01	Habitat Channel Construction	m3	1,658	$ 22.00	$ 36,476.00	$ 12.00	$ 19,896.00	$ 15.00	$ 24,870.00	$ 9.39	$ 15,568.62	$ 9.00	$ 14,922.00	$ 8.16	$ 13,529.28	$ 11.00	$ 18,238.00	$ 27.00	$ 44,766.00	$ 28.00	$ 46,424.00	$ 43.70	$ 72,454.60
	Subtotal Section 03 - Off Setting Works				$ 185,642.00		$ 283,596.00		$ 162,870.00		$ 211,094.06		$ 157,840.00		$ 384,994.95		$ 135,881.00		$ 307,296.02		$ 291,924.00		$ 302,033.60
04	SECTION 04 - REVEGETATION																						
04.01.01	Live-staking	m2	3,000	$ 9.81	$ 29,430.00	$ 12.00	$ 36,000.00	$ 11.00	$ 33,000.00	$ 25.65	$ 76,950.00	$ 9.00	$ 27,000.00	$ 16.10	$ 48,300.00	$ 26.90	$ 80,700.00	$ 15.85	$ 47,550.00	$ 31.55	$ 94,650.00	$ 10.40	$ 31,200.00
04.01.02	Riparian Planting	m2	10,409	$ 7.72	$ 80,357.48	$ 8.00	$ 83,272.00	$ 15.00	$ 156,135.00	$ 12.13	$ 126,261.17	$ 10.00	$ 104,090.00	$ 8.83	$ 91,911.47	$ 12.00	$ 124,908.00	$ 8.63	$ 89,829.67	$ 14.50	$ 150,930.50	$ 8.80	$ 91,599.20
04.01.03	Seeding	Ha.	1.8	$ 20,632.00	$ 37,137.60	$ 18,000.00	$ 32,400.00	$ 21,000.00	$ 37,800.00	$ 18,313.56	$ 32,964.41	$ 22,451.00	$ 40,411.80	$ 6,758.57	$ 12,165.43	$ 15,130.00	$ 27,234.00	$ 22,726.11	$ 40,907.00	$ 18,000.00	$ 32,400.00	$ 15,460.00	$ 27,828.00
	Subtotal Section 04 - Revegetation				$ 146,925.08		$ 151,672.00		$ 226,935.00		$ 236,175.58		$ 171,501.80		$ 152,376.90		$ 232,842.00		$ 178,286.67		$ 277,980.50		$ 150,627.20
	Combined Subtotal of Sections 01, 02, 03 ,04				$ 2,986,917.58		$ 3,051,300.00		$ 12,142,577.00		$ 3,410,574.80		$ 3,708,209.30		$ 3,832,009.43		$ 4,103,647.00		$ 4,350,884.63		$ 4,519,815.50		$ 4,853,076.20
	GST @ 5%				$ EXEMPT		$ EXEMPT		$ EXEMPT		$ EXEMPT		$ EXEMPT		$ EXEMPT		$ EXEMPT		$ EXEMPT		$ EXEMPT		$ EXEMPT
	TOTAL TENDER PRICE ADJUSTED (excludes. GST)				$ 2,986,917.58		$ 3,051,300.00		$ 12,142,577.00		$ 3,410,574.80		$ 3,708,209.30		$ 3,832,009.43		$ 4,103,647.00		$ 4,350,884.63		$ 4,519,815.50		$ 4,853,076.20
	Yellow highlights appear to be rounding and only out minor amounts.																						
	Light green highlights out significant amounts.																						
	Orange highlights are where totals are out.																						
	Tender Submitted				2,986,917.58		3,051,300.00		3,351,377.00		3,414,882.65		3,708,209.30		3,832,009.43		4,083,598.00		4,350,884.63		4,519,815.50		4,873,377.20
	Total Discrepancy				$ -		$ -		$ 8,791,200.00		-$ 4,307.85		$ -		-$ 0.00		$ 20,049.00		$ 0.00		$ -		-$ 20,301.00

\\kwl.ca\projects\2800-2899\2838-003\1000-Construction\2025 - Construction\1010-Tendering\03 Tender Evaluation\[02 DerocheTenderEvaluation_20250121.xlsx]EVALUATION

TIMBRO
CONTRACTING

Company Name	Timbro Contracting Ltd.
Company Address	7357 Pioneer Ave, Agassiz BC.V0M 1A0
Contact Person and Title	Andres Murillo, Director
Phone Number	6047963851
Email	andres@timbroconstruction.com

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Form of Tender

Submitted To: Leq'a:mel First Nation
43101 Leq'a:mel Way
Deroche, BC V0M 1G0

Date: January 17th 2025

Tenderer

Legal Name: Timbro Contracting Ltd.

Address: 7357 Pioneer Ave. Agassiz, BC. V0M 1A0

Tender Price

Having examined the Tender Documents and Addenda No. 1 to No. 2 inclusive, and having visited the Place of the Work; we hereby offer to enter into a Contract to perform the Work required by the Tender Documents for the stipulated price of Two Million nine hundred eighty six thousand nine hundred seventeen Dollar 58/100s Dollars ($ 2,986,917.58) in Canadian funds,

excluding GST.

The immediately following schedules shall be read with and form part hereof as if embodied herein:

Schedule 1 – Schedule of Quantities and Prices
Schedule 2(A,B) - Hourly Rates for Labour and Equipment
Schedule 3(A,B) - Tenderer's Qualifications
Schedule 4 - List of Sub-Contractors
Schedule 5 – Preliminary Construction Schedule
Schedule 6 - Tenderer's Proposed Variations

To Owner

WE, THE UNDERSIGNED

1.1 have received and carefully reviewed all of the *Contract Documents*, including but not necessarily limited to: the Instructions to Tenderers, CCDC4-2011 Documents - General Conditions, Supplementary Conditions, Technical Specifications, Appendices, Drawings and Addenda.

1.2 have full knowledge of the Place of the Work, and the Work required; and

1.3 have complied with the Instructions to Tenderers.

ACCORDINGLY,WE HEREBY OFFER

2.1 to perform and complete all of the *Work* and to provide all the labour, equipment and material all as set out in the *Contract Documents*, in strict compliance with the *Contract Documents*; and

2.2 to achieve Substantial Performance of the Work on or before the date of Substantial Performance as stated under 'Key Dates and Times' on the 'Invitation to Tender

2.3 to do the *Work* for the price, which is the sum of the products of the actual quantities incorporated into the *Work* and the appropriate unit prices set out in Schedule 1, the "*Schedule of Quantities and Prices*", plus any lump sums or specific prices and adjustment amounts as provided by the *Contract Documents*. For the purposes of tender comparison, our offer is to complete the *Work* for the "*Tender Price*" as set out on Schedule 1 of this Form of Tender. Our *Tender Price* is based on the estimated quantities listed in the *Schedule of Quantities and Prices* and excludes *GST*.

WE CONFIRM

3.1 that we understand and agree that the quantities as listed in the *Schedule of Quantities and Prices* are estimated, and that the actual quantities will vary.

WE CONFIRM

4.1 that the following Schedules and Security are attached to and form a part of this tender:

4.1.1 Schedule 1 – Schedule of Quantities and Prices
Schedule 2 (A,B) - Hourly Rates for Labour and Equipment
Schedule 3 (A,B) - Tenderer's Qualifications
Schedule 4 - List of Sub-Contractors
Schedule 5 - Preliminary Construction Schedules
Schedule 6 - Tenderer's Proposed Variations

4.1.2 10% Bid Bond (Bid Security).

4.1.3 Consent of Surety (recommended)

WE AGREE

5.1 that this tender will be irrevocable and open for acceptance by the Owner for a period of 60 calendar days from the day following the Tender Closing Date and Time, even if the tender of another tenderer is accepted by the Owner. If within this period the Owner delivers a written notice ("Notice of Acceptance") by which the Owner accepts our tender we will:

5.1.1 within 14 calendar days of receipt of the written *Notice of Acceptance* deliver to the *Owner*:

5.1.1.1 a Performance Bond and a Labour and Material Payment Bond, each in the amount of 50% of the *Contract Price*, covering the performance of the *Work* including the *Contractor*'s obligations during the *Maintenance Period,* issued by a surety licensed to carry

on the business of suretyship in the province of British Columbia, and in a form acceptable to the *Owner*;

5.1.1.2 a *Preliminary Construction Schedule*, as provided by GC 3.5 and Technical Specification 1.05; and

5.1.1.3 a 'clearance letter' indicating that the tenderer is in WCB compliance; and

5.1.1.4 a copy of the insurance policies as specified in GC 11.1 and any Supplementary GCs indicating that all such insurance coverage is in place; and

5.1.1.5 a copy of a Traffic Management Plan (TMP) for Works on Taylor Road; and

5.1.5.6 Construction Quality Management Plan

5.1.1.7 Construction Site Safety Plan (OHS Program); and

5.1.1.8 a signed/dated letter on Contractors Letterhead stating the CEMP has been reviewed, understood and will be adhered to; and

5.1.1.9 a pile driving work plan; and

5.1.1.10 a copy of the "Notice of Project" as submitted to WorkSafe BC (WCB)

5.1.2 within 2 *Days* of receipt of written "*Notice to Proceed*", or such longer time as may be otherwise specified in the *Notice to Proceed*, commence the *Work*; and

5.1.3 Sign and return the Contract Documents to the Owners Representative within 5 calendar days of receipt.

WE AGREE

6.1 that, if we receive written *Notice of Acceptance* of this *Contract* and, contrary to paragraph 5.1 of this Form of Tender, we:

6.1.1 fail or refuse to deliver the documents as specified by paragraph 5.1.1 of this Form of Tender; or

6.1.2 fail or refuse to sign the Contract Documents; or

6.1.2 fail or refuse to commence the *Work* as required by the *Notice to Proceed*,

then such failure or refusal will be deemed to be a refusal by us to enter into the *Contract* and the *Owner* may, on written notice to us, award the *Contract* to another party. We further agree that, as full compensation on account of damages suffered by the *Owner* because of such failure or refusal, the *Bid Security (Bid Bond)* shall be forfeited to the *Owner*, in an amount equal to the lesser of:

6.1.3 the face value of the *Bid Security*; and

6.1.4 the amount by which our *Tender Price* is less than the amount for which the *Owner* contracts with another party to perform the *Work*.

OUR ADDRESS IS AS FOLLOWS

7357 Pioneer Ave. Agassiz, BC. V0M 1A0

Phone: 6047963851 / 6049910108
Email: andres@timbroconstruction.com
Attn.: G.Andres Murillo

This Tender is executed this 17th day of January,2024.

Contractor:

Timbro Contracting Ltd.
(Full legal name of corporation, partnership or individual)

TIMBRO CONTRACTING LTD SEAL

Signature of Authorized Signatory — Print Name and Title of Person Signing

Signature of Witness — Print Name and Title of Person Signing

DEROCHE CREEK RECOVERY SOLUTION
PROJECT NO. 2900712
SCHEDULE 1 - SCHEDULE OF QUANTITIES AND PRICES

SEE ARTICLE A-3 CONTRACT DOCUMENTS - AGREEMENT BETWEEN OWNER AND CONTRACTOR MODIFICATION #1
(All prices and quotations including subtotals shall not include GST.)

L.S. - Lump Sum
P.S. - Provisional Sum
m3 - Cubic Metre
ea. - Each
m2 - Square Metre
Ha. - Hectare

Item No.	Description of Work	Unit	Estimated Quantity	Unit Price ($)	Total ($)
01	**SECTION 01 - GENERAL**				
01.03	Bonding and Insurance	L.S.	100%	$ 29,869.00	$ 29,869.00
01.04	Construction Quality Management	L.S.	100%	$ 48,929.00	$ 48,929.00
01.07	Traffic Management	L.S.	100%	$ 9,174.00	$ 9,174.00
01.15	Mobilization & Demobilization	L.S.	100%	$ 23,427.00	$ 23,427.00
01.16	Site Office	L.S.	100%	$ 24,603.00	$ 24,603.00
01.17	Protection of the Environment	L.S.	100%	$ 28,104.00	$ 28,104.00
01.24 (a)	Maintenance of Taylor Road	L.S.	100%	17,874.00	17,874.00
01.24 (b)	Resurfacing of Taylor Road (Conditional Work)	L.S.	100%	126,625.00	126,625.00
01.25	Provisional Sum for Site Modifications (Conditional Work)	P.S.	100%	$ 150,000.00	$ 150,000.00
				Subtotal Section 01 - General	$ 458,605.00
02	**SECTION 02 - MAJOR WORKS**				
02.01	**Access, Laydown, Clearing and Grubbing**				
02.01.01	Access and Laydown	L.S.	100%	$ 160,452.00	$ 160,452.00
02.01.02	Clearing and Grubbing	Ha.	1.5	$ 37,347.00	$ 56,020.50
02.02	**Treatment of Trees by Species**				
02.02.02	WRC Stems for Timber Piling	ea.	20	$ 1,161.00	$ 23,220.00
02.02.03	WRC Stems and Stumps for Onsite Use	L.S.	100%	$ 64,922.00	$ 64,922.00
02.02.04	Other Species for Onsite Use	L.S.	100%	$ 13,067.00	$ 13,067.00

gam
Tenderer Initial

DEROCHE CREEK RECOVERY SOLUTION
PROJECT NO. 2900712
SCHEDULE 1 - SCHEDULE OF QUANTITIES AND PRICES

SEE ARTICLE A-3 CONTRACT DOCUMENTS - AGREEMENT BETWEEN OWNER AND CONTRACTOR MODIFICATION #1
(All prices and quotations including subtotals shall not include GST.)

L.S. - Lump Sum
P.S. - Provisional Sum
m3 - Cubic Metre
ea. - Each
m2 - Square Metre
Ha. - Hectare

Item No.	Description of Work	Unit	Estimated Quantity	Unit Price ($)	Total ($)
02.03	**Reach 1 Timber Pile Deflectors**				
02.03.01	Timber Piling	ea.	22	$ 1,571.00	$ 34,562.00
02.03.02	LWD Fill and Bracing Logs	L.S.	100%	$ 53,904.00	$ 53,904.00
02.03.03	Imported Logs (Conditional Work)	Per Log	25	$ 1,015.00	$ 25,375.00
02.04	**Reach 2 Taylor Bridge Bed Armouring**				
02.04.01	Excavation to Lot 8-3-3	m3	186	$ 27.00	$ 5,022.00
02.04.02	Excavation for On-Site Use	m3	26	$ 113.00	$ 2,938.00
02.04.03	Void-Filled 500 mm Boulders	m3	53	$ 451.00	$ 23,903.00
02.04.04	500 mm Minus Fill	m3	52	$ 185.00	$ 9,620.00
02.05	**Reach 2 Sediment Basin**				
02.05.01	Excavation to Lot 8-3-3 Berms	m3	10540	$ 17.00	$ 179,180.00
02.05.02	Excavation for On-Site Use	m3	2960	$ 8.90	$ 26,344.00
02.05.03	Excavation to Off-Site Disposal (Conditional Work)	m3	10000	$ 32.00	$ 320,000.00
02.05.04	Excavation to Off-Site Disposal - Contaminated (Conditional Work)	m3	5000	$ 79.00	$ 395,000.00
02.05.05	Substrate-filled Type I Rock	m3	4233	$ 116.00	$ 491,028.00
02.05.06	500-kg Riprap	m3	511	$ 114.00	$ 58,254.00
02.05.06	250-kg Riprap	m3	185	$ 156.00	$ 28,860.00
02.05.07	Void-filled 900 mm Boulders	m3	291	$ 273.00	$ 79,443.00
02.05.08	Grade Control Spines	m3	428	$ 142.00	$ 60,776.00
02.05.09	Anchored WRC Rootwads	ea.	20	$ 2,151.00	$ 43,020.00
02.05.10	500 to 1200 mm Complexing Boulders	ea	50	$ 374.00	$ 18,700.00
02.05.11	Access Ramp	m2	72	$ 197.00	$ 14,184.00
02.05.12	Basin Access Gate	L.S.	100%	$ 7,951.00	$ 7,951.00
				Subtotal Section 02 - Major Works	$ 2,195,745.50

gam
Tenderer Initial

DEROCHE CREEK RECOVERY SOLUTION
PROJECT NO. 2900712
SCHEDULE 1 - SCHEDULE OF QUANTITIES AND PRICES

SEE ARTICLE A-3 CONTRACT DOCUMENTS - AGREEMENT BETWEEN OWNER AND CONTRACTOR MODIFICATION #1
(All prices and quotations including subtotals shall not include GST.)

L.S. - Lump Sum
P.S. - Provisional Sum
m3 - Cubic Metre
ea. - Each
m2 - Square Metre
Ha. - Hectare

Item No.	Description of Work	Unit	Estimated Quantity	Unit Price ($)	Total ($)
03	**SECTION 03 - OFF-SETTING WORKS**				
03.01	**Reach 1 LWD Reef**				
03.01.01	Timber Piling	ea.	32	$ 1,391.00	$ 44,512.00
03.01.02	LWD Fill and Bracing Logs	L.S.	100%	$ 53,904.00	$ 53,904.00
03.01.03	Imported Logs	Per Log	50	$ 1,015.00	$ 50,750.00
03.02	**Reach 1 Habitat Channels**				
03.02.01	Habitat Channel Construction	m3	1,658	$ 22.00	$ 36,476.00
				Subtotal Section 03 - Off Setting Works	$ 185,642.00
04	**SECTION 04 - REVEGETATION**				
04.01.01	Live-staking	m2	3,000	$ 9.81	$ 29,430.00
04.01.02	Riparian Planting	m2	10,409	$ 7.72	$ 80,357.48
04.01.03	Seeding	Ha.	1.8	$ 20,632.00	$ 37,137.60
				Subtotal Section 04 - Revegetation	$ 146,925.08
				Combined Subtotal of Sections 01, 02, 03 ,04	**$** 2,986,917.58
				GST @ 5%	**$ EXEMPT**
				TOTAL TENDER PRICE (excludes. GST)	**$** 2,986,917.58

Timbro Contracting Ltd
Corporate Name of Tenderer

gam
Tenderer Initial

SCHEDULE 2 – HOURLY RATES FOR LABOUR AND EQUIPMENT

A. ALL-FOUND HOURLY RATES FOR LABOUR

The tenderer shall list the job categories (complete with "all-found" hourly rates) they intend to use for this project. The hourly rates listed herein will be used to determine the cost of any cost plus or authorized additional work.

Hourly rates shall include holiday pay, Workers' Compensation, Unemployment Insurance, Canada Pension Plan, accommodation and travel allowance.

Hourly rates shall **not** include any markup for the Contractor's supervision, "overhead and profit." Markup for supervision, overhead and profit shall be added separately in accordance with the Supplementary General Conditions.

Tenderers are cautioned that a complete list is required, refer to Instructions to Tenderers Item 16.

B. ALL-FOUND HOURLY RATES FOR EQUIPMENT

The tenderer shall list equipment (complete with 'all-found' hourly rates) available for use on this project. The hourly rental rates listed herein will be used in determining the cost of any cost plus or authorized additional work.

Hourly rates for equipment shall include all costs of operating the equipment. This includes operator wages, total fringe benefits and allowances.

Hourly rates shall **not** include any markup for the Contractor's supervision, "overhead and profit." Markup for supervision, overhead and profit shall be added separately in accordance with the Supplementary General Conditions.

Tenderers are cautioned that a complete list is required, refer to Instructions to Tenderers Item 17.

Tenderers shall include completed tables for hourly labour and equipment rates in a format similar to Schedules 2A and 2B, add extra pages if necessary.

SCHEDULE 2A - HOURLY LABOUR RATES

Item	Job Category	All-Found Rate
1.	Superintendent	140.00
2.	Surveyor c/w surveying equipment & Truck	170.00
3.	Foreman c/w Tools & Truck	115.00
4.	Project Coordinator	85.00
5.	Operator	85.00
6.	First Aid Level 3	80.00
7.	Pipe Layer / Grade man	85.00
8.	Labourer	70.00
9.	Density Gravels Testing Technician	115.00
10.	Flagger c/w signs	82.00

SCHEDULE 2B - HOURLY EQUIPMENT RATES

Type od Equipment	Make, Model & Year		All- Found Rate (hr)	2025 Blue Book Page reference
Excavators (e.g. Class 7)	2020	Linkbelt 350 / 35 Tonnes Excavator c/w Thumbs	295.00	63 and 06
Dump Truck (e.g. Tandem)	2022	Kenworth / 9.2 m3	159.00	127
Dozer Class 4	2021	John Deere 700 k/96-14KW	270.15	114
Excavators	2023	Case/Hitachi 245	218.20	62
Excavators	2023	Case/Hitachi 200	211.10	61
Excavators	2023	Case rock rate cx145DSR	180.00	60
Skid Steer	2023	Bobcat 770/250	127.60	83
Mini Hoe	2021	5 tonnes hitachi 50, kubota 44	118.35	56
Backhoe	2023	John Deere Backhoe 310 / case	163.64	123/ 116
Loader	2018	WA 380 loader	214.80	87
Compaction Equipment 12 tonnes	2023	Roller 12-13 Tonne Amman 130 / HAMM	172.60	100
Compaction Equipment 5 tonnes	2007	Roller 5 tonne Bomag	130.25	98
Articulated Dump truck	2024	Doosan DA30	260.90	132
Truck and pony	2022	Truck and pony 13.8m3	175.20	127
Truck and side dump	2023	Side dumper 14.5 m3	175.90	127
Truck and transfer	2020	Truck and transfer	190.05	127
One ton with tools (Less operator)	2024	One ton with tools (Less operator) 4X4	39.55	128
Lowbed c/w tractor 8 axle 62,000kg	2022	Kenworth	217.40	128
GPS attachment for Excavator or Dozer	n/a	TOPCON	27.00	19
plate tamper	n/a	plate tamper 1500 lbs	21.40	106
B Train Sidedumps	2024	Kenworth + 2 sidedumps Sidedumps 13.1m3 c/w rock boxes rock rates	220.18	127

Note: Rates based on 9 hr regular working day. Rates include attachement of necessary equipment for the scope of work.

SCHEDULE 3 - TENDERER'S QUALIFICATIONS

As a reminder -by submitting a tender a tenderer is representing that it has the competence, qualifications and relevant experience to do the Work.

A. COMPANY EXPERIENCE

Tenderers shall provide summaries of three (3) comparable projects together with references (name and contact information of owner/agent) for each comparable project. Comparable projects shall be those that include excavation within stream channels, placement of armour within stream channels, and construction of instream large woody debris habitat incorporating timber piling.

Tenderers shall provide correct contact information and correct names of references able to speak about their experience with the Tenderer.

Tenderers shall include a completed table for Company Experience in a format similar to Schedule 3A following:

B. EXPERIENCE OF PROJECT TEAM

Tenderers shall list the names of the key members of the Project Team and shall indicate their previous experience.

At a minimum the following Job Categories shall be included:

1. Project Manager
2. Construction Superintendent
3. Construction Foreman

Tenderers shall include a completed table for Experience of Project Team in a format similar to Schedule 3B following:

SCHEDULE 3A - COMPANY EXPERIENCE

Name of Project	Reference (Owner / Agent Name)	Reference (Contact Information)	WORK DESCRIPTION	VALUE ($)
Lorenzetta Creek Flood Recovery	Ministry of Environment and Climate Change	KWL, Brett Barker, 250-503-5806, bbarker@kwl.ca	**Hope, BC.** The Lorenzetta Creek project involves sediment removal 12,548m3, channel widening and deepening, and habitat restoration to address past flood damage. This includes installing erosion controls, bypass pumping, removing sediment through instream excavation, placing large woody debris for habitat, and planting trees/shrubs/live stakes. Clearing and Grubbing - 13,000m², Tree Falling - 77 trees, Invasive Species Removal - 7,000m², Large Woody Debris Install - 11, Plantings - 8,300 plants. **2024-08-01 / 2024-12-06**	$1,371,513.50
Rockwell Dr Flood Recovery Sites DF1, DF2, and DF3	Ministry Of Transportation and Highway Infrastructure	McElhanney, Oliver Schrul oschrul@mcelhanney.com 778 793 0516 Oliver Schrul	**Rockwell Dr, Agassiz.** SITE DF1- Construction of cast-in-place concrete box culvert 2700mmx2400mmx 12.0m at DF1 site, cast-in-place headwalls, with hot dip galvanized steel Debris rack, hot dip galvanized handrails on headwalls, rip rap drainage channel at outlet using Presto Geoweb GW30V6. SITE DF2- Cast-in-place concrete box culvert 2400mmx1800mmx 28.5m at DF2 site, cast-in-place headwalls with hot dip galvanized handrails, rip rap swales outlet and inlet, 600mm x13.5m polymer coated CSP culvert. SITE DF3- 2000mm 14.5m polymer coated CSP culvert, cast-in-place concrete headwalls with energy dissipating baffle, construction of 51m of class 50kg grouted riprap at 70% slope with check dam, hot dip galvanized handrails on headwalls. 150ea Road barriers including drainage barriers. Traffic signs barrier mounted, one post, and two post. Asphalt paving 1,521 sq m with cold milling lap joints and tack coat. Revegetation planting including topsoil blowing, planting 379 trees and hydroseeding. **2023-08-07 / 2023-11-28**	$3,772,265.85
Instream Works Culvert installation	City of Chilliwack	dtyson@islengineering.com ISL Engineering & Land Services 604-530-2288 Darryl Tyson	**City of Chilliwack.** Installation of 30m of 3.05 x 1.52m precast concrete box culvert across Yarrow Central in Chilliwack, c/w road reconstruction, 100meters of CRB with MMCD hand rail, remove and dispose of existing twin 160 mm CSP culvert.50 meters od Sierra scape wall, 25KG Riprap and coho space gravel. 2022-08-16 / 2022-10-28	$835,000.00
Big Bar Lake Rd Fifty Seven Creek-RD Realignment and Culvert Replacement	MOTI - Ministry Of Transportation and Highway Infrastructure.	Stephen.Raaflaub@stantec.com Stantec - Stephen Raaflaub P.L.Eng. 236-333-8355	**Clinton, BC .** Realignment of Big Bar Lake Rd and install a new concrete box culvert; roadway and drainage construction; 3.06 hectares of clearing and grubbing, drainage excavation, Removal of existing culvert and fencing, installing 110 meters of Type C1 Fencing. Installation of 28 meters of Install 600mm CSP, 60 meters of Install 800mm CSP, 37 meters of Install 1200mm CSP, 17 meters of Install 2995mm x 2100mm Concrete Box Culvert (CBX). Installation of 59m3 of class 10kg, 48m3 of class 25kg riprap, 59m3 of class 50kg riprap, 20m3 of class 100kg riprap. 2021-11-01 / **2022-12-30**	$1,823,304.20
Fraser River Erosion Protection	City of Chilliwack	Northwest Hydraulic Consultants (604) 980-6011 Aaron Blenzy, P.Eng. - Hydrotechnical Engineer-ablezy@nhcweb.com 6043475791	**Chilliwack, BC.** Supply all labour, materials, and equipment to provide approximately 9,300 cubic metres (15,810 tonnes) of new riprap riverbank armoring. 2022-01-05 / 2022-03-15	$918,415.16

SCHEDULE 3B - EXPERIENCE OF PROJECT TEAM

Job Category	Name	Summary of Related Experience
Project Manager G.Andres Murillo	Lorenzeta Flood creek recovery	In charge of overseen, coordinating all work activities Progress draws, project schedule and material submital
	Rockwell dr. flood recovery MOTI	In charge coordinating excavating, concrete cast in place and box culvert constructional Ensure schedule was met, review Progress draws
	Fraser River Erosion protection- City of chilliwack	In charge procuring materials, review drawings, coordinate all work activities, review Progress draws, and project schedule
Superintendent Travis Neels	Instream works culvert installation	Directed crews, coordinate works with site inspector and project coordinator, ensure project was ontime, work with the foreman
	Fraser River Erosion protection- City of chilliwack	Directed crews, review progress draws, coordinate works with site inspector. performed tailgate safety meetings, keep project ontime. work with the foreman
	Big Bar lake rd 57 creek rd realignment MOTI	Directed crews, review progress draws, coordinate works with site inspector. performed tailgate safety meetings, keep project ontime. Work with the foreman
Foreman Liam Janssen	Lorenzeta Flood creek recovery	Worked together with the Superintendent directing excavation, placing and clearing crews. Ensure productions, safety standards were maintained. Work along Environmental representative.
	Fraser River Erosion protection- City of chilliwack	Worked together with the Superintendent directing Riprap placing coordinate trucking and delivery of materials. Ensure productions, safety standards were maintained.
	Big Bar lake rd 57 creek rd realignment MOTI	Worked together with the Superintendent directing excavation, placing material as well as the installation of culverts and bypass traffic Ensure productions, safety standards were maintained. Work along Environmental representative.
Safety Officer Level 3 COR certified Melissa Martin	Engage in all project since 2017	Performed pre-job safety inspections and site hazardous assessments, safety meetings, Ensure job safety and review incident and near misses at job sites.

Add additional pages if required.

SCHEDULE 4 - LIST OF SUB-CONTRACTORS

The Tenderer shall list all Sub-Contractors that they intend to use on this project, and the phase of the work that each will be undertaking, including at least the following:

Work Component	Name of Subcontractor	Value of Work/Scope Performed (% or % of Total Tender Price)
Timber Piling	Torque and Hammer Pile Driving Ltd	2%
Revegetation	KDF construction & Development	5%

SCHEDULE 5, – PRELIMINARY CONSTRUCTION SCHEDULE

The Tenderer shall include all milestone dates listed and, at a minimum, shall identify the schedule for all activities shown in Table 2 of Section 1.05 of the Specification." All dates and Activities shall be identified by the Contractor with reference to and meeting Project Milestones.

Project Milestones:	Assumed Notice to Proceed Dates:	Refer to Invitation to Tender-Key Dates and Times
	Substantial Performance Date:	Refer to Invitation to Tender-Key Dates and Times
	Instream Work Window:	August 1 to September 15, 2025
	Total Performance Date:	Two Weeks After Substantial Performance

Activity	February 21st	2 WEEKS PERIODS											August 1st	13	14	15	16	17	
		1	2	3	4	5	6	7	8	9	10	11							
Assumed Notice to Proceed	X																		
Mobilization																			
Clearing and Grubbing																			
Assumed Notice to Proceed - Major Works																			
Access and Laydown																			
Access Ramp																			
Basin Access Gate																			
Instream Work Window - Aug 1 to Sept 15, 2025																			
Excavation to Lot 8-3-3 (Bridge)																			
Void-Filled 500 mm Boulders																			
500 mm Minus Fill																			
Excavation to Lot 8-3-3 Berms																			
Excavation for On-Site Use																			
Excavation to Off-Site Disposal																			
LWD Fill and Bracing Logs																			
Imported Logs (Conditional Work)																			
Substrate-filled Type I Rock																			
500-kg Riprap																			
250-Kg Riprap																			
Void-filled 900 mm Boulders																			
Grade Control Spines																			
500 to 1200 mm Complexing Boulders																			
LWD Fill and Bracing Logs																			
Imported Logs																			
500 to 1200mm Complexing Boulders																			
WRC Stems and Stumps for Onsite Use																			
Anchored WRC Rootwads																			
Habitat Channel Construction (off-channel)																			
Live-staking																			
Riparian Planting																			
Seeding																			
Resurfacing of Taylor Road (Conditional Work)																			
Substantial Performance																		X	
Total Performance **Two weeks after Substantial Performance**																			
Demobilization																			

Regardless of Assumed Notice to Proceed issuance date, the Instream Work Window dates shall be adhered to with no changes. The Tenderer shall adapt their work schedule to meet the Instream Work Window.

Assumed Notice to Proceed - Clearing and Grubbing: shall be for Works identified as such in the contract documents.

Assumed Notice to Proceed – Major Works: shall be for all other Works in the contract documents.

SCHEDULE 6 - TENDERER'S PROPOSED VARIATIONS

A tenderer may, at the tenderers election, submit proposed variation(s) which varies the materials, products, designs or equipment from those approved under the Contract Documents, or approved by the Owner , as Approved Equals, as the case may be.

A variation must be in addition to and not in substitution for, a tender which conforms to the requirements of the Contract Documents. Variations shall only be identified and listed separately in this schedule.

The only variation that the Owner may accept is a variation submitted by that tenderer whose conforming tender would have been accepted by the Owner in preference to other tenders, if no variation had been invited.

Additional pages may be attached to this page and/or separate numbered documents such as specifications, descriptive literature and drawings may be submitted with this Schedule.

Each such additional page and/or separate document shall be clearly marked "Deroche Creek Recovery Solution FORM OF TENDER - SCHEDULE 6," and shall be signed by the Tenderer.

See attached page "Proposed Variations"

PROPOSED VARIATIONS

Material Substitutions:
• Replace the proposed 500 mm / 900mm boulders for armoring with an alternative rock material that has similar strength but is locally sourced to reduce transportation costs and emissions.
• Replace any of the import material with locally source material.

Design Modifications:
• Propose a revised sediment basin configuration that minimizes excavation while maintaining the required capacity. This could involve slight adjustments to the grading plan.
• Optimize the layout of Reach 1 timber pile deflectors to reduce the total number of piles while ensuring hydraulic effectiveness.

Alternative Construction Methods:
• Use a modular geocell system for the equipment access ramp instead of traditional materials. This can allow for easier installation and reduced soil disturbance.

• Planting and Revegetation Adjustments:

gam



EXPERIENCE AND QUALIFICATIONS

Experience and Qualifications

Proponent Description

Established in 2004, Timbro Contracting is a civil construction company headquartered in Agassiz, BC that offers its services across the Lower Mainland and Fraser Valley. Over the years, Timbro has established itself as a reputable entity in the industry, with a workforce of over 80 skilled employees capable of executing a diverse range of projects.

Knowledge, Skills, and Experience

Over the years, Timbro Contracting has demonstrated exceptional performance, having successfully completed over several million dollars in projects that range from modest private endeavours to large-scale municipal undertakings. Our team of superintendents, possessing extensive knowledge and experience in the field, lead these projects with an unwavering dedication to producing the highest quality results for our clients. Specializing in heavy civil construction, Timbro Contracting offers a broad spectrum of services that include, but are not limited to, clearing and grubbing, earthworks (excavation and stabilization), water treatment plants and reservoirs, road works, and sanitary, storm, and water pipe laying.

Roles and Responsibilities

Timbro has amassed a wealth of experience and has established robust relationships with essential subcontractors to ensure project success. Timbro's Project Manager, Superintendent, Sub-contractor and support staff will play pivotal roles in the achievement the Project objectives.

TIMBRO
CONTRACTING

WORK SUMMARY OF THE COMPANY



COR CERTIFICATE

Certificate of Recognition

HEALTH & SAFETY

This certificate is awarded to

Timbro Contracting Ltd.

For developing, implementing, and successfully auditing a health and safety management system that meets the approved industry standards, and for demonstrating a continuous commitment to raising the standard of worker health and safety in the province of British Columbia.

TODD MCDONALD
Head of Prevention Services

WorkSafeBC

MIKE McKENNA
Executive Director

BCCSA BC Construction Safety Alliance

Certificate Number: 0007156671120230227HL
WorkSafeBC Legal Name: TIMBRO CONTRACTING LTD.
WorkSafeBC Account Number: 715667

Classification Unit(s): 721031
Certified as Large / Small Employer: Large
Expiry Date: 11-Feb-2026

CAR CERTIFIED

The information on this certificate may be confirmed in the Certificate of Recognition (COR) section of WorkSafeBC.com

KERR WOOD LEIDAL
consulting engineers

Appendix D

DFO-Authorization under the Fisheries Act

See SI #03

KERR WOOD LEIDAL
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Appendix E

DFO-Scientific Fish Collection Permit

See SI #03

KERR WOOD LEIDAL
consulting engineers

Appendix F

BC Ministry of Water, Land and Resource Stewardship – Change Approval under the Water Sustainability Act

November 13, 2024 File Number: 2011239

Amy Vallarino
BC Ministry of Environment and Climate Change Strategy
PO BOX 9360 Stn Prov Govt
Victoria , BC V8W 9M2
Sent via email: Amy.Vallarino@gov.bc.ca

Dear Amy Vallarino,

Re: Application for approval to make changes in Deroche Creek and Nicomen Slough That Part of SW1/4 Lying West of District Lot 475, Group 1, and East of Nicomen Slough, Section 5, Township 24, East of the Coast Meridian, 29TR1A_IR, in the Vicinity of Lakahahmen IR 11 New Westminster Regional District. Unsurveyed Crown foreshore or Land Covered by Water being part of the Bed of the Deroche Creek and lands held under Permit # 29854 authorizing the Occupation of Crown Land.

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

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

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

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

The holder of this Approval must advise Water Authorizations at SouthCoastWSAReporting@gov.bc.ca with the Approval number in the subject line, five (5)

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

working days prior to commencement and five (5) working days following completion of the authorized work to facilitate the timing of auditing.

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

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.

When choosing compensation/restoration locations, it is encouraged to avoid areas that are isolated or are discontinuous from existing habitat, to avoid creating habitat sinks, and enable wildlife access.

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

The holder of this Approval must 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.

You are reminded of requirement to comply with Permit # 2024-02415 issued by the Ministry of Transportation "Permit to Construct, Use and Maintain Works within the Right of Way of a Provincial Public Highway" Under the Transportation Act and/or the industrial roads Act and/or the Motor Vehicle Act and/r as defined in the Nisga'a final agreement and the Nisga'a final Agreement Act dated May 7, 2024.

It is the Ministry's understanding that Leq'a:mel First Nation will be maintaining the sediment basin following completion of works. Future maintenance of the basin (e.g. additional sediment removal) is not authorized under this Change Approval and will require appropriate authorization. If regular maintenance is expected to be required, the holder of this Approval is encouraged to apply for a Water Licence as soon as possible.

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: Janice Kwo, KWL, Email: jkwo@kwl.ca
Pradeep Poudel, Ministry of Water, Land and Resource Stewardship, Email: Pradeep.1.Poudel@gov.bc.ca
Leq'a:mel First Nation (LFN)
Peters First Nation
Snuneymuxw First Nation
S'ólh Téméxw Stewardship Alliance Strategic Engagement Agreement
People of the River Referral Office (PRRO)

November 13, 2024 File Number: 2011239

APPROVAL

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

Ministry of Environment and Climate Change Strategy and Leq'a:mel First Nation
are hereby authorized to make changes in and about a stream as follows:

(a) The names of the streams are Deroche Creek and Nicomen Slough, herein referred to as the stream(s).

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

1. Deflection Berms/Reach 1:

   i. Clearing of vegetation and trees along the access path and within the berm footprints from Taylor Road over an approximate footprint of 2400 square metres.
   ii. Placement and compaction of subgrade and fill for the berm(s).
   iii. Installation of riprap at the head of the berm.
   iv. Install high-performance turf reinforcement (HPTRM) along the trunks of both berms, with soil amendments and revegetation augmentation.
   v. Restoration of the site with native riparian plant species and willow staking on the installed riprap at the end of the berm and placement of cleared trees between the berms in order to provide fish cover during high water conditions, all over an area of approximately 6667 square metres.

2. Sediment basin

   i. Clearing of vegetation and trees along the access path from Taylor Road to the downstream extent of the sediment basin and on the

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

east bank of Deroche Creek within the basin footprint over an area of approximately 6200 square metres.
ii. Site isolation and dewatering, including us of pumps as required.
iii. Install exclusion fencing to prevent fish access.
iv. Excavation and grading of the sediment basin.
v. Installation of riprap back-filled with an appropriate growing substrate for vegetation above the normal high-water mark.
vi. Establish a low-flow channel through the basin to convey base surface flows once they return to the creek.
vii. Restoration of the site with native riparian plant species and willow staking on the installed riprap at the end of the berm and placement of cleared trees between the berms in order to provide fish cover during high water conditions, all over an area of approximately 6328 square metres.

3. Taylor Bridge:

i. Clearing of vegetation and trees along the access path from Taylor Road.
ii. Site isolation and dewatering, including use of pumps as required.
iii. Excavation of sediment to subgrade, placement of boulders in a checkerboard pattern and filling voids using excavated sediment.
iv. Restoration of the site with native riparian planting over approximately 414 square metres.

4. Offset Measures

i. Construction of four habitat channels within the northeast and southeast portions of the Deroche Creek alluvial fan over approximately 1325 square metres.
ii. Installation of a large woody debris reef along the Highway 7 embankment to improve habitat complexity, limit erosion, and encourage natural channel migration away from the south bank of Nicomen slough, all over an area of approximately 1200 square metres.
iii. Installation of habitat complexing features, including installation of large woody debris in the sediment basin low flow channel over an area of approximately 700 square metres.
iv. Enhancement of the existing riparian habitat along Deroche Creek via planting of native shrubs and trees and removal of invasive species, all over an area of approximately 9800 square metres.

That Part of SW1/4 Lying West of District Lot 475, Group 1, and East of Nicomen Slough, Section 5, Township 24, East of the Coast Meridian, 29TR1A_IR, in the Vicinity of Lakahahmen IR 11 New Westminster Regional District. Unsurveyed Crown foreshore or Land Covered by Water

being part of the Bed of the Deroche Creek and lands held under Permit # 29854 authorizing the Occupation of Crown Land.

(c) The location of the works is at the following coordinates, as provided by the applicant are:
    1. Offset locations: 49.1825390, -122.0708980 and 49.1841060, -122.0717250.
    2. Sediment basin: 49.1851240, -122.0750980.
    3. Taylor Road Bridge location: 49.1837530.
    4. Deflection berms: 49.1828910, -122.0735630.

(d) The works authorized in this Approval must be completed on or before. December 31, 2025.

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

(f) All works associated with the Effectiveness Monitoring Plan, as outlined in clause (x) below, must be completed by December 1, 2035, ten years after the works are completed.

(g) As much as is practicable, the construction area(s) and access routes must be marked on-site prior to starting groundwork. Any vegetation removal must be minimized and limited only to the areas required for active construction, with consideration for the timing and scheduling of work.

(h) Work in the stream and stream channel must occur during the reduced risk instream work window of August 1 to September 15, so that the fisheries interests are protected:

(i) All works must be completed within the designed project footprint and in accordance with the following:

    1. “Deroche Creek Sediment Long-term Solution Project: Environmental Assessment” prepared by Kerr Wood Leidal Associates Ltd. for the BC Ministry of Environment and Climate Change Strategy dated September 15, 2023.
    2. “Deroche Creek Sediment Long-Term Solution Project: Environmental Assessment and Offsetting Plan” prepared by Kerr Wood Leidal Associates Ltd. For the BC Ministry of Environment and Climate change Strategy dated May 29, 2024.
    3. Deroche Creek Sediment Long-Term Solution Project “Construction Environmental Management Plan” prepared by Kerr Wood Leidal Associates Ltd. For the BC Ministry of Environment and Climate

Change Strategy dated September 29, 2023, and updated on December 18, 2023.

4. " Deroche Creek Recovery Solution Project: Final Hydrotechnical Design Report Rev.0" prepared by Northwest Hydraulic Consultant (NHC) for Ministry of Environment and Climate Change Strategy dated May 27, 2024.
5. "Leq'a:mel First Nation Permit Report: Archaeological Assessment Deroche Creek, Phase 1" prepared by Summit Earthworks Inc. for Leq'a:mel First Nation Lands Department dated October 31, 2023.
6. Sealed Engineering drawings IFT for Deroche Creek Recovery Solutions prepared by NHC for Ministry of Environment and Climate Change Strategy and Leq'a:mel First Nation dated 30 April 2024, including:
   v. 001 Title Sheet and Project Location
   vi. 002 Site Plan
   vii. 003 Reach 1 Works Plan and Profile Views
   viii. 004 Reach 2 Works- Plan and Profile Views
   ix. 005 Reach 1 Typical Sections and Profiles
   x. 006 Reach 2 Typical Sections and Profiles
   xi. 007 Sediment Basin- Standard Sections
   xii. 008 Lot 8-3-3 Grading Plan
   xiii. 009 Off-Setting Works
   xiv. 010 Off-Setting Works- Typical Sections and Profiles
   xv. 011 Planting Plan

(j) 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 must:

1. Ensure all best management practices and mitigation measures are in place to avoid and minimize environmental impact on the land and on fish and fish habitat of the stream.
2. Where applicable, assist in the isolation of the stream prior to the commencement of works.
3. Implement and ensure erosion and sediment control measures are constructed, installed, and maintained appropriately for the full duration of instream works.
4. Supervise all instream works authorized under this Approval.
5. When the works involve temporary diversions to isolate the work site,
   i) Monitor all diversion works daily to ensure pumps & flow bypasses are in proper working condition;
   ii) Ensure diversion works that include pump intakes be screened for fish and aquatic species in accordance with the "Interim

code of practice: End-of-pipe fish protection screens for small water intakes in freshwater" (Fisheries and Oceans Canada, 2020); and

iii) Ensure fish are prevented from entering the works.

6. When the works involve dewatering or isolation of flow and the stream is known or suspected to contain fish and/or amphibians,
   i) Attend the site prior to conducting any instream works to complete fish and wildlife search and salvage(s);
   ii) Obtain any permits needed prior to undertaking the salvage(s); and
   iii) Inspect the extraction area for fish stranding at least once after water levels have declined.
   iv) Protect the species at risk and salvage under the direction of a Qualified Environmental Professional in the event of discovery of species at risk. The works must not result in harm to species at risk.
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. 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 must 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.

(k) All work must be carried out in accordance with the Provincial "Requirements and Best Management Practices for Making Changes In and About A Stream in British Columbia" (2022). The Provincial guidance document can be found at the following link: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/wsa-cias-requirements-bmps.pdf .

(l) 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.

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

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

(o) All equipment and machinery used in or near the stream channel:

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 refueled a minimum of 30 meters 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 must be exercised during all phases of the work to prevent the release of silt, sediment, sediment-laden water, raw concrete, concrete leachate, or any deleterious substances. All control measures must meet or surpass the Requirements and Best Management Practices for Making Changes in and About a Stream in British Columbia (2022) and the "Land Development Guidelines for the Protection of Aquatic Habitat" (Fisheries and Oceans Canada and the British Columbia, 1993).

(q) Discharge and runoff water from the site into any watercourse(s) must comply with the BC Approved Water Quality Guidelines for the Protection of Aquatic Life (https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines/approved-water-quality-guidelines) and/or the applicable Local Government Bylaw(s) .

Water quality monitoring must be conducted by an appropriately Qualified Professional or a designate (in writing) Environmental Monitor on every day in which instream works are being conducted. Measurements must be taken upstream of any works taking place and within the extent of the sedimentation downstream of where instream work is actively occurring. Measurements are to be taken immediately prior to works beginning, and then at regular intervals until the works are completed and may require additional frequency during wet weather conditions. Wet weather conditions will be defined as being equal to or greater than 25 millimetres of rainfall within a 24-hour period. All excavated material and debris must be removed from the site or placed in a stable area above the high water mark of the stream. Mitigative measures must

be applied to protect the excavated material and debris from erosion and reintroduction into the watercourse. These measures may include covering the material with erosion blankets, seeding and planting with native vegetation, or as otherwise directed by a Qualified Professional.

(r) All excavated material and debris must be removed from the site or placed in a stable area above the high-water mark of the stream. Mitigative measures must be applied to protect the excavated material and debris from erosion and reintroduction into the watercourse.

(s) The holder of this Approval must ensure that instream works are designed and installed so as not to restrict fish passage and/or lead to fish stranding. The works must not result in depressions that have the ability to trap fish and other aquatic life.

(t) All temporary works (including a ford, stream crossing, flow bypass, and erosion and sediment control measures) must be removed on completion of the project, and the stream channel restored to its natural condition.

(u) All disturbed areas of the banks of the stream must be restored using native vegetation suitable for the site conditions.

(v) All rock used in the works must be clean and free of sediment producing material, durable, non-acid generating and suitably graded. Any other engineering material required for the construction of the works must be clean of any substances deleterious to aquatic life.

(w) 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 must cease if the Drought Level Classification is at Level 5. The proponent must contact WLRS and DFO 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 WLRS and DFO.

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 must 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 must be inspected regularly and maintained throughout the project.

(x) The holder of this Approval must retain an appropriately Qualified Professional to develop and implement a Five-Year effectiveness monitoring for aquatic habitat and channel function and Ten-Year Effectiveness Monitoring Plan for riparian habitat 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. Invasive species management; and
4. Monitoring water flow and function with proposed adaptive management strategies to address shortfalls.
5. Monitoring of Fish habitat (Water Quality, Water Quantity/Flow, Habitat Quantity/quality), Fish community (fish diversity, relative abundance), Riparian habitat (vegetation cover, density and survival, riparian stability)
6. Monitoring of sediment basin for its performance, functionality and stability, the monitoring parameters could be photo documentation, sediment volume, elevation of riverbed, scouring or undercut banks etc.

Annual reports must be submitted by December 1 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.

(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 must 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 pre-construction and post-construction surveys if undertaken;
5. The quantity of gravel removed;
6. Representative site photographs;
7. Whether or not they observed or were otherwise aware of any non-compliance with the terms and conditions of this Approval; and

8. A description of any environmental incidents, non-compliance or other difficulties, and how these were addressed and reported.

Sincerely,



Michael Currie
Assistant Water Manager

Province of British Columbia
Water Sustainability Act

PERMIT 29854 AUTHORIZING THE OCCUPATION OF CROWN LAND

The holders of this permit, BC Ministry of Environment and Climate Change Strategy and Leq'a:mel First Nation (29854), whose Change Approval authorizes changes in and about a stream (Deroche Creek and Nicomen Slough), are hereby authorized to occupy Crown Land by constructing, maintaining and operating the works as authorized in the Change Approval (2011239).

(a) The Crown land which is authorized to be occupied under this permit is Unsurveyed Crown foreshore or Land Covered by Water being part of the Bed of the Deroche Creek, the location of which is shown approximately on the plan listed in said Change Approval.

(b) The approximate area of the Crown Land authorized to be occupied under this permit is 0.754 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

KERR WOOD LEIDAL
consulting engineers

Appendix G

BC Ministry of Water, Land and Resource Stewardship – Scientific Fish Collection

See SI #03

KERR WOOD LEIDAL
consulting engineers

Appendix H

BC Ministry of Water, Land and Resource Stewardship – General Wildlife Permit

See SI #03

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consulting engineers

Appendix I

Leq'a:mel First Nation – Soil Law Permit
(Pending)

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Appendix J

Access Agreements

KERR WOOD LEIDAL ASSOCIATES LTD.
consulting engineers

Leq'á:mel First Nation

43101 Leq'á:mel Way
Deroche, BC V0M 1G0
Tel: 604-826-7976
Fax: 604-826-0362
www.leqamel.ca

November 1, 2023

Sent via email.

Amy Vallarino
Senior Project Manager
Flood Debris Management Secretariat
Ministry of Environment
amy.vallarino@gov.bc.ca

Dear Amy:

Re: General Letter of Support for sediment management in the Deroche Creek sub-basin

Leq'á:mel First Nation (LFN) is greatly concerned about the impacts of climate change and the management of sediment in our area, particularly for Deroche Creek. Deroche Creek lies at the heart of Leq'á:mel Territory, over which we continue to exercise and assert our unextinguished Indigenous Rights, Title and Governance. The headwaters of Deroche Creek originate directly above our present day reserve, Lakahahmen IR 11, and the Creek flows through the reserve, both through and adjacent to community lands (including the Leq'á:mel Cemetery) and privately held (i.e. allotted) land on-reserve as it enters Nicomen Slough. All of these waters have a deep historic connection with the Leq'á:mel people.

Leq'á:mel has a recognized self-governing authority over our reserve lands (i.e. Leq'á:mel Lands) as an operational signatory to the Framework Agreement on First Nation Land Management (FAFLNM). With our Land Code in place, we have implemented our own Indigenous Plans and Laws that guide and regulate all Land and Natural Resource-related activities and uses on Leq'á:mel Lands. The proposed sediment removal works occurring on-reserve must receive the consent and authorization of Leq'á:mel First Nation in accordance with Leq'á:mel Law. Generally, project-related applications are submitted to and reviewed by the Lands and Natural Resources Department (LNRD) and the Leq'á:mel Family Advisory Committee (FAC), and are brought forward to our Chief & Council for final review and approval.

Since the Atmospheric River Event (ARE) of November 2021, the LNRD has spearheaded a climate-informed, Indigenous-led, holistic and collaborative approach to watershed management in our area, including Deroche Creek. We note that, historically, watershed management has been lacking for us due to a fractured governance system, lack of communication and a lack of recognition of our Indigenous Rights, Authorities and Responsibilities. We are pleased with the relationship we have built with the Province since the ARE, the support we have received, and the willingness to adopt an Indigenous-led approach founded in the recognition of our Rights and Title and the protection of our people and property. We know and understand that the proposed works not only protect our members and tenants, but also our neighbors living in Deroche.

LFN is pleased to support the ongoing efforts at sedimentation management in the Deroche Creek watershed, subject to the final consent and approval of any project occurring on Leq'á:mel Territory in accordance with our Laws and Responsibilities.

Please don't hesitate to reach out to me to discuss this further.

Sincerely,

Stephen McGlenn
Director of Lands and Natural Resources Governance
Leq'á:mel First Nation
C: 604-226-9338
E: stephen@leqamel.ca

A quorum of Leq'á:mel First Nation is 4 of any 7 Elected Council members

BAND COUNCIL RESOLUTION
RESOLUTION DE CONSEIL DE BANDE
LEQ'Á:MEL FIRST NATION

Resolution #

DATE OF DULY CONVENED MEETING: February 12, 2024.

Approval of the Deroche Creek Recovery Project Environmental Assessment

WHEREAS

Deroche Creek is central to the Leq'á:mel people and our cultural and environmental well-being, flowing through the core of our Territory both on and off reserve;

Deroche Creek has experienced significant environmental and cumulative impacts due to industrial logging as well as climate change, and Leq'á:mel has had to advocate for management actions in Deroche Creek, including sediment removals, for the last several decades. Due to several factors, including logging and climate change, the risks, hazards and vulnerabilities to Leq'á:mel from Deroche Creek - including further sedimentation, habitat loss, land slides, debris flow, flooding and risks to people, property and critical infrastructure - are increasing and require new management and governance approaches;

Since the Atmospheric River Events (ARE) of 2021, there has been emergency sediment removal works conducted in Deroche Creek with support from BC and Canada, however the intent of these works was limited to removing sediment deposits to "pre-ARE" levels, and not to improve habitat or to develop further flood resilience for our community.

The Lands and Natural Resources Department has been working with BC and Canada to advocate for a better solution to the management of sediment deposition in Deroche Creek, and to protect our people and community from the risks posed by a rapidly changing climate.

In a collaborative approach between LFN and the Province of BC, and with support from Northwest Hydraulics (NHC) and Kerr Wood Lidel (KWL), an innovative approach to sediment management on Deroche Creek has been proposed, which includes the installation of a sediment catch basin. This is an engineered structure which would be located on-reserve, primarily on Lot 8-13 3538R RSBC, Lakahahmen IR11, which is held via Certificate of Possession.

The project is proposed to occur in the Creek bed and requires both Provincial and Federal approvals. These approvals are time sensitive as they depend on timing of least risk windows to bird and fish habitat.

The Province has agreed to fund and sub-contract the project to Leq'á:mel First Nation, thereby allowing the Nation to control the project procurement. The project is proposed to occur in two stages, with tree clearing occurring in the early spring, and project construction slated for Summer 2024. Construction is expected to be complete in October, 2024.

Leq'á:mel (LFN) is self-governing over our on-reserve lands and natural resources pursuant to the Framework Agreement on First Nation Land Management and the Leq'á:mel Land Code,

and the project requires approval under the LFN Environmental Assessment (EA) Law, and the consent of the Registered Property Owners, in order to proceed to construction.

On December 15, 2023, an EA and Project Description was submitted to LNRD by NHC. An EA Completion Report was presented to the Family Advisory Committee. On January 25th, 2024, the LNRD presented an EA Completion Report to the FAC, which issued a recommendation to Chief & Council to approve the Deroche Creek Environmental Assessment, subject to all applicable laws, including the Leq'á:mel Land Code.

THEREFORE BE IT RESOLVED,

That the Chief & Council of Leq'á:mel First Nation hereby approve the environmental assessment for the Deroche Creek Recovery Project, and instruct the Director of Lands and Natural Resources Department to:

1. Notify the Province, NHC and KWL of the approval;
2. Ensure the consent of the Registered Property Owner is obtained in writing prior to any works occurring on their premises;
3. Initiate the project procurement processes under LFN Policy for the project to commence.

Dated at Deroche, BC this 12th Day of February, 2024.

Alice Thompson
Chief Councillor

Darrel McKamey
Councillor

Camielle Laslo
Councillor

Sandy McDonald
Councillor

Philip Sherwood
Councillor

Barbara Leggat
Councillor

Dawn Styran
Councillor

Leq'á:mel First Nation

43101 Leq'á:mel Way
Deroche, BC V0M 1G0
Tel: 604-826-7976
Fax: 604-826-0362
www.leqamel.ca

Lorraine Lewis
Registered Property Owner
Lot 8-13, 3538R RSBC, Lakahahmen IR11

Dear Lorraine,

Re: Consent for Deroche Creek Recovery Project

This letter is to confirm your understanding and consent for emergency and recovery works to occur on your property in 2024 as described below. Before signing this letter, you are encouraged to seek independent legal advice.

In response to the Atmospheric River Events (ARE) of 2021, a large amount of sediment was deposited in Deroche Creek, which runs through your property. Emergency works authorized by Leq'á:mel First Nation, the Province of BC and the Department of Fisheries and Oceans Canada allowed us to remove the sediment to "pre-ARE levels". However, due to a combination of climate change and improper forestry practices in the Deroche Creek basin, sedimentation deposition will be an ongoing challenge that requires a long-term solution. If we do not address the problem of sedimentation in Deroche Creek, people, property, environment and critical infrastructure is at an increasing risk from flooding, debris flow and other risks related to Deroche Creek.

In collaboration with Keir Wood Lidel (KWL), Northwest Hydraulics (NHC), and the Province of BC, LFN has successfully proposed and received funding commitments to construct a "sediment basin" in Deroche Creek. This infrastructure is designed to capture and direct the deposit of sedimentation in a way that prevents and reduces risks to people, property, environment and critical infrastructure. Leq'á:mel is seeking your consent to construct this emergency infrastructure on your property. As part of the ongoing maintenance and operations of the sediment basin, LFN and our contractors will need regular access through your land to access and maintain the basin, as well as to remove accumulated sediment so that the basin can continue functioning. We anticipate accessing the basin to remove sediment will likely occur every 5-7 years, however the frequency could change depending on future weather events and the behavior of the Creek.

To secure access to the property and to ensure that your rights are protected, we are working with legal to establish a formal agreement with you that would be registered against the title of the property in the First Nation Lands Registry System. I will be in touch with you soon in this regard.

The first phase of construction is tree removal. Based on our environmental assessment, approximately 99 trees will need to be taken down. However, some of these trees will be re-used on site in innovative ways and will actually form a part of the flood mitigation infrastructure. Other trees will be chopped and bucked for firewood, and some trees with cultural significant may be set aside for use in the construction of the Leq'á:mel Longhouse. Due to the approaching bird nesting season, we hope to begin tree removal by the end of February or early March.

The second phase of the project will take place after tree removal, and includes the removal of soil material from the Creek and constructing the sediment basin itself. The work is anticipated to be complete by October 2024.

I'm happy to provide you with the technical information about this project. Due to the emergency nature of the works, we are hopeful that you understand and support the need for the works to proceed as soon as possible, and that you will consent to the project.

By signing here, you agree to the following:

1. I have received full and sufficient information about the project;

2. On behalf of myself, my family and my heirs, in relation to any claims of any kind whatsoever relating directly or indirectly to the Deroche Creek Recovery Project, I hereby:
   (a) waive any claims I may have against Leq'á:mel First Nation, its Council, staff, employees, contractors, and agents against any loss or liability of any kind relating to such claims; and
   (b) indemnify Leq'á:mel First Nation, its Council, staff, employees, contractors, and agents against any liability, damages, or payments of any kind relating to such claims.

3. I am signing this form voluntarily and that I have had the opportunity to ask questions and seek independent legal advice before signing it.

Signed:

Lorraine Lewis
(signature) Lorraine Lewis

Date:

Witnessed:

Susan McKamey
(signature)

Date: April 24, 2024

Stephen McGlenn
Director of Lands and Natural Resources Governance
Leq'á:mel First Nation
41320 Lougheed Highway
Deroche BC V0M1G0

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Appendix K

Field Review Reports and Site Instructions

KERR WOOD LEIDAL ASSOCIATES LTD.
consulting engineers

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7AM	**OFF SITE**	4:45PM
DATE	June 9, 2025				
WEATHER	Temperature: 28°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 23 US AQI (Good). Main Pollutant: PM2.5. Wind: 0 km/h. Humidity: 77%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: Site startup, grubbing
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5
Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 845-2425
(Site Superintendent):	(604) 845-2425
(Foreman):	Liam Janssen (could not find contact)

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

1x Rock Truck
- MD0054578

1x Track Loader
- DO0700-03

1x Superintendent (off site at 4:15)
1x Foreman
2x Operator

CONSTRUCTION PROGRESS

Detail Progress

1. Clearing and grubbing main works area 2, approximately halfway to the bridge
2. Stripping stockpile area

REVIEWER'S OBSERVATIONS

Item 1

- Start of constructing going smoothly, just a few questions/clarifications from the contractor

Item 2

- Path to stockpile area moved further east to not interfere with the dyke

ETC

DISCUSSIONS WITH CONTRACTOR:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

Item 1

- Toay we're mostly doing layout with a little bit of grubbing

Item 2

- Travis asked about locations of contaminated soils, I showed him the workpoints table

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

- 2 positive interactions with local residents

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

- N/A

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Grubbing near beginning of day

Photo 2:



Laydown area

Photo 3:



Photo 4:

Stockpile area construction	
Photo 5:	**Photo 6**:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7AM	**OFF SITE**	12:30PM
DATE	June 10, 2025				
WEATHER	Temperature: 25°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 23 US AQI (Good). Main Pollutant: PM2.5. Wind: 0 km/h. Humidity: 77%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski and Sebastien Latrielle
KWL Activities: Inspection
Site Activities: Grubbing and stockpile prep
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	Liam Janssen (could not find contact)
(Site Superintendent):	(604) 845-2425
(Foreman):	Liam Janssen (could not find contact)

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

1x Rock Truck
- MD0054578

1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

1x Track Loader
- DO0700-03

1x Foreman
3x Operator

CONSTRUCTION PROGRESS

Detail Progress

- Grubbed around 10m of the sediment basin
- Laid out some of the access road to the stock pile
- Continued with the top layer of the stock pile.
- Work paused at 9:45 am.
- Stabilized berm at the stock pile and added plastic wrap to limit dust and ensure safety.

Field Review Report

KERR WOOD LEIDAL
consulting engineers

REVIEWER'S OBSERVATIONS

Item 1

- Work was passed as soon as possible. The berm of soil at the stockpile appeared sufficiently covered in wrap

Item 2

-

ETC

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Continuing grubbing and removing top soil at stockpile area.

Item 2

- Informed workers to pause work.

Item 3

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

- Discussed with members of LFN to pause work

Item 2

- Two positive interactions with surrounding neighbors who are happy that the work is happening.

ETC

-

ACTION REQUIRED:

Item 1

- Determine next steps to start project back up

Item 2

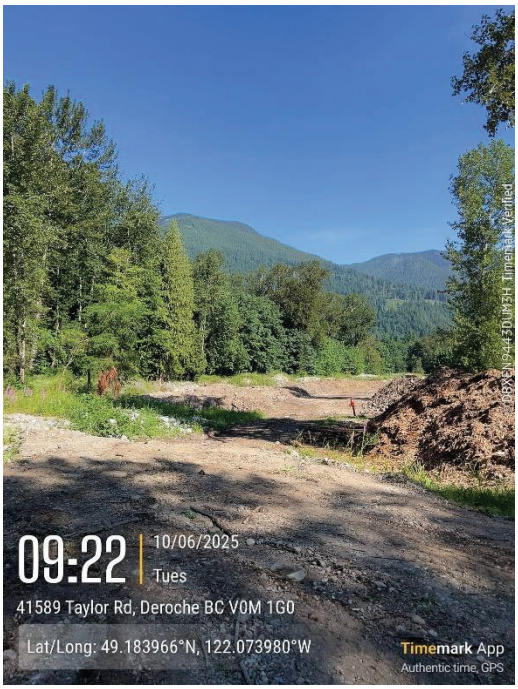
-

ETC

-

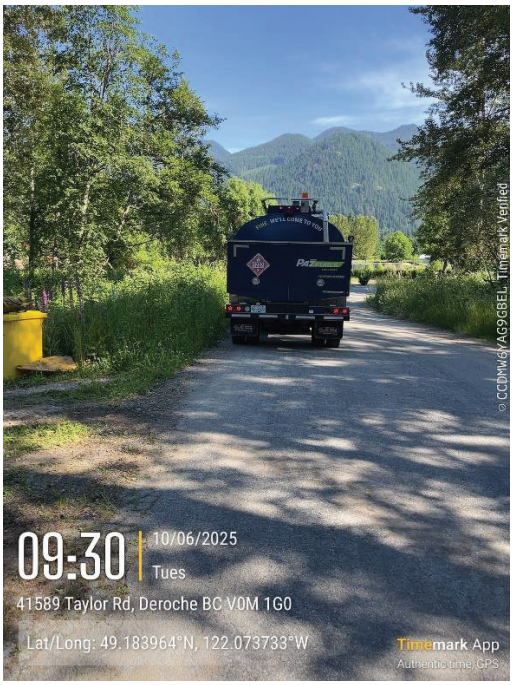
PHOTOGRAPHS

Photo 1:



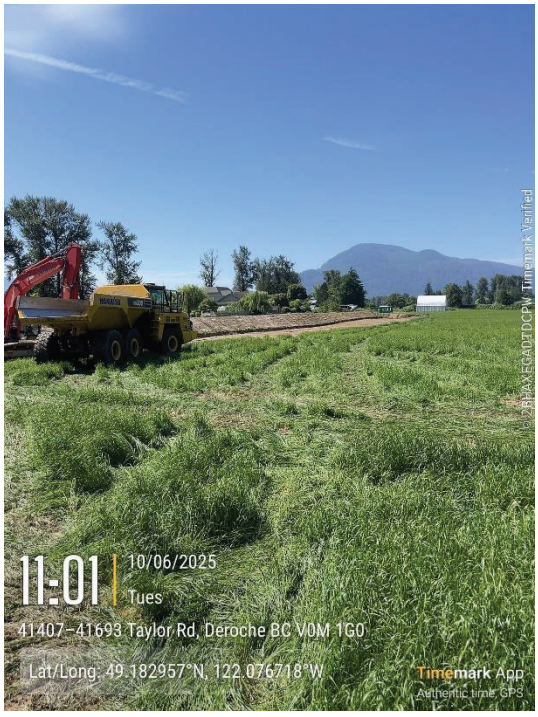
Site near beginning of day

Photo 2:



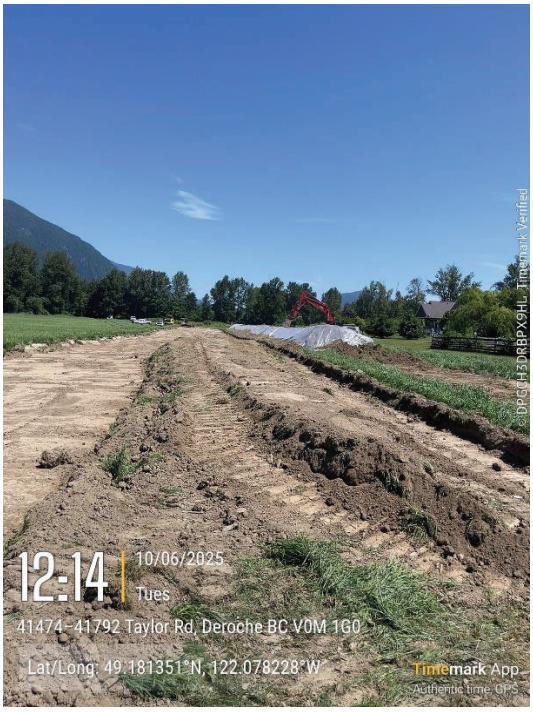
Fuel truck

Photo 3:



Path to stockpile being created

Photo 4:



Stockpile area as work was ending

Photo 5:



Stockpile area removed soil being covered

Photo 6:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7AM	**OFF SITE**	5PM
DATE	June 24, 2025				
WEATHER	Temperature: 23°C Precipitation: N/A Air Pollution Level: Moderate. Air Quality Index: 52 US AQI (Good). Main Pollutant: PM2.5. Wind: 4.7 km/h. Humidity: 77%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: Grubbing and Clearing
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	Liam Janssen (could not find contact)
(Site Superintendent):	(604) 845-2425
(Foreman):	Liam Janssen (could not find contact)

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

1x Rock Truck
- MD0054578

1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

1x Superintendent (onsite 7:30, offsite 8:30)
1x Foreman
2x Operator
1x Surveyor

CONSTRUCTION PROGRESS

Detail Progress

- More clearing
- Mostly completed laydown area

REVIEWER'S OBSERVATIONS

Item 1

- Reduced crew today, Travis said they would be back in full by later this week

Item 2

- No hauling offsite yet

ETC

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Survey of west bank for witness point 2 to be completed tomorrow, witness for Thursday

Item 2

-

Item 3

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

-

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Progress start of day

Photo 2:



Old stockpile

Field Review Report

Photo 3:	**Photo 4:**
	
Progress EOD	
Photo 5:	**Photo 6**:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7AM	**OFF SITE**	5PM
DATE	June 25, 2025				
WEATHER	Temperature: 24°C Precipitation: N/A Air Pollution Level: Moderate. Air Quality Index: 52 US AQI (Good). Main Pollutant: PM2.5. Wind: 4.7 km/h. Humidity: 77%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: Grubbing and Clearing
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	Liam Janssen (could not find contact)
(Site Superintendent):	(604) 845-2425
(Foreman):	Liam Janssen (could not find contact)

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

1x Rock Truck
- MD0054578

1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

7x truck and pups
1x Superintendent
1x Foreman
2x Operator
1x Surveyor

CONSTRUCTION PROGRESS

Detail Progress

- More clearing
- Mostly completed laydown area

REVIEWER'S OBSERVATIONS

Item 1

- Reduced crew today

Item 2
- Hauling offsite with truck and pups began

Item 3
- Trailor arrived

DISCUSSIONS WITH CONTRACTOR:

Item 1
- West bank witness tomorrow

Item 2
-

Item 3
-

ETC
-

DISCUSSIONS WITH OTHERS

Item 1
-

Item 2
-

ETC
-

ACTION REQUIRED:

Item 1
-

Item 2
-

ETC
-

PHOTOGRAPHS

Photo 1:



Truck and pup loading

Photo 2:



Progress near beginning of day

Photo 3:	Photo 4:
	
West bank marked	
Photo 5:	**Photo 6**:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7AM	**OFF SITE**	5PM
DATE	June 26, 2025				
WEATHER	Temperature: 24°C Precipitation: N/A Air Pollution Level: Moderate. Air Quality Index: 52 US AQI (Good). Main Pollutant: PM2.5. Wind: 4.7 km/h. Humidity: 77%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: Grubbing and Clearing
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	Liam Janssen (could not find contact)
(Site Superintendent):	(604) 845-2425
(Foreman):	Liam Janssen (could not find contact)

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

1x Rock Truck
- MD0054578

1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

7x truck and pups
1x Superintendent
1x Foreman
2x Operator
1x Surveyor

CONSTRUCTION PROGRESS

Detail Progress

- More clearing
- Mostly completed laydown area

REVIEWER'S OBSERVATIONS

Item 1

- Full crew

Item 2
Item 3
•

DISCUSSIONS WITH CONTRACTOR:
Item 1
• West bank witness
Item 2
•
Item 3
•

ETC
•

DISCUSSIONS WITH OTHERS
Item 1
•
Item 2
•
ETC
•

ACTION REQUIRED:
Item 1
•
Item 2
•
ETC
•

PHOTOGRAPHS

Photo 1:



Start of day

Photo 2:



Mid day progress

Photo 3:  	**Photo 4:**
Photo 5: Electrical for trailer	**Photo 6**:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Sebastien Latrille	**ON SITE**	7AM	**OFF SITE**	3:30PM
DATE	June 27, 2025				
WEATHER	Temperature: 16°C Precipitation: N/A Air Pollution Level: Moderate. Air Quality Index: 52 US AQI (Good). Main Pollutant: PM2.5. Wind: 4.7 km/h. Humidity: 77%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Sebastien Latrille
KWL Activities: Inspection
Site Activities: Grubbing and Clearing
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	Liam Janssen (could not find contact)
(Site Superintendent):	(604) 845-2425
(Foreman):	Liam Janssen (could not find contact)

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

13x Trucks with trailers to haul dirt
1x Bob cat
- SK0770-03

1x Track Loader
- DO0700-03

1x Superintendent (onsite 7:00, offsite 7:30)
1x Foreman
2x Operator
1x Surveyor

CONSTRUCTION PROGRESS

Detail Progress

- Hauling dirt off site

REVIEWER'S OBSERVATIONS

Item 1

- Hauling dirt off site

Item 2

- Documented trees labeled "Keep"

Item 3

- Surveyor staked the outline of the dirt that is contaminated

ETC

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Calling off the surveyor to find stationing of trees labeled “Keep”

Item 2

- Will most likely spend Wednesday hauling dirt again

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

-

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PHOTOGRAPHS



Photo 1: Excavator grubbing



Photo 2: Excavator grubbing

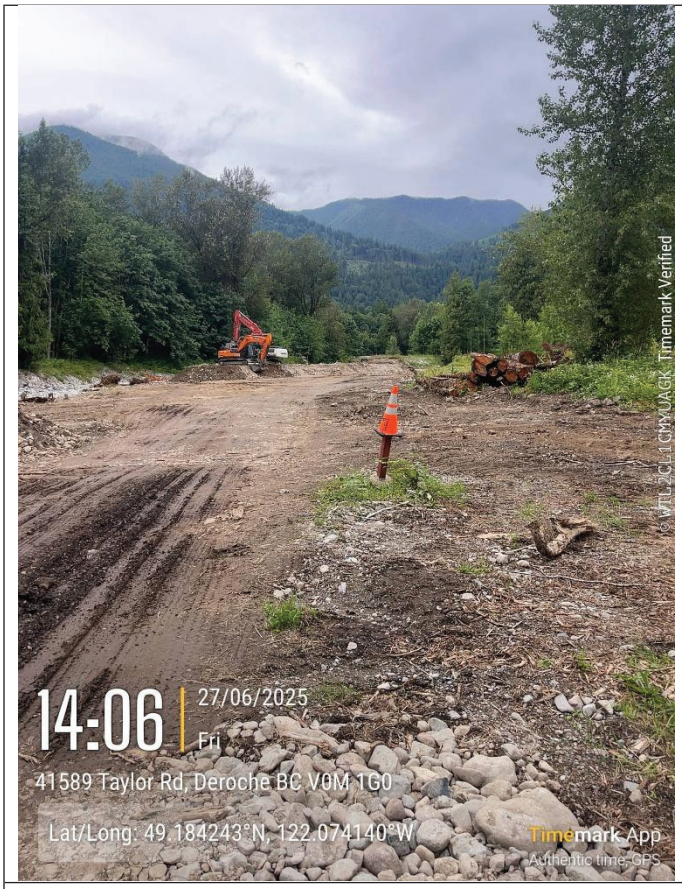


Photo 3: Excavator grubbing

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:15AM	**OFF SITE**	5PM
DATE	July 2, 2025				
WEATHER	Temperature: 23°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 19 US AQI (Good). Main Pollutant: PM2.5. Wind: 12.4 km/h. Humidity: 54%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: Grubbing and Clearing
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	Liam Janssen (could not find contact)
(Site Superintendent):	(604) 845-2425
(Foreman):	Liam Janssen (could not find contact)

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

1x Rock Truck
- MD0054578

1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

truck and pups
1x Superintendent
1x Foreman
2x Operator
1x Surveyor

CONSTRUCTION PROGRESS

Detail Progress

- Clearing
- Built turnaround area for highway trucks at the north end of site
- Excavated part of contaminated area to make way for turnaround

REVIEWER'S OBSERVATIONS

Item 1

- The crew did touch the contaminated area, but put that as a clear separate pile from the rest getting towed away

Item 2

Item 3

-

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Discussed how tree clearing will look

Item 2

- Discussed progress payment to be looked over with myself and Travis tomorrow

Item 3

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

- Spoke with Janice from KWL on tree clearing requirements

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

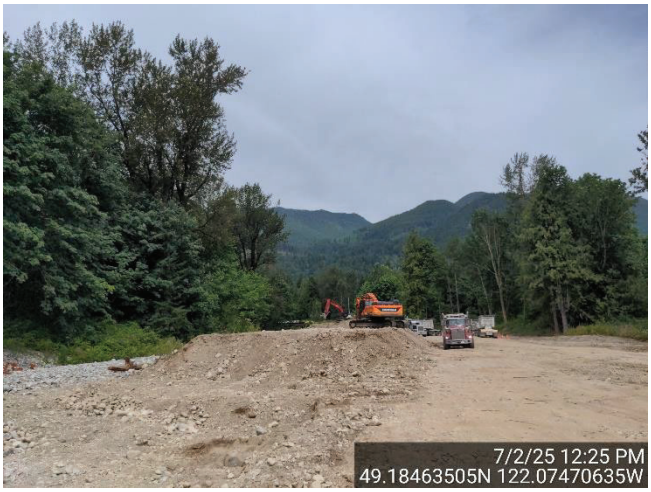
PHOTOGRAPHS

Photo 1:



Beginning of day

Photo 2:



Mid day progress

Photo 3:	**Photo 4:**
	
Moving contaminated soil	Progress near end of day
Photo 5:	**Photo 6**:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7AM	**OFF SITE**	5PM
DATE	July 3, 2025				
WEATHER	Temperature: 18°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 24 US AQI (Good). Main Pollutant: PM2.5. Wind: 9 km/h. Humidity: 56%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: Grubbing and Clearing
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	Liam Janssen (could not find contact)
(Site Superintendent):	(604) 845-2425
(Foreman):	Liam Janssen (could not find contact)

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

1x Rock Truck
- MD0054578

1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

truck and pups
1x Superintendent
1x Foreman
2x Operator
1x Surveyor

CONSTRUCTION PROGRESS

Detail Progress

- Continued excavation

REVIEWER'S OBSERVATIONS

Item 1

- Water truck on site. Excavated a small pit to water table to refill tank

Item 2

•

Item 3

•

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Discussed progress payment with Travis. Went through sheet together and sent it over to Brett

Item 2

- Discussed west bank excavation regarding tree falling and keeping trees

Item 3

•

ETC

•

DISCUSSIONS WITH OTHERS

Item 1

- Spoke to a local resident. Was happy with project

Item 2

•

ETC

•

ACTION REQUIRED:

Item 1

•

Item 2

•

ETC

•

PHOTOGRAPHS

Photo 1:



Pit for water refilling

Photo 2:



Wetted road

Photo 3:	**Photo 4:**
	
Mid day progress	End of day progress
Photo 5:	**Photo 6**:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:15AM	**OFF SITE**	4:30PM
DATE	July 4, 2025				
WEATHER	Temperature: 18°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 24 US AQI (Good). Main Pollutant: PM2.5. Wind: 9 km/h. Humidity: 56%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP

KWL Staff: Luke Komisarski

KWL Activities: Inspection

Site Activities: Grubbing and Clearing, west bank excavation

Identified Hazards: List actual site hazards, Identify if PSP requires updating.

Contractor Tailgate Meeting Notes Reviewed?

(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address

Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	Liam Janssen (could not find contact)
(Site Superintendent):	(604) 845-2425
(Foreman):	Liam Janssen (could not find contact)

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

1x Rock Truck
- MD0054578

1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

truck and pups
1x Superintendent
1x Foreman
2x Operator
2x Surveyor
1x Mechanic
1x Tree faller
1x NHC – Des Goold

CONSTRUCTION PROGRESS

Detail Progress

- Continued excavation
- Fell the required 2 trees

-

REVIEWER'S OBSERVATIONS

Item 1

- Trees felled easily, no problems

Item 2

-

Item 3

-

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Discussed west bank excavation regarding tree falling and keeping trees

Item 2

- Discussed next weeks plans. Mon-Wed contaminated area. Start of week west bank

Item 3

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

- Spoke to Ray about the tree falling. He will keep them.

Item 2

- Guardians spoke to resident who was concerned with truck speeds

ETC

-

ACTION REQUIRED:

Item 1

- Felled trees to be moved to other side of Taylor road bridge next week

Item 2

-

ETC

-

PHOTOGRAPHS

Field Review Report

KERR WOOD LEIDAL
consulting engineers

Photo 1:



Beginning of day

Photo 2:



First slope excavation

Photo 3:



Felled trees

Photo 4:



Blackberry bushed trimmed back

Photo 5:

Photo 6:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7AM	**OFF SITE**	5PM
DATE	2025-07-07				
WEATHER	Temperature: 28°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 38 US AQI (Good). Main Pollutant: O3. Wind: 9.1 km/h. Humidity: 43%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP

KWL Staff: Luke Komisarski

KWL Activities: Inspection

Site Activities: Grubbing and Clearing, west bank excavation

Identified Hazards: List actual site hazards, Identify if PSP requires updating.

Contractor Tailgate Meeting Notes Reviewed?

(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address

Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	Liam Janssen (could not find contact)
(Site Superintendent):	(604) 845-2425
(Foreman):	Liam Janssen (could not find contact)

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

1x Rock Truck
- MD0054578

1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

truck and pups
1x Superintendent
1x Foreman
2x Operator
2x Surveyor
1x Mechanic
1x Tree faller
1x Arcadis – Kenny Smith

CONSTRUCTION PROGRESS

Detail Progress

REVIEWER'S OBSERVATIONS

Item 1

- Continued excavation

Item 2

-

ETC

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Substrate type 1 to begin Wednesday

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

- Kenny Smith from Arcadis walked through site. Kenny thought there was an expansion of the work area near the northeast corner by the railway, but is checking that

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Beginning of day

Photo 2:



Location of tree falling

Photo 3:



Mid day progress

Photo 4:



Mid day progress

Photo 5:



End of day

Photo 6:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:15AM	**OFF SITE**	5PM
DATE	2025-07-08				
WEATHER	Temperature: 24°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 24 US AQI (Good). Main Pollutant: O3. Wind: 12.6 km/h. Humidity: 45%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP

KWL Staff: Luke Komisarski

KWL Activities: Inspection

Site Activities: Grubbing and Clearing, west bank excavation

Identified Hazards: List actual site hazards, Identify if PSP requires updating.

Contractor Tailgate Meeting Notes Reviewed?

(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address

Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539-6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

truck and pups
1x Superintendent
1x Foreman
2x Operator
2x Surveyor
1x Mechanic
1x water truck driver

CONSTRUCTION PROGRESS

Excavation of contaminated material area

REVIEWER'S OBSERVATIONS

Item 1

- Excavation of contaminated materials began smoothly

Item 2

- Continued excavation of west slope

ETC

Field Review Report

KERR WOOD LEIDAL
consulting engineers

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Emailed Travis and spoke to Liam regarding safety concerns with speed of trucks

Item 2

- Discussed substrate placement plans. To begin Thursday

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

- Discussion with LFN Guardians on safety concerns with truck speed.

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Beginning of day

Photo 2:



North end of west slope

Photo 3:



Beginning of day

Photo 4:



Contaminated area mid-day

Photo 5:



Mid-day

Photo 6:



End of day

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:00AM	**OFF SITE**	4:30PM
DATE	2025-07-09				
WEATHER	Temperature: 19°C Precipitation: 100% Air Pollution Level: Good. Air Quality Index: 10 US AQI (Good). Main Pollutant: O3. Wind: 5.5 km/h. Humidity: 95%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: excavation
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

truck and pups
1x Foreman
2x Operator
1x Surveyor
3x Mechanic

CONSTRUCTION PROGRESS

Excavation of contaminated area

REVIEWER'S OBSERVATIONS

Item 1

- Day was slow. One excavator broke down, and one truck broke down which slowed down production. Less excavation than normal

Item 2

- Lot 5 was excavated, as the team on site states they were unaware of the fact that we didn't yet have clearance to do this

ETC

Field Review Report

KERR WOOD LEIDAL
consulting engineers

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Discussed how to excavate the entrance to the sediment basin as the ground level is ~1.5m higher than expected. As per discussion with Des, told Timbro to start excavation from the level in the drawings

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

- Discussed with Carter the fact that Timbro excavated Lot 5

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

- Continue resolving issue with Lot 5

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Beginning of day

Photo 2:



Excavator broke down, spill kit used

Photo 3:



Photo of Lot 5 excavation

Photo 4:



Photo of Lot 5 excavation

Photo 5:



Contaminated area grade

Photo 6:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7AM	**OFF SITE**	5PM
DATE	2025-07-10				
WEATHER	Temperature: 20°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 21 US AQI (Good). Main Pollutant: pm2.5. Wind: 2.1 km/h. Humidity: 65%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP

KWL Staff: Luke Komisarski

KWL Activities: Inspection

Site Activities: Grubbing and Clearing, west bank excavation

Identified Hazards: List actual site hazards, Identify if PSP requires updating.

Contractor Tailgate Meeting Notes Reviewed?

(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address

Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

truck and pups
1x Foreman
2x Operator
1x Surveyor
1x Mechanic
1x water truck driver
1x NHC (Des Goold)

CONSTRUCTION PROGRESS

Finished bulk excavation of contaminated material
Began construction on riprap

REVIEWER'S OBSERVATIONS

Item 1

- Contaminated area was completed, aside from some small slope elements that can't be reached until the basin entrance is excavated

Item 2

- Start of riprap placement went smoothly

ETC

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Discussed with Liam how they plan to execute riprap placement

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

- Des came to site to witness initial placement of riprap and check slope of excavation prior to placement

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

- LSK to connect with CA team, and get out meeting minutes

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Contaminated area start of day

Photo 2:



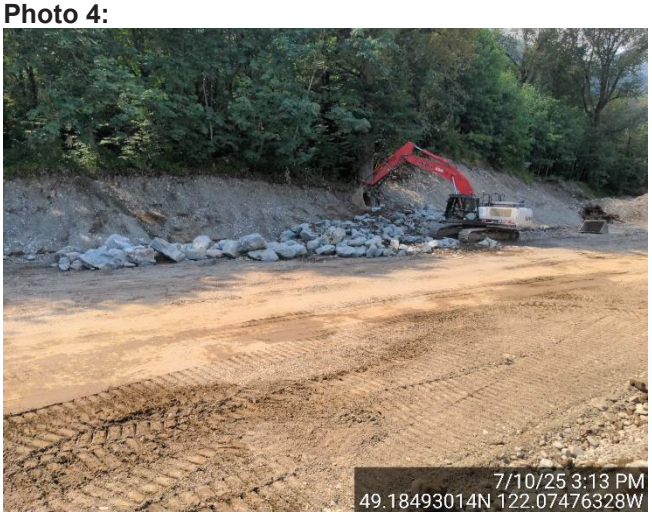
Initial placement of riprap

Photo 3:



Contaminated area mid-day

Photo 4:



Riprap placement mid-day

Photo 5:



Riprap placement

Photo 6:



Riprap placement end of day

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:15AM	**OFF SITE**	4:30PM
DATE	2025-07-11				
WEATHER	Temperature: 27°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 28 US AQI (Good). Main Pollutant: pm2.5. Wind: 10.8 km/h. Humidity: 42%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: excavation, riprap placement
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

truck and pups
1x Foreman
2x Operator
1x Surveyor
1x Mechanic
1x Laborer

CONSTRUCTION PROGRESS

Riprap construction and bulk excavation

REVIEWER'S OBSERVATIONS

Item 1

- Riprap placement continued well. The hand-filling of voids is working well

Item 2

-

ETC

DISCUSSIONS WITH CONTRACTOR:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

Item 1

- Discussed if we wanted to add a layer of fill above riprap. Spoke to Des and we did not want to do that, which I communicated with Liam

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

-

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Riprap beginning of day

Photo 2:



Riprap beginning of day

Photo 3:



Riprap beginning of day

Photo 4:



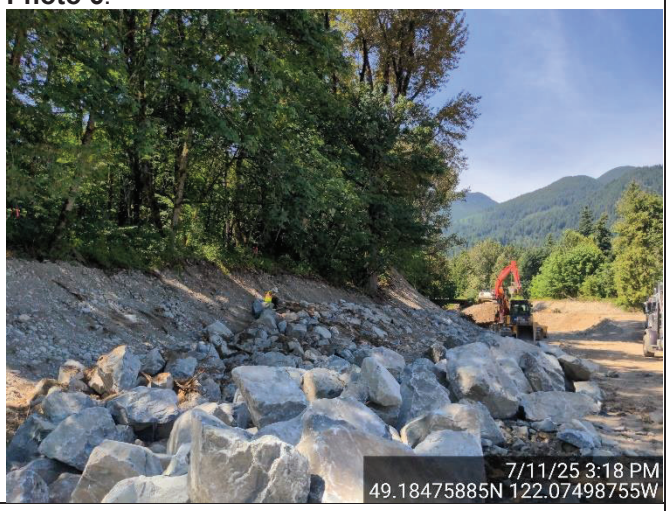
Riprap mid-day

Photo 5:



Riprap mid-day

Photo 6:



Riprap EOD

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:15AM	**OFF SITE**	5PM
DATE	2025-07-14				
WEATHER	Temperature: 25°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 19 US AQI (Good). Main Pollutant: PM2.5. Wind: 7.2 km/h. Humidity: 59%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: west bank riprap and excavation
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5
Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

1x Rock Truck
- ADT30T-03

truck and pups
1x Superintendent (Onsite 7-9)
1x Foreman
3x Operator
2x Surveyor
1x Mechanic
1x water truck driver

CONSTRUCTION PROGRESS

Continued riprap placement on west bank
Bulk excavation to make room for truck turnaround

REVIEWER'S OBSERVATIONS

Item 1

- No sediment was hauled offsite. All excavation works were to make room for truck turnaround, so not enough material was being moved to need hauling offsite. A rock truck was brought in to move material around site

Item 2

•

ETC

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Travis asked if they can bring a “representative” pile of 900mm boulders to inspect before bringing the whole lot to site. Spoke to Des and we will do this on Wednsday.

Item 2

•

ETC

•

DISCUSSIONS WITH OTHERS

Item 1

•

Item 2

•

ETC

•

ACTION REQUIRED:

Item 1

•

Item 2

•

ETC

•

PHOTOGRAPHS

Photo 1:



West bank riprap start of day

Photo 2:



West bank north end start of day

Photo 3:



Contaminated area start of day

Photo 4:



West bank riprap mid day

Photo 5:



Void fill

Photo 6:



West bank progress

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7AM	**OFF SITE**	5PM
DATE	2025-07-15				
WEATHER	Temperature: 33°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 24 US AQI (Good). Main Pollutant: PM2.5. Wind: 9.5 km/h. Humidity: 50%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP

KWL Staff: Luke Komisarski

KWL Activities: Inspection

Site Activities: Grubbing and Clearing, west bank excavation

Identified Hazards: List actual site hazards, Identify if PSP requires updating.

Contractor Tailgate Meeting Notes Reviewed?

(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address

Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

truck and pups
1x Foreman
2x Operator
2x Surveyor
1x Mechanic
1x water truck driver

CONSTRUCTION PROGRESS

West bank riprap, continued excavation of contaminated area

REVIEWER'S OBSERVATIONS

Item 1

- Sediment trucking has slowed down as bulk material is largely gone. Contractor has began stockpiling on site

Item 2

-

ETC

DISCUSSIONS WITH CONTRACTOR:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

Item 1

- Spoke with Travis and Tyson regarding a shift to 12 hour workdays

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

- Called Rick at LFN to discuss the longer hours

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



West bank start of day

Photo 2:



Contaminated area start of day

Field Review Report

Photo 3:	**Photo 4:**
	
Riprap mid day	Stockpiling
Photo 5:	**Photo 6**:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:15AM	**OFF SITE**	5PM
DATE	2025-07-16				
WEATHER	Temperature: 31°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 38 US AQI (Good). Main Pollutant: O3. Wind: 11 km/h. Humidity: 52%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: west bank excavation
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

1x Rock Truck
- ADT30T-03

truck and pups
1x Foreman
2x Operator
1x Surveyor
1x Mechanic
1x water truck driver

CONSTRUCTION PROGRESS

Finalized contaminated area and sediment basin entrance, west bank progress

REVIEWER'S OBSERVATIONS

Item 1

- West bank north end mostly finalized.

Item 2

- Sediment basin entrance excavated.

ETC

Field Review Report

KERR WOOD LEIDAL
consulting engineers

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Discussed with Liam getting a new batch of 900mm boulders for review to make sure they can supply the correct size.

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

- Spoke with Des regarding 500 kg riprap placement, confirmed west bank was ok.

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



West bank start of day

Photo 2:



Contaminated area and entrance basin

Photo 3:



Contaminated area and entrance basin

Photo 4:



Mid day

Photo 5:



Basin EOD

Photo 6:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7AM	**OFF SITE**	4:45PM
DATE	2025-07-17				
WEATHER	Temperature: 22°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 32 US AQI (Good). Main Pollutant: O3. Wind: 7 km/h. Humidity: 70%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: west bank excavation
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

1x Rock Truck
- ADT30T-03

truck and pups
1x Foreman
2x Operator
1x Surveyor
2x Laborer
1x water truck driver

CONSTRUCTION PROGRESS

Detail Progress

REVIEWER'S OBSERVATIONS

Item 1
- West bank largely finalized

Item 2
- Geotextile came in. 500 kg placement on west side began

ETC

Field Review Report

KERR WOOD LEIDAL
consulting engineers

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Tyson asked about GST inclusion on progress draw, after speaking to KWL team I informed Tyson there was to be no GST

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

- Ran weekly meeting

Item 2

- Discussed GST question with Brett and Rob

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

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ETC

-

PHOTOGRAPHS

Photo 1:



Sediment basin

Photo 2:



Sediment basin

Photo 3:



Measuring rocks

Photo 4:



Geotextile arrival

Photo 5:



Geotextile placement

Photo 6:



Stockpiled materials

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:00AM	**OFF SITE**	3:45PM
DATE	2025-07-18				
WEATHER	Temperature: 22°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 28 US AQI (Good). Main Pollutant: O3. Wind: 6 km/h. Humidity: 58%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: west bank excavation
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5
Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

1x Rock Truck
- ADT30T-03

truck and pups
1x Foreman
2x Operator
1x Surveyor
2x Laborer
1x water truck driver
1x NHC (Haley Oosterman)

CONSTRUCTION PROGRESS

Detail Progress

REVIEWER'S OBSERVATIONS

Item 1

- Over excavation of basin entrance and fill with onsite material, as in situ material was incompetent

Item 2

- Placement of 900mm boulders

ETC

Field Review Report

KERR WOOD LEIDAL
consulting engineers

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Discussed if we can over excavate basin entrance because incompetent ground made boulders sink. Ended up giving the “ok” to replace with pit run from site

Item 2

- Discussed boulder placement and sizing

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

- Discussed boulder placement and sizing with Haley

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Basin entrance start of day

Photo 2:



500 kg load

Photo 3:



900 mm boulder placement

Photo 4:



900 mm boulder placement

Photo 5:



900 mm boulder placement

Photo 6:



900 mm boulder placement

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7AM	**OFF SITE**	7PM
DATE	2025-07-21				
WEATHER	Temperature: 26°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 35 US AQI (Good). Main Pollutant: O3. Wind: 7.1 km/h. Humidity: 92%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP

KWL Staff: Luke Komisarski

KWL Activities: Inspection

Site Activities: west bank excavation, sediment basin

Identified Hazards: List actual site hazards, Identify if PSP requires updating.

Contractor Tailgate Meeting Notes Reviewed?

(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address

Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

1x Rock Truck
- ADT30T-03

truck and pups
1x Supervisor
1x Foreman
2x Operator
1x Surveyor
2x Laborer
1x water truck driver
1x NHC (Haley Oosterman)

CONSTRUCTION PROGRESS

Sediment basin finalized, west bank 500kg finalized, east bank Type 1 started. Fan channels 1 and 2 began

REVIEWER'S OBSERVATIONS

Item 1

- Sediment basin was finalized with Haley's guidance

Item 2

- 500 kg on west side finalized, tied in well to entrance

ETC

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Discussed problems with fan channels 1/2 and related RFI

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

- Had a call with Janice, Al, and Des regarding fan channel changes

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Entrance boulders before fill

Photo 2:



Fan channel 2

Photo 3:



Entrance void filling

Photo 4:



Voids filled

Photo 5:



500 kg riprap finalizing

Photo 6:



500 kg tie in on west side

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7AM	**OFF SITE**	7PM
DATE	2025-07-22				
WEATHER	Temperature: 28°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 38 US AQI (Good). Main Pollutant: O3. Wind: 9.1 km/h. Humidity: 43%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: west bank excavation
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

1x Rock Truck
- ADT30T-03

truck and pups
1x Superintendent
1x Foreman
2x Operator
1x Surveyor
2x Laborer
1x water truck driver

CONSTRUCTION PROGRESS

East bank excavation and Type 1 placement began. Much more material removed from site than the last few days. Fan channels 4 a/b started

REVIEWER'S OBSERVATIONS

Item 1

- Fan channel areas are difficult to traverse because of peat bog

Item 2

-

ETC

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Discussed with Travis what we will do with fan channels 1 and 2. We will connect them together and then connect at nearby side channel to the north

Item 2

- Discussed Type 1 Riprap sizing, mentioned some of the recent material has come in smaller than we wanted

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

-

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Placement of Type I

Photo 2:



Access to Fan Channels A/B

Photo 3:



Rocks marked as suitable for rootwad boulders

Photo 4:



Mid day Fan Channel 4A

Photo 5:



Mid day Fan Channel 4A

Photo 6:



East bank excavation and Type I placement

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:15AM	**OFF SITE**	6:45PM
DATE	2025-07-23				
WEATHER	Temperature: 25°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 48 US AQI (Good). Main Pollutant: PM2.5. Wind: 9.3 km/h. Humidity: 49%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: east bank excavation
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

1x Mini-Excavator
1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

1x Rock Truck
- ADT30T-03

truck and pups
1x Foreman
3x Operator
1x Surveyor
2x Laborer
1x water truck driver

CONSTRUCTION PROGRESS

Continued east bank excavation to grade. Some riprap was placed but largely works consisted of shaping bank and getting material offsite. Fan channels 4 A/B were finalized (for now, before water recedes more)

REVIEWER'S OBSERVATIONS

Item 1

- Some Type I rock was still undersized, but getting better

Item 2

-

ETC

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Discussed Type I gradation again with Timbro. Travis said he'd raise concern with the quarry, as material is coming in smaller than ordered

Item 2

- Discussed new tie-in location for Fan Channels 1 and 2

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

- Janice (KWL biologist) came to site to inspect the change to Fan Channels 1 and 2. We looked at the tie-in location and discussed with Travis and Liam how it will look. Also discussed success routing for this area.

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



East bank morning

Photo 2:



Area for Fan channels 1 and 2 tie-in

Photo 3:



Area for Fan channels 1 and 2 tie-in

Photo 4:



Channel 4

Photo 5:



East bank progress

Photo 6:



East bank progress

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:30AM	**OFF SITE**	7PM
DATE	2025-07-24				
WEATHER	Temperature: 25°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 32 US AQI (Good). Main Pollutant: PM2.5. Wind: 10.8 km/h. Humidity: 51%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: east bank excavation
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5
Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

2x mini-excavator
1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

1x Rock Truck
- ADT30T-03

truck and pups
1x Superintendent
1x Foreman
3x Operator
1x Surveyor
2x Laborer
1x water truck driver

CONSTRUCTION PROGRESS

East bank continued excavation. Fan channel 2 was detailed, and the new access route was established

REVIEWER'S OBSERVATIONS

Item 1

- Est bank progress going well. Not enough good sized Type I material to place, so Timbro has just excavated the extent and will leave placement for later

Item 2

- Accessing the fan channels 1 and 2 was easy enough, Timbro removed trees after birds nest survey

ETC

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Discussed Type II riprap. Most of the pile was quite good, some large stuff that will need to be separated

Item 2

- Timbro wants to begin spines tomorrow

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

- Held construction meeting #6

Item 2

- Discussed birds nest survey with Melissa from LFN

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



East bank

Photo 2:



New access to fan channels 1 and 2

Photo 3:



Culvert installed for reef structure access

Photo 4:



Rootwads

Photo 5:



Type II material reference

Photo 6:



EOD

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Sebastien Latrille	**ON SITE**	7:00AM	**OFF SITE**	6:45PM
DATE	2025-07-28				
WEATHER	Temperature: 26°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 23 US AQI (Good). Main Pollutant: PM2.5. Wind: 8.1 km/h. Humidity: 66%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP

KWL Staff: Sebastien Latrille

KWL Activities: Inspection

Site Activities: East bank riprap, Fan channel 1 and 2

Identified Hazards: List actual site hazards, Identify if PSP requires updating.

Contractor Tailgate Meeting Notes Reviewed?

(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address

Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

2x mini-excavator
1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

1x Rock Truck
- ADT30T-03

truck and pups
1x Foreman
3x Operator
1x Surveyor
2x Laborer
1x water truck driver

CONSTRUCTION PROGRESS

East bank Type 1 riprap nearly completed, start of low flow channel. Grade spine 2 completed. Fan channel 1 and 2 complete

REVIEWER'S OBSERVATIONS

Item 1

- Installation of spine #2 went very well

Item 2

- Type 1 riprap aligns with the specs

ETC

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Timbro asks if someone needs to be there when they do the large woody debris in the fan channels

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

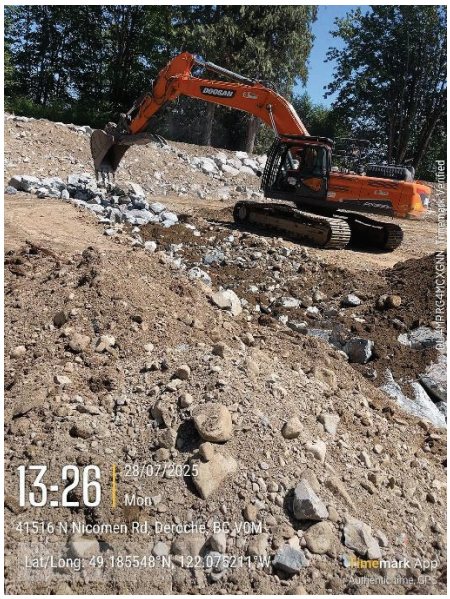


Photo 1: Grade spine excavation



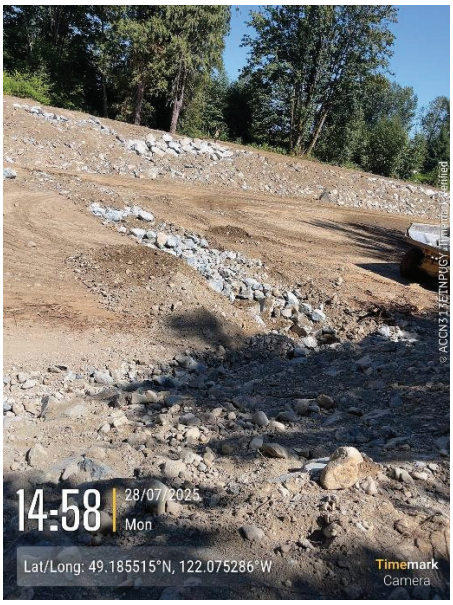
Photo 2: Grade spine first lift

Photo 3:



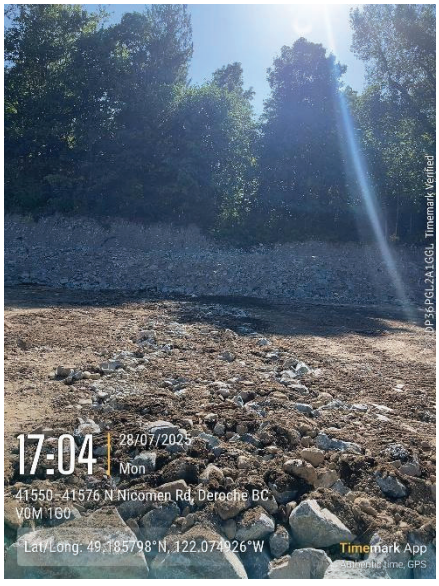
Grade spine first lift void fill

Photo 4:



Grade spine second lift

Photo 5:



Finalized void fill

Photo 6:



East bank beginning of day



Photo 7: East bank end of day



Photo 8: Low Flow Channel

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Clientx : eLqpxmel First ' ation
Nroject ' ox 2900612
Contractorx Pim7ro ContractinT : td.
bW: File ' o.x 2838.003

PREPARED BY	ge7astien : atrille	**ON SITE**	6x00AK	**OFF SITE**	5x50NK
DATE	2025-06-29				
WEATHER	Pemperaturex29MC Nrecipitationx' JA Air Nollution : evelx, ood. Air ° uality /nde4x23 Qg A° / I, oodU K ain Nollutantx NK 2.5. Windx8.1 kmJS. (umidityx GG) . SttpsxJJwww.iLair.comJusJcanadaJ7ritisS-colum7iaJcSilliwack				
WORK AREA	DerocSe Creek				

TAILGATE MEETING NOTES

Review ohSaHards ohsite per NgN

KWL Staff: ge7astien : atrille

KWL Activities: /nspection

Site Activitiesx%ast 7ank riprapf Fan cSannel 1 and 2

Identified Hazards: : ist actual site SaHardsf /dentiby ihNgN reLuires updatinT.

Contractor Tailgate Meeting Notes Reviewed?

IcSeck oneU zes ☒ ' o ☐ nJa ☐

EMERGENCY CONTACTS

Nearest Hospital Address

K ission K emorial (ospital
632Y (urd gtf K issionf BC V2V 3(5

Emergency Phone Numbers

%merTency gervicesx	911
(ospital Inon-emerTencyUx	IG0YU82G-G2G1
Nolice Inon-emerTencyUx	IG0YU82G-61G1
Fire Inon-emerTencyUx	IG0YU820-3693
Client (ealtS and gahety EHicer	I668U539 G118
En-site First Aid Attendantx	IG0YU698-G826
Igite guperintendentUx	IG0YU8Y5-2Y25
IForemanUx	IG0YU698-G826

EQUIPMENT AND WORKFORCE ON SITE

24 %4cavator
- %O-350-03
- %O-0350-0Y

24 mini-e4cavator
14 Bo7 cat
- gb0660-03

14 Compaction Roller
- R: 012P-01

14 Rock Pruck
- ADP30P-03

truck and pups
14 Foreman
34 E perator
14 gurveyor
24 : a7orer
14 water truck driver

CONSTRUCTION PROGRESS

500 kg riprap on basin entrance halfway complete. East bank Type 1 riprap complete

Field Review Report

KERR WOOD LEIDAL
consulting engineers

REVIEWER'S OBSERVATIONS

Item 1

- 500 kT riprap aliTns witS tSe specs
- : aid out property line hor 500kT

ETC

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Pim7ro Tave updates on work planned in tSe cominT weeks

Item 2

- Xanice will come tomorrow earlier to witness woody de7ris in tSe han cSannel

Item 2

- : iam says DB , round PestinT says work looks Tood

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

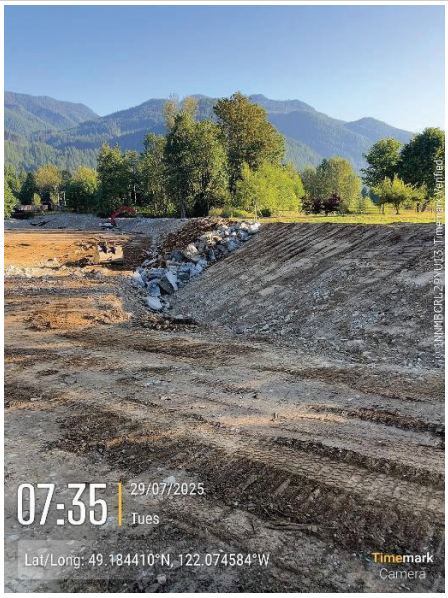


Photo 1: Beginning of day on East bank

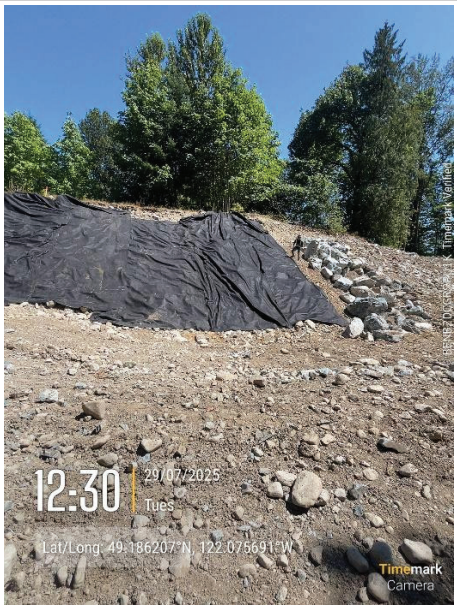
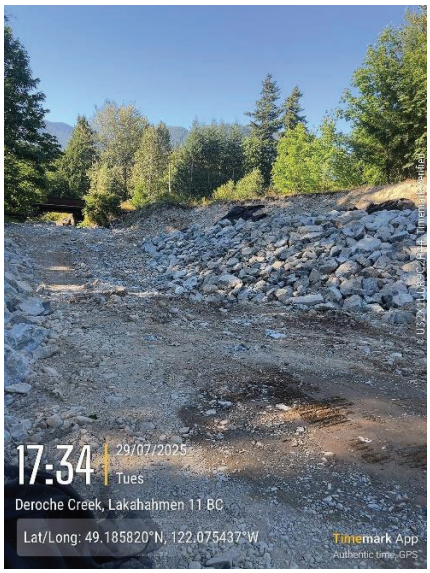


Photo 2: Geotextile for 500kg riprap

Photo 3:



End of day 500 kg riprap

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Clientx : eLqpxmel First ' ation
Nroject ' ox 2900712
Contractorx PimTro Contractinb : td.
gW: File ' o.x 2838.003

PREPARED BY	KeTastien : atrille	**ON SITE**	7x00AM	**OFF SITE**	° x00NM
DATE	2025-07-30				
WEATHER	Pemperaturex30/C Nrecipitationx' CA Air Nollution : evelxQood. Air I uality Unde4x23 SK AI U(Qood). Main NollutantxNM2.5. Windx8.1 kmCh. Humidityx° ° %. https:xGwww.iLair.comGusGcanadaGTritish-columTiaGchilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per NKN

KWL Staff: KeTastien : atrille

KWL Activities: Unspection

Site ActivitiesxWoody deTris in fan channel, meetinb discussinb fish salvabe, Tasin e4it brade

Identified Hazards: : ist actual site hazards, Udentify if NKN reLuires updatinb.

Contractor Tailgate Meeting Notes Reviewed?

(check one) Yes ☒ ' o ☐ nCa ☐

EMERGENCY CONTACTS

Nearest Hospital Address

Mission Memorial Hospital
732B Hurd Kt, Mission, VC E2E 3H5

Emergency Phone Numbers

6merbency Kervicesx	911
Hospital (non-emerbency)x	(° 0B) 82° -° 2° 1
Nolice (non-emerbency)x	(° 0B) 82° -71° 1
Fire (non-emerbency)x	(° 0B) 820-3793
Client Health and Kafety Officer	(778) 539 ° 118
On-site First Aid Attendantx	(° 0B) 798-° 827
(Kite Kuperintendent)x	(° 0B) 8B5-2B25
(Foreman)x	(° 0B) 798-° 827

EQUIPMENT AND WORKFORCE ON SITE

24 6 4cavator
- 6X-350-03
- 6X-0350-0B

24 mini-e4cavator
14 VoT cat
- Kg0770-03

14 Compaction Roller
- R: 012P-01

14 Rock Pruck
- ADP30P-03

truck and pups
14 Foreman
34 Operator
14 Kurveyor
24 : aTorer

CONSTRUCTION PROGRESS

Basin exit grade nearly completed. Woody debris in fan channel #4b. Working on low flow channel.

REVIEWER'S OBSERVATIONS

Item 1

- Vasin e4it brade matches specs

Item 2

- Fish salvabe to start on the ° th

ETC

Field Review Report

KERR WOOD LEIDAL
consulting engineers

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Vibber corrubated pipe came in to provide breater flow for the fish diversion

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

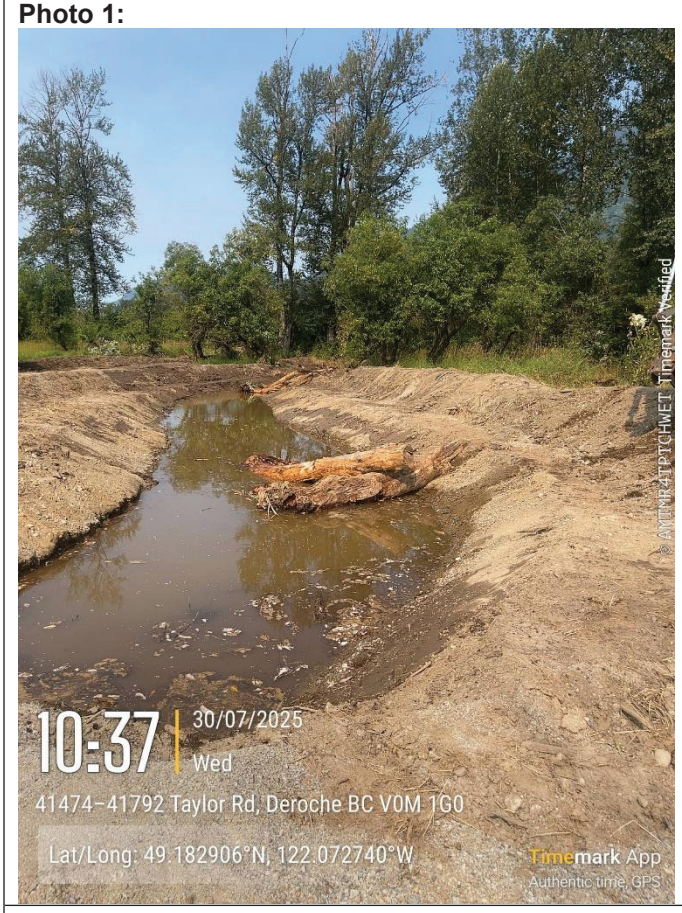
-

ETC

-

PHOTOGRAPHS

Photo 1:



Woody debris in fan channel #4b

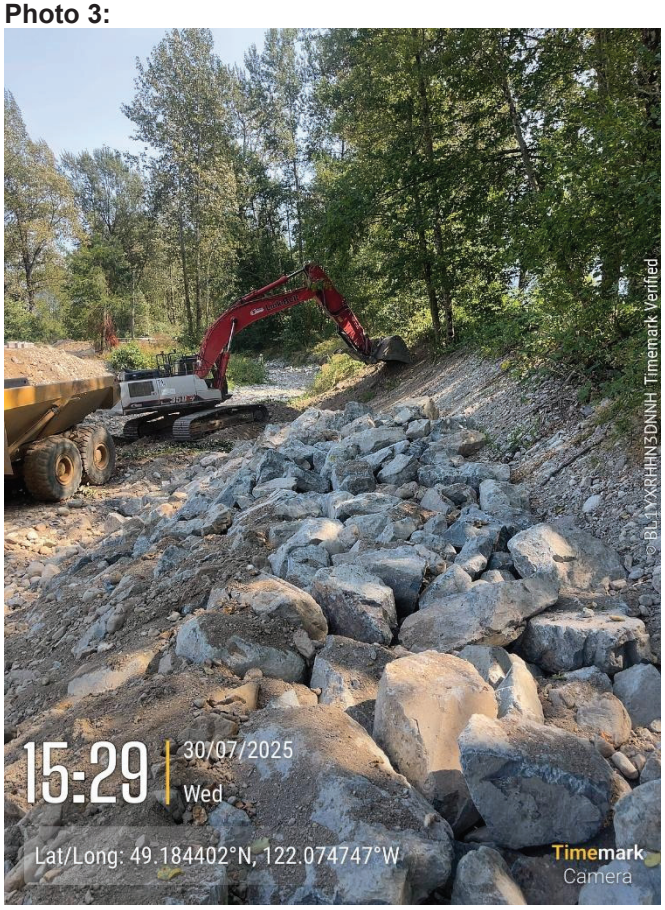
Photo 2:



Bigger corrugated pipe

Field Review Report

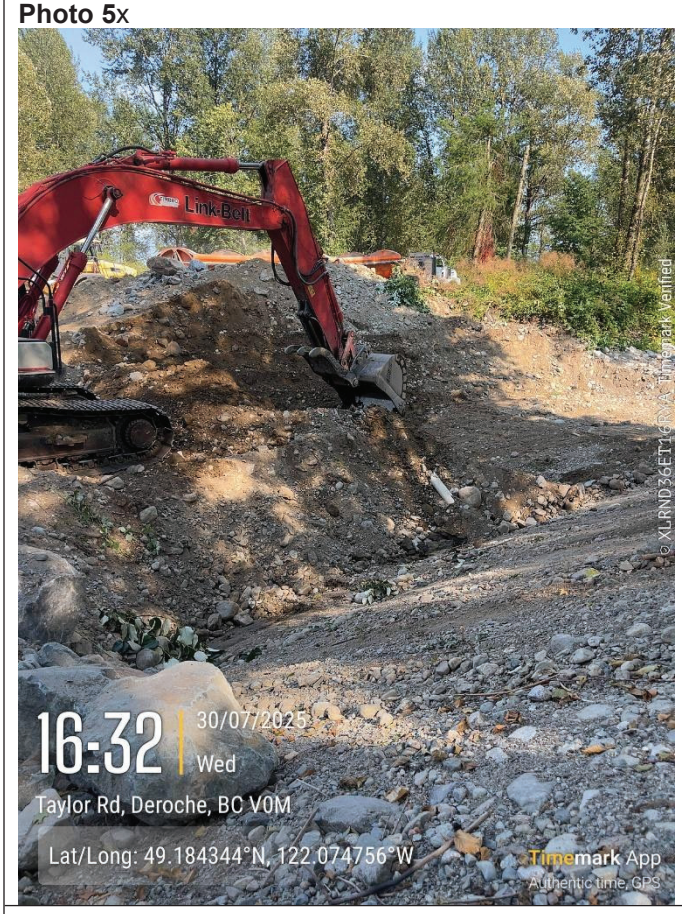
KERR WOOD LEIDAL
consulting engineers

Photo 3:	Photo 4:
	
West basin exit	West basin exit

Field Review Report

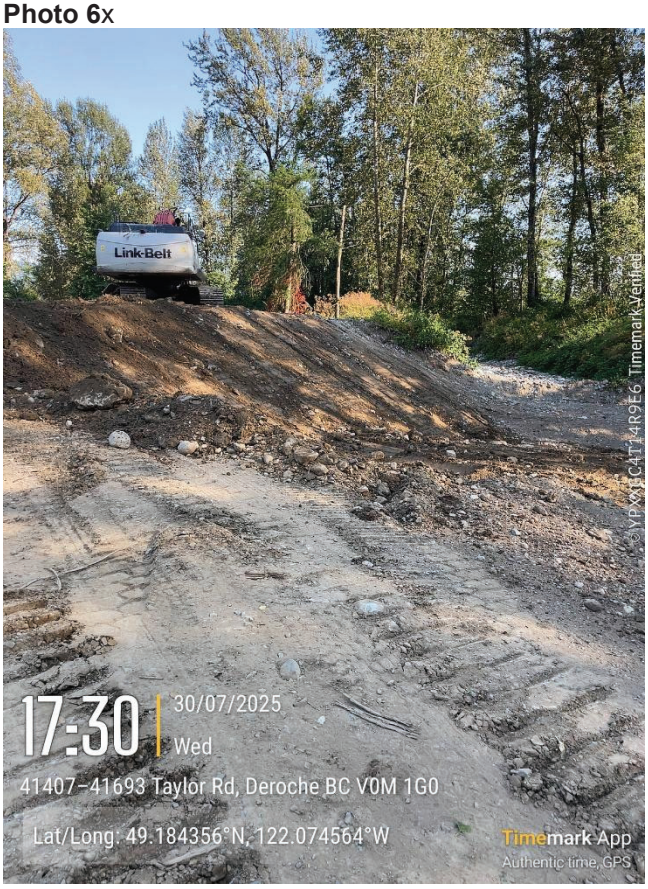
KERR WOOD LEIDAL
consulting engineers

Photo 5x



East basin exit

Photo 6x



6ast Tasin e4it

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Clientx : eLqaxmel First ' ation
Nroject ' ox 2900712
Contractorx PimTro Contractinb : td.
gW: File ' o.x 2838.003

PREPARED BY	KeTastien : atrille	**ON SITE**	7x00AM	**OFF SITE**	°x00NM
DATE	2025-07-31				
WEATHER	Pemperaturex28/C Nrecipitationx' A Air Nollution : evelxQood. Air I uality Uide4x23 SK AI U(Qood). Main NollutantxNM2.5. Windx8.1 kmG. Humidityx°°%. httpsxGwww.iLair.comGsGanadaGritish-columTiaGhilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per NKN

KWL Staff: KeTastien : atrille

KWL Activities: Uspection

Site Activitiesx, asin e4it riprapYPayor , ridbe armorinb e4cavation

Identified Hazards: : ist actual site hazardsYUdentify if NKN reLuires updatinb.

Contractor Tailgate Meeting Notes Reviewed?

(check one) Bes ☒ ' o ☐ nGa ☐

EMERGENCY CONTACTS

Nearest Hospital Address

Mission Memorial Hospital
732V Hurd KtYMissionY, C E2E 3H5

Emergency Phone Numbers

6merbency Kervicesx	911
Hospital (non-emerbency)x	(°0V) 82°-°2°1
Nolice (non-emerbency)x	(°0V) 82°-71°1
Fire (non-emerbency)x	(°0V) 820-3793
Client Health and Kafety Officer	(778) 539°118
On-site First Aid Attendantx	(°0V) 798-°827
(Kite Kuperintendent)x	(°0V) 8V5-2V25
(Foreman)x	(°0V) 798-°827

EQUIPMENT AND WORKFORCE ON SITE

24 64cavator
- 6X-350-03
- 6X-0350-0V

24 mini-e4cavator
14 , oT cat
- Kg0770-03

14 Compaction Roller
- R: 012P-01

14 Rock Pruck
- ADP30P-03

truck and pups
14 Foreman
34 Operator
14 Kurveyor
24 : aTorer

CONSTRUCTION PROGRESS

Basin exit riprap nearly completed. Taylor Bridge excavation nearly complete.

REVIEWER'S OBSERVATIONS

Item 1

- , asin e4it riprap alibns with specs

Item 2

- 64istinb riprap found under Paylor , ridbe when e4cavatinb

Item 3

- Pree on limit of WN 107 at Paylor , ridbe and email sent out the provide buidance on ne4t steps

ETC

DISCUSSIONS WITH CONTRACTOR:

Item 1

- PimTro asked for clarity on ne4t steps rebardinb the found e4istinb riprap under Palor , ridbe and the tree on WN 107

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

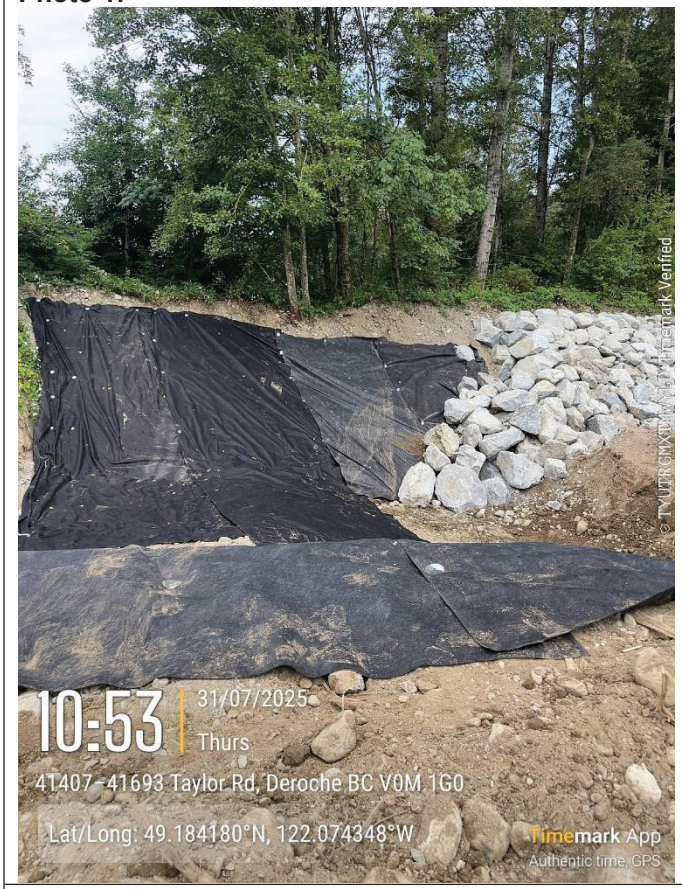
-

ETC

-

PHOTOGRAPHS

Photo 1:



Basin exit west bank

Photo 2:



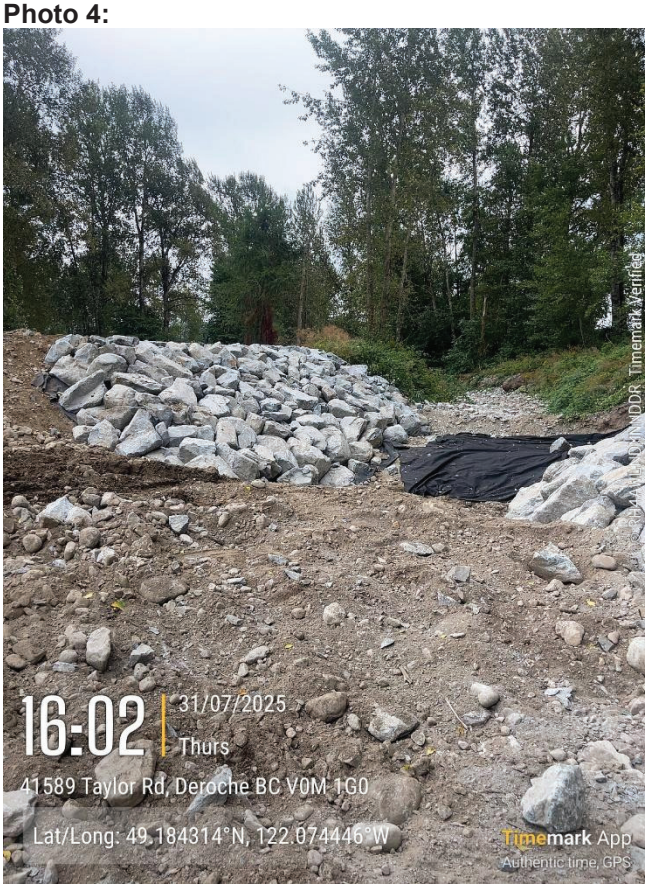
Basin exit west bank

Photo 3:



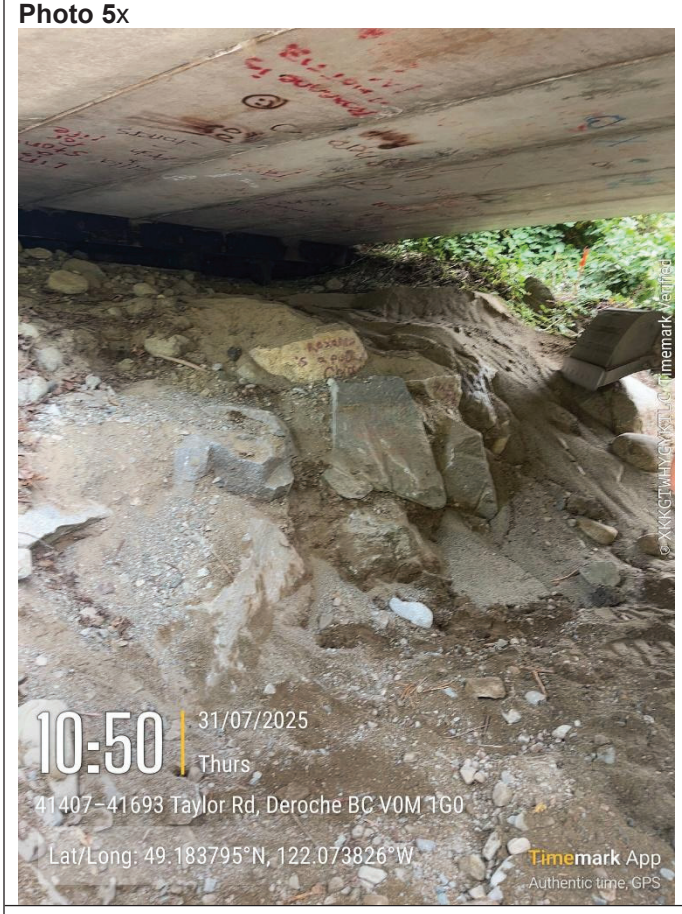
Basin exit east bank

Photo 4:



Basin exit east bank

Photo 5x



Existing riprap under Taylor Bridge

Photo 6x



WN 107 ne4t to e4istinb tree

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Clientx : eLqaxmel First ' ation
Nroject ' ox 2900712
Contractorx PimTro Contractinb : td.
gW: File ' o.x 2838.003

PREPARED BY	KeTastien : atrille	**ON SITE**	7x00AM	**OFF SITE**	5x00NM
DATE	2025-08-01				
WEATHER	Pemperaturex2° / C Nrecipitationx ' A Air Nollution : evelxQood. Air I uality Uide4x23 SK AI U(Qood). Main NollutantxNM2.5. Windx8.1 kmG. Humidityx° ° %. https:xGwww.iLair.comGsGanadaGritish-columTiaGhilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per NKN

KWL Staff: KeTastien : atrille

KWL Activities: Uspection

Site Activitiesx, asin e4it riprapYPayor , ridbe armorinb e4cavation

Identified Hazards: : ist actual site hazardsYUdentify if NKN reLuires updatinb.

Contractor Tailgate Meeting Notes Reviewed?

(check one) Bes ☒ ' o ☐ nA ☐

EMERGENCY CONTACTS

Nearest Hospital Address

Mission Memorial Hospital
732V Hurd KtYMissionY, C E2E 3H5

Emergency Phone Numbers

6merbency Kervicesx	911
Hospital (non-emerbency)x	(° 0V) 82° -° 2° 1
Nolice (non-emerbency)x	(° 0V) 82° -71° 1
Fire (non-emerbency)x	(° 0V) 820-3793
Client Health and Kafety Officer	(778) 539 ° 118
On-site First Aid Attendantx	(° 0V) 798-° 827
(Kite Kuperintendent)x	(° 0V) 8V5-2V25
(Foreman)x	(° 0V) 798-° 827

EQUIPMENT AND WORKFORCE ON SITE

24 64cavator
- 6X-350-03
- 6X-0350-0V

24 mini-e4cavator
14 , oT cat
- Kg0770-03

14 Compaction Roller
- R: 012P-01

14 Rock Pruck
- ADP30P-03

truck and pups
14 Foreman
34 Operator
14 Kurveyor
24 : aTorer

CONSTRUCTION PROGRESS

Placement of 900 mm boulders completed. Two WRC root wad completed.

REVIEWER'S OBSERVATIONS

Item 1

- ' HC witnessed placement of 900 mm Toulders

Item 2

- ' HC witnessed completion of two WRC rootwads

Item 3

- First try of caTlinb the rootwad ended in the caTle Teinb too loose

Item 3

- Koil was placed on the cap on the 500kb riprap instead of the coarse bravel

ETC

DISCUSSIONS WITH CONTRACTOR:

Item 1

- PimTro will Trinb in the needed coarse bravel for the cap of the 500kb riprap
- PimTro will Trinb in the need rootwads that alibn with the specs as there are only V that currently alibn

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

- ’ HC said to keep e4istinb riprap at Paylor , ridbe and to create a bradual fit up to the riprap on Toth sides of the Tanks
- ’ HC said PimTro can use the Tibber Toulders (around ° 00C00 mm) for the 500mm Toulders if finished brade is achieved

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

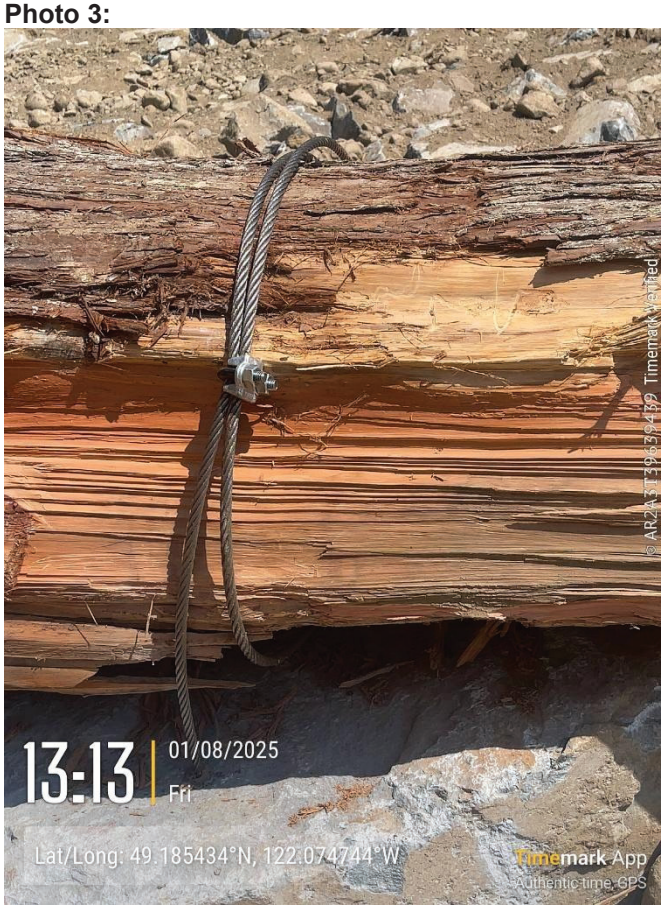
PHOTOGRAPHS

Field Review Report

KERR WOOD LEIDAL
consulting engineers

Photo 1:	Photo 2:
	
900 mm placement	Fill after the 900mm placement

Photo 3:



First attempt with loose cables

Photo 4:



Soil on top of the 500kg riprap

Photo 5x



First cabled rootwad

Photo 6x



Kecond caTled rootwad

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:15AM	**OFF SITE**	7PM
DATE	2025-08-05				
WEATHER	Temperature: 23°C Precipitation: N/A Air Pollution Level: Moderate. Air Quality Index: 56 US AQI (Good). Main Pollutant: PM2.5. Wind: 8.8 km/h. Humidity: 61%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP

KWL Staff: Luke Komisarski

KWL Activities: Inspection

Site Activities: east bank excavation, Taylor Road bridge

Identified Hazards: List actual site hazards, Identify if PSP requires updating.

Contractor Tailgate Meeting Notes Reviewed?

(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address

Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

2x mini-excavator
1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

1x Rock Truck
- ADT30T-03

truck and pups
1x Foreman
2x Operator
1x Surveyor
2x Laborer
1x water truck driver

CONSTRUCTION PROGRESS

Spines, under Taylor Road bridge, piles imported

REVIEWER'S OBSERVATIONS

Item 1

- Piles were imported, appeared uniform

Item 2

- 2 more spines completed. Performed in 2 lifts

ETC

Field Review Report

KERR WOOD LEIDAL
consulting engineers

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Discussed applicable material for under bridge, as well as root wads

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

- Discussion with Andy on materials for under bridge placement, as well as root wads

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Pile delivery to site

Photo 2:



Spine #4

Photo 3:



Under Taylor Road Bridge boulder placement

Photo 4:



Spine #4

Photo 5:



Reach 2

Photo 6:



Under bridge

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:30AM	**OFF SITE**	6PM
DATE	2025-08-06				
WEATHER	Temperature: 19°C Precipitation: 21mm Air Pollution Level: Good. Air Quality Index: 32 US AQI (Good). Main Pollutant: PM2.5. Wind: 10.8 km/h. Humidity: 69%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP

KWL Staff: Luke Komisarski

KWL Activities: Inspection

Site Activities: Under Taylor road bridge works, east bank

Identified Hazards: List actual site hazards, Identify if PSP requires updating.

Contractor Tailgate Meeting Notes Reviewed?

(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address

Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

2x mini-excavator
1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

1x Rock Truck
- ADT30T-03

truck and pups
1x Foreman
3x Operator
1x Surveyor
2x Laborer
1x water truck driver

CONSTRUCTION PROGRESS

5~10 piles strapped. Constructed isolation for fish salvage at the reef

REVIEWER'S OBSERVATIONS

Item 1

- Bags were placed in river for fish salvage to allow passage to the reef. Fish salvage was started

Item 2

- Pile strapping began, and looked good

ETC

Field Review Report

KERR WOOD LEIDAL
consulting engineers

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Discussed strapping methodology

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

- Discussed fish salvage with Janice

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Area opened

Photo 2:



Lining placement

Photo 3:



Bag placement

Photo 4:



Bag placement

Photo 5:



Strapping

Photo 6:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:30AM	**OFF SITE**	7PM
DATE	2025-08-07				
WEATHER	Temperature: 22°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 12 US AQI (Good). Main Pollutant: PM2.5. Wind: 9.4 km/h. Humidity: 60%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP

KWL Staff: Luke Komisarski

KWL Activities: Inspection

Site Activities: pile strapping, under Taylor Road bridge

Identified Hazards: List actual site hazards, Identify if PSP requires updating.

Contractor Tailgate Meeting Notes Reviewed?

(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address

Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

2x mini-excavator
1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

1x Rock Truck
- ADT30T-03

1x Foreman
3x Operator
1x Surveyor
2x Laborer
1x water truck driver

CONSTRUCTION PROGRESS

Continued pile strapping, fish salvage, work under Taylor Road bridge

REVIEWER'S OBSERVATIONS

Item 1

- Pumps on site were not sufficient to allow fish salvage. There is too much piping, so the slough depth is too large to properly salvage

Item 2

-

ETC

Field Review Report

KERR WOOD LEIDAL
consulting engineers

DISCUSSIONS WITH CONTRACTOR:

Item 1

•

Item 2

•

ETC

•

DISCUSSIONS WITH OTHERS

Item 1

- Discussed fish salvage with Janice

Item 2

•

ETC

•

ACTION REQUIRED:

Item 1

•

Item 2

•

ETC

•

PHOTOGRAPHS

Photo 1:



Bags in place

Photo 2:



Planks laid on place

Photo 3:	**Photo 4:**
	
Under bridge works	Southeast under bridge
Photo 5:	**Photo 6**:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:15AM	**OFF SITE**	5PM
DATE	2025-08-08				
WEATHER	Temperature: 20°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 36 US AQI (Good). Main Pollutant: PM2.5. Wind: 9.5 km/h. Humidity: 60%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: Fish salvage
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
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2x mini-excavator
1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

1x Rock Truck
- ADT30T-03

truck and pups
1x Superintendent
1x Foreman
1x Operator
1x Surveyor
2x Laborer

CONSTRUCTION PROGRESS

Fish salvage

REVIEWER'S OBSERVATIONS

Item 1

- Bags did fail at one point, no harm just needed to be refilled and placed double bags. There was still water inflowing so Timbro filled a small section of sediment to slow piping

Item 2

-

ETC

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Discussed pile driving. Will come Monday or Tuesday next week depending on status of fish salvage

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

-

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Under bridge south finalized

Photo 2:



Bags after failure

Photo 3:



Filling east end

Photo 4:



Filling east end

Photo 5:



Water dropping

Photo 6:



Filling west end

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:30AM	**OFF SITE**	6PM
DATE	2025-08-11				
WEATHER	Temperature: 33°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 29 US AQI (Good). Main Pollutant: PM2.5. Wind: 7.2 km/h. Humidity: 36%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: Fish salvage
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5
Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
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(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

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- EX-0350-04

2x mini-excavator
1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

1x Rock Truck
- ADT30T-03

truck and pups
1x Foreman
1x Operator
1x Surveyor
2x Laborer

CONSTRUCTION PROGRESS

Fish salvage complete and reef access developed. Site prepped for pile driving. Final spine construction. Northeast side of Taylor Road bridge

REVIEWER'S OBSERVATIONS

Item 1

- Fish salvage went well

Item 2

-

ETC

Field Review Report

KERR WOOD LEIDAL
consulting engineers

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Pile driver coming in tomorrow

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

-

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Final spine construction

Photo 2:



East end reef access

Photo 3:



West end reef access

Photo 4:



East end reef access

Photo 5:



Works around tree at bridge

Photo 6:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:00AM	**OFF SITE**	7PM
DATE	2025-08-12				
WEATHER	Temperature: 30°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 23 US AQI (Good). Main Pollutant: PM2.5. Wind: 10.8 km/h. Humidity: 44%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: pile driving prep
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5
Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

2x mini-excavator
1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

1x Rock Truck
- ADT30T-03

truck and pups
1x Foreman
2x Operator
1x Surveyor
2x Laborer

CONSTRUCTION PROGRESS

Detail Progress

REVIEWER'S OBSERVATIONS

Item 1

- Test pits went well, the reef seemed easy enough to drive. Deflector 1 may be a challange

Item 2

- Pumping for fish salvage was challanging

ETC

Field Review Report

KERR WOOD LEIDAL
consulting engineers

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Pile driver says it may be difficult in the upper deflector areas, as well as on the old berm

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

-

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Deflector 1 access

Photo 2:



Spine

Photo 3:	**Photo 4:**
	
Test pit for deflector 2	Water pumping for fish salvage
Photo 5:	**Photo 6**:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:30AM	**OFF SITE**	5:15PM
DATE	2025-08-13				
WEATHER	Temperature: 25°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 24 US AQI (Good). Main Pollutant: PM2.5. Wind: 10.8 km/h. Humidity: 47%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: pile driving prep
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

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- EX-0350-04

2x mini-excavator
1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

1x Rock Truck
- ADT30T-03

truck and pups
1x Foreman
2x Operator
1x Surveyor
2x Laborer

CONSTRUCTION PROGRESS

Test pile and completion of fan channels 1 and 2 extension

REVIEWER'S OBSERVATIONS

Item 1

- Test pile went in easily

Item 2

-

ETC

Field Review Report

KERR WOOD LEIDAL
consulting engineers

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Pile driver was happy with test pile driving

Item 2

- Pile driving was stopped as it was determined we Lodgepole pine was not useable

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

-

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Deflector 2 access

Photo 2:



Test pile

Photo 3:	Photo 4:
	
Fan channel 1 and 2 extension	
Photo 5:	**Photo 6**:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:00AM	**OFF SITE**	5:00PM
DATE	2025-08-14				
WEATHER	Temperature: 23C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 22 US AQI (Good). Main Pollutant: PM2.5. Wind: 8.8 km/h. Humidity: 41%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: Rootwads
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5
Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
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(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

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- EX-0350-04

2x mini-excavator
1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

1x Rock Truck
- ADT30T-03

truck and pups
1x Foreman
2x Operator
1x Surveyor
2x Laborer

CONSTRUCTION PROGRESS

Rootwad cabling mostly completed

REVIEWER'S OBSERVATIONS

Item 1

- Rootwads were almost completed. Pull tests still required

Item 2

- Pump was placed for rainfall

ETC

Field Review Report

KERR WOOD LEIDAL
consulting engineers

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Timbro brought out a pump in case the incoming rain were to bring water into the project area

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

-

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:

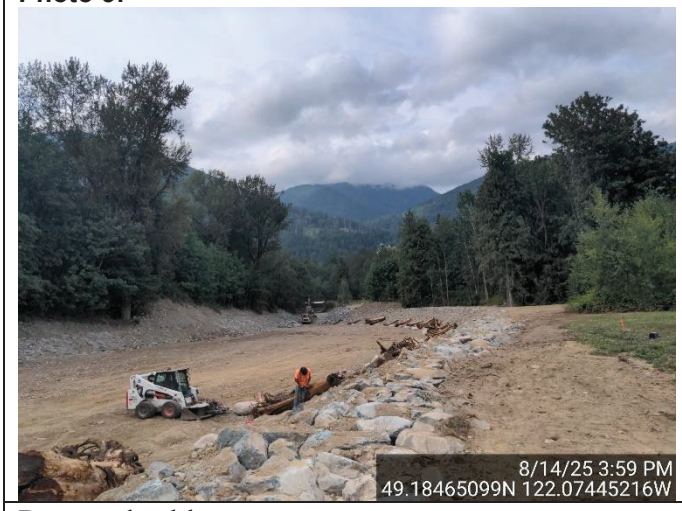


Rootwad cables

Photo 2:



Pump for incoming rain

Photo 3:	Photo 4:
	
Rootwad cables	
Photo 5:	**Photo 6**:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:00AM	**OFF SITE**	5:00PM
DATE	2025-08-15				
WEATHER	Temperature: 23C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 22 US AQI (Good). Main Pollutant: PM2.5. Wind: 8.8 km/h. Humidity: 41%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: Prep for rainfall
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

2x mini-excavator
1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

1x Rock Truck
- ADT30T-03

truck and pups
1x Foreman
2x Operator
1x Surveyor
2x Laborer

CONSTRUCTION PROGRESS

Rootwad cabling mostly completed

REVIEWER'S OBSERVATIONS

Item 1

- Works consisted of prep for incoming rainfall

Item 2

-

ETC

Field Review Report

KERR WOOD LEIDAL
consulting engineers

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Timbro moved the pump to the slough in case the incoming rain were to bring water into the project area

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

-

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Pump for incoming water

Photo 2:



Culvert clearing

Photo 3:	**Photo 4:**
	
Culvert cleared	
Photo 5:	**Photo 6**:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client4 xe: la4mel First q ation
’ roject q o4 2900N12
Contractor4 Pim7ro ContractinT xtd.
bWx File q o.4 2838.003

PREPARED BY	ge7astien xatrille	**ON SITE**	N400AK	**OFF SITE**	M K
DATE	2025-08-11				
WEATHER	Pemperature422JC ’ recipitation4q ,A Air ’ ollution xevel4° ood. Air / uality Qde6429 I g A/ QU ood S K ain ’ ollutant4’ K2.5. Wind4N2 km,(. Gumidity43) h . (ttps4,www.i: air.com,us,canada,7ritis(-colum7ia,c(illiwack				
WORK AREA	Deroc(e Creek				

TAILGATE MEETING NOTES
Review oH(a%ards oHsite per ’ g’
KWL Staff: ge7astien xatrillef zanice b wo
KWL Activities: Qspection
Site Activities4Ca7linT rootwad
Identified Hazards: xist actual site (a%ardsf Qdentiby iH’ g’ re: uires updatinT.
Contractor Tailgate Meeting Notes Reviewed?
Uc(eck oneS Yes ☒ q o ☐ n,a ☐

EMERGENCY CONTACTS
Nearest Hospital Address
K ission K emorial Gospital
N32MGurd g tf K issionf BC V2V 3G5
Emergency Phone Numbers

EmerTency g ervices4	911
Gospital Uhon-emerTencyS4	U) 0MS82) -) 2) 1
’ olice Uhon-emerTencyS4	U) 0MS82) -N1) 1
Fire Uhon-emerTencyS4	U) 0MS820-3N93
Client Gealt(and g ahety OHHicer	UNN8S539) 118
On-site First Aid Attendant4	U) 0MSN98-) 82N
Ug ite g uperintendentS4	U) 0MS8M5-2M25
UForemanS4	U) 0MSN98-) 82N

EQUIPMENT AND WORKFORCE ON SITE
26 E6cavator
- EX-350-03
- EX-0350-0M

26 mini-e6cavator
16 Bo7 cat
- g b0NN0-03

16 Compaction Roller
- Rx012P-01

16 Rock Pruck
- ADP30P-03

truck and pups
16 Foreman
16 Operator
16 g urveyor
26 xa7orer

CONSTRUCTION PROGRESS
Finished with the epoxy on one side of all the accepted rootwads. Started on the coarse gravel cap.

REVIEWER’S OBSERVATIONS
Item 1
- Coarse Travel is accepta7le si%e

Item 2
- ° ood amount oHepo6y and clean drill (oles 7eHore application

ETC

Field Review Report

KERR WOOD LEIDAL
consulting engineers

DISCUSSIONS WITH CONTRACTOR:

Item 1

- K ay come in tomorrow

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

-

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS



Photo 1: Coarse gravel on basin entrance

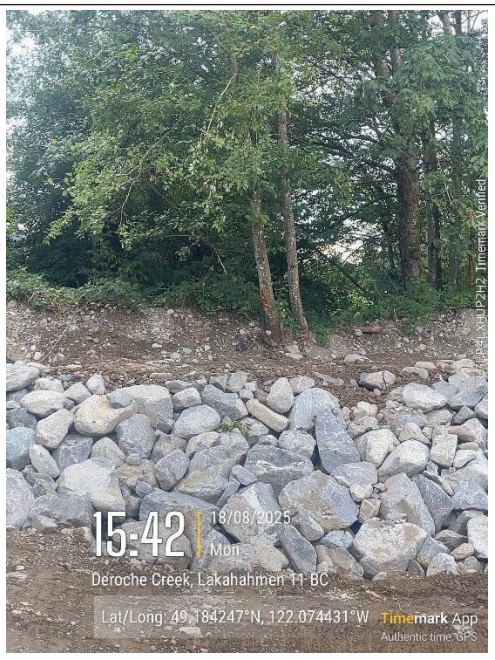


Photo 2: Coarse gravel on basin exit

Photo 3:

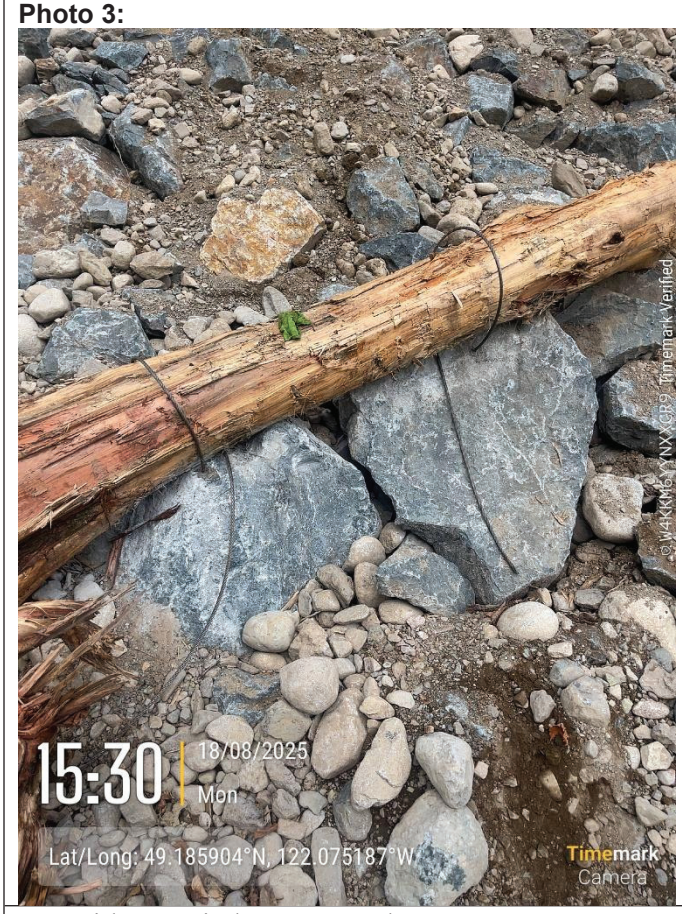


Photo 4:

One side epoxied on rootwad

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client4 xe: la4mel First q ation
’ roject q o4 2900N12
Contractor4 PimTro Contractinb xtd.
gWx File q o.4 2838.003

PREPARED BY	KeTastien xatrille	**ON SITE**	114M5A°	**OFF SITE**	5430’ °
DATE	2025-08-19				
WEATHER	Pemperature422/C ’ recipitation4q GA Air ’ ollution xevel4Qood. Air I uality Uide7429 SK AI U(Qood). ° ain ’ ollutant4’ ° 2.5. Wind4N2 kmG. Humidity43%f . https4GBwww.i: air.comGsGanadaGritish-columTiaGhilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES
Review ozha, ards ozsite per ’ K’
KWL Staff: KeTastien xatrille
KWL Activities: Uspection
Site Activities4CaTlinb rootwad
Identified Hazards: xist actual site ha, ardsYUdentizy iz’ K’ re: uires updatinb.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Bes ☒ q o ☐ nGa ☐

EMERGENCY CONTACTS
Nearest Hospital Address
° ission ° emorial Hospital
N32MHurd KtY° issionYVC E2E 3H5
Emergency Phone Numbers

6merbency Kervices4	911
Hospital (non-emerbency)4	(%0M) 82%%2%1
’ olice (non-emerbency)4	(%0M) 82%N1%1
Fire (non-emerbency)4	(%0M) 820-3N93
Client Health and Kazety Ozzicer	(NN8) 539 %118
On-site First Aid Attendant4	(%0M) N98-%82N
(Kite Kuperintendent)4	(%0M) 8M5-2M25
(Foreman)4	(%0M) N98-%82N

EQUIPMENT AND WORKFORCE ON SITE
27 67cavator
- 6X-350-03
- 6X-0350-0M

27 mini-e7cavator
17 VoT cat
- Kg0NN0-03

17 Compaction Roller
- Rx012P-01

17 Rock Pruck
- ADP30P-03

truck and pups
17 Foreman
17 Operator
17 Kurveyor
27 xaTorer

CONSTRUCTION PROGRESS
Finished with the epoxy on both sides of most of the accepted rootwads. One more rootwad to drill and cable, a few left to epoxy.

REVIEWER’S OBSERVATIONS
Item 1
- CaTle is tibht and can not move on the rootwad

Item 2
- One caTle was too loose and Troubht to contractorsLattention to redo

Item 2

- q ew rootwads are similar to previously accepted rootwads

ETC

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Will not Te on site zor the rest ozthe week.

Item 2

- Already completed inventory ozthe Trace lobs zor the xWD reez

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

-

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



New rootwads

Photo 2:



New rootwads

Photo 3: 	**Photo 4:** 
Finished cabled rootwad	Cabled rootwad, still needs epoxy

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:30AM	**OFF SITE**	5PM
DATE	2025-08-25				
WEATHER	Temperature: 25°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 32 US AQI (Good). Main Pollutant: PM2.5. Wind: 9.2 km/h. Humidity: 49%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: piles
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5
Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

2x mini-excavator
1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

1x Rock Truck
- ADT30T-03

truck and pups
1x Superintendent
1x Foreman
3x Operator
1x Surveyor
2x Laborer
1x pile driver

CONSTRUCTION PROGRESS

Setting up new piles

REVIEWER'S OBSERVATIONS

Item 1

- DF piles arrived to site

Item 2

-

ETC

DISCUSSIONS WITH CONTRACTOR:

Item 1

- New piles came in much longer than required, Timbro cut them down.

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

-

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Pile driver

Photo 2:



New piles (right)

Photo 3:	Photo 4:
	
Strapping new piles	
Photo 5:	**Photo 6**:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:00AM	**OFF SITE**	5:00PM
DATE	2025-08-26				
WEATHER	Temperature: 17°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 30 US AQI (Good). Main Pollutant: PM2.5. Wind: 9.1 km/h. Humidity: 73%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: piles
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5
Emergency Phone Numbers

Emergency Services:	911
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Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
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(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

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1x Compaction Roller
- RL012T-01

1x Rock Truck
- ADT30T-03

truck and pups
1x Superintendent
1x Foreman
1x Operator
1x Surveyor
1x Laborer
1x pile driver

CONSTRUCTION PROGRESS

Reinstating lot 8-3-3, gravel

REVIEWER'S OBSERVATIONS

Item 1

- Lot 8-3-3 reinstated, not yet planted

Item 2

-

ETC

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Discussed gravel imports. Sizing looks good

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

-

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Lot 8-3-3 windrow

Photo 2:



Lot 8-3-3 windrow removed and leveled

Photo 3:	**Photo 4:**
	
Area reinstated and leveled	Gravel came in
Photo 5:	**Photo 6**:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:30AM	**OFF SITE**	4:00PM
DATE	2025-08-27				
WEATHER	Temperature: 18°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 28 US AQI (Good). Main Pollutant: PM2.5. Wind: 2.1 km/h. Humidity: 75%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: piles
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
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(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

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- EX-0350-04

2x mini-excavator
1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

1x Rock Truck
- ADT30T-03

truck and pups
1x Superintendent
1x Foreman
1x Operator
1x Surveyor
1x Laborer
1x pile driver

CONSTRUCTION PROGRESS

Deflector 2 piles

REVIEWER'S OBSERVATIONS

Item 1

- Piles drove easily enough

Item 2

- Pile driving machine broke down, spilled non-biodegradable oil

Item 3

- Setting up deflector 1 pile area, filling in area for driver to sit on

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Discussed the fat that oil in driver was not biodegradable. Timbro was not aware of this

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

-

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

- Pile driver needs to be removed from the wetted area and have it's oil flushed and replaced with biodegradable oil

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Pile driver

Photo 2:



Deflector 1 setup

Photo 3:



Deflector 1 setup

Photo 4:



Pile driver

Photo 5:



Pile driver broken down

Photo 6:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:00AM	**OFF SITE**	5:00PM
DATE	2025-08-28				
WEATHER	Temperature: 22°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 32 US AQI (Good). Main Pollutant: PM2.5. Wind: 7.1 km/h. Humidity: 56%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: piles
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5
Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

2x mini-excavator
1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

1x Rock Truck
- ADT30T-03

truck and pups
1x Superintendent
1x Foreman
1x Operator
1x pile driver

CONSTRUCTION PROGRESS

Deflector 2 piles, lot 8-3-3 access

REVIEWER'S OBSERVATIONS

Item 1
- Pile driving machine remains broken down

Item 2
- Removing access to lot 8-3-3

Item 3
-

DISCUSSIONS WITH CONTRACTOR:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

Item 1

- Pile driver broken down, unsure of how this will delay project

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

- Discussion with Janice about oil spill and replacement

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

- Pile driver needs to be removed from the wetted area and have it's oil flushed and replaced with biodegradable oil

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Lot 8-3-3 access

Photo 2:



Pile driver broken down

Photo 3:	**Photo 4:**
	
Appears to be oil in water	Pile driver
Photo 5:	**Photo 6**:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:30AM	**OFF SITE**	4:00PM
DATE	2025-08-29				
WEATHER	Temperature: 15°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 30 US AQI (Good). Main Pollutant: PM2.5. Wind: 2.1 km/h. Humidity: 94%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: piles
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

2x Excavator
- EX-350-03
- EX-0350-04

1x mini-excavator
1x Bob cat
- SK0770-03

1x Compaction Roller
- RL012T-01

1x Rock Truck
- ADT30T-03

1x Superintendent
1x Foreman
1x Operator
1x pile driver

CONSTRUCTION PROGRESS

Lot 5

REVIEWER'S OBSERVATIONS

Item 1
- Pile driving machine remains broken down

Item 2
- Lot 5 corner allowed to be touched, riprap installed

Item 3
-

DISCUSSIONS WITH CONTRACTOR:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

Item 1

- Discussion with Tyson West of Timbro on what oil is allowed to be used

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

- Discussion with Janice about oil spill and replacement

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

- Pile driver needs to be removed from the wetted area and have it's oil flushed and replaced with biodegradable oil

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Soil on top of west side north end

Photo 2:



Lot 5 riprap

Photo 3:	**Photo 4:**
	
Machine broken down	Pile driver
Photo 5:	**Photo 6**:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:00AM	**OFF SITE**	6:00PM
DATE	2025-09-02				
WEATHER	Temperature: 17°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 32 US AQI (Good). Main Pollutant: PM2.5. Wind: 5.5 km/h. Humidity: 72%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: piles
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5
Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

1x Excavator
- EX-350-03

1x mini-excavator
1x Bob cat
- SK0770-03

1x Rock Truck
- ADT30T-03

1x Superintendent
1x Foreman
1x Operator
1x pile driver

CONSTRUCTION PROGRESS

Deflector 2, reef piles

REVIEWER'S OBSERVATIONS

Item 1
- Pile driver back in operation

Item 2
- Deflector 2 piles completed, reef started

Item 3
-

DISCUSSIONS WITH CONTRACTOR:

Item 1
- Biodegradable oil has been transferred into pile driver

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

-

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Deflector 2

Photo 2:



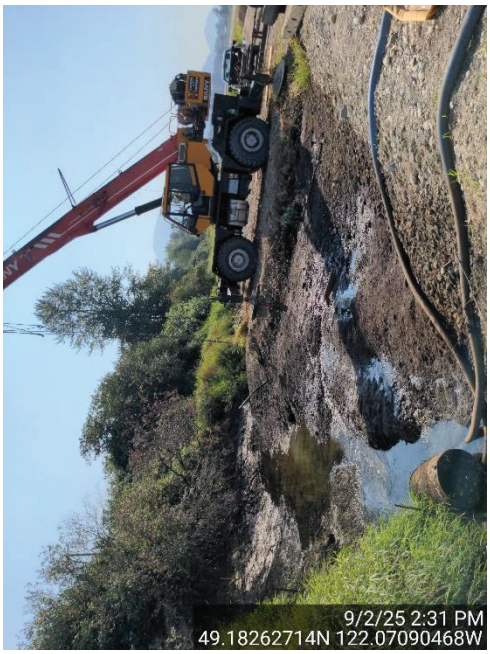
Deflector 2

Photo 3:



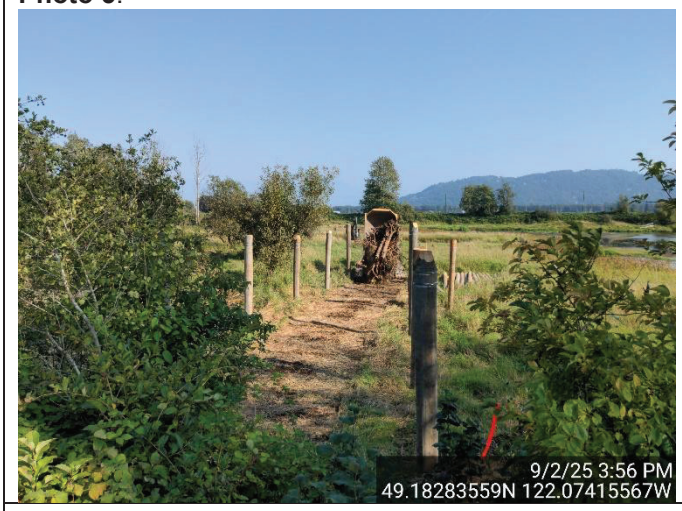
Access ramp

Photo 4:



Reef pumped for piles

Photo 5:



LWD placement

Photo 6:



LWD placement

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:00AM	**OFF SITE**	6:00PM
DATE	2025-09-03				
WEATHER	Temperature: 17°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 32 US AQI (Good). Main Pollutant: PM2.5. Wind: 4.2 km/h. Humidity: 71%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: piles
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5
Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

1x Excavator
- EX-350-03

1x mini-excavator
1x Bob cat
- SK0770-03

1x Rock Truck
- ADT30T-03

1x Superintendent
1x Foreman
1x Operator
1x pile driver

CONSTRUCTION PROGRESS

Deflector 2, reef piles

REVIEWER'S OBSERVATIONS

Item 1
- Deflector 2 and reef piles completed

Item 2
-

Item 3
-

DISCUSSIONS WITH CONTRACTOR:

Item 1
- Timbro found a Rogers line underground, moved some piles along the road to avoid them

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

-

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

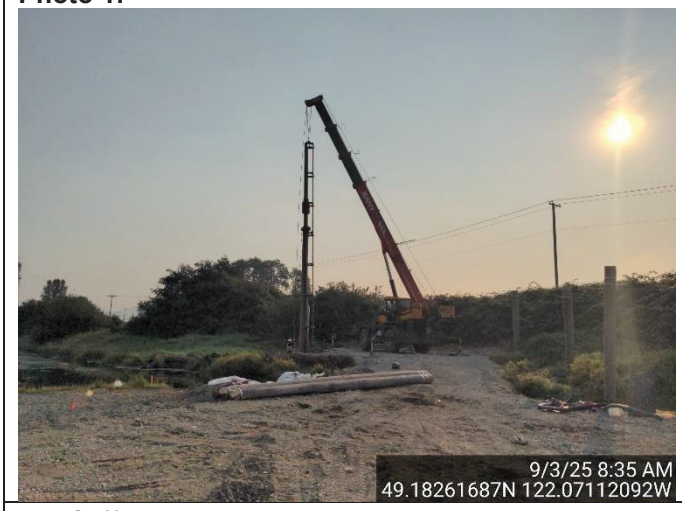
-

ETC

-

PHOTOGRAPHS

Photo 1:



Reef piles

Photo 2:



Reef piles

Photo 3:



LWD

Photo 4:



Rogers line

Photo 5:



Driver moved to Deflector 1

Photo 6:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:00AM	**OFF SITE**	5:00PM
DATE	2025-09-04				
WEATHER	Temperature: 26°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 32 US AQI (Good). Main Pollutant: PM2.5. Wind: 6.2 km/h. Humidity: 67%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: piles
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5
Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

1x Excavator
- EX-350-03

1x mini-excavator
1x Bob cat
- SK0770-03

1x Rock Truck
- ADT30T-03

1x Superintendent
1x Foreman
1x Operator
1x pile driver

CONSTRUCTION PROGRESS

Deflector 1, reef

REVIEWER'S OBSERVATIONS

Item 1
- Reef pile complete, driver moved to Deflector 1. Pre-drilling performed for some of the piles

Item 2
-

Item 3
-

DISCUSSIONS WITH CONTRACTOR:

Item 1
- Timbro found a Rogers line underground, moved some piles along the road to avoid them

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

- Pile driver didn't believe some of the piles would drive. Pre-drilling commenced, and all piles drove well

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Reef

Photo 2:



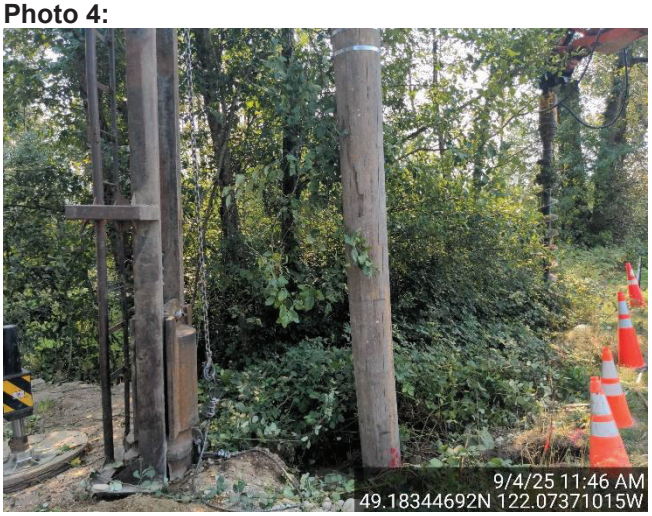
Pre-drilling

Photo 3:



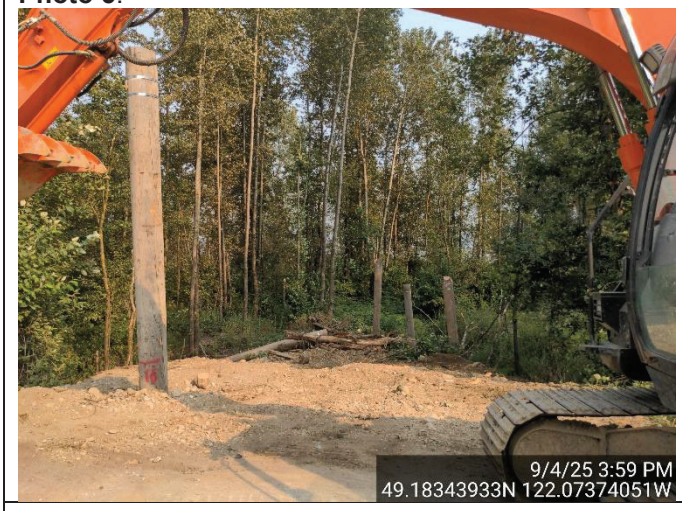
Pre-drilled hole

Photo 4:



Placement of pile in pre-drilled hole

Photo 5:



Piles installed

Photo 6:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Tierra Parminter (TRP)	**ON SITE**	8:45 AM	**OFF SITE**	3:15PM
DATE	September 5, 2025				
WEATHER	Temperature: 24°C Air Pollution Level: Bad Air Quality Index: 158 US AQI (Unhealthy) Main Pollutant: PM2.5. Wind: 7 km/h. Humidity: 62%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP

KWL Staff: Tierra Parminter

KWL Activities: Inspection

Site Activities: east bank excavation, woody debris fill, log delivery to site, log cable bracing

Identified Hazards: Hazards identified as per PSP

- Poor visibility due to bad air quality

Contractor Tailgate Meeting Notes Reviewed?

(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address

Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

- 1x Diesel generator for site office
- 1x mini excavator
- 1x JD T4 Excavator
- 1x Excavator
- T4 bobcat Bulldozer
- Dump truck
- SANY Telehandler

Workforce

1x Foreman (Liam)
2x Operators
1x Environmental Monitor

CONSTRUCTION PROGRESS

- Filling of reef at deflection berm #2 with woody debris in progress
- Cable bracing of deflector pile #2 to be complete by the end of today
- Dump truck arriving with bracing logs for deflector piles; stored in laydown area

REVIEWER'S OBSERVATIONS

- First cable brace completed at around 12:30; installed as per detail (shown on sheet 005) with staple & looped wire
- Installation of cable bracing slowed due to excavator issue; resolved around 3PM

DISCUSSIONS WITH CONTRACTOR:

- Fill & install of cabling bracing for deflector pile #2 anticipated to be complete by end of day
- Installed brace log cabling secured with minimal slack, aligns with the detail in sheet 005

DISCUSSIONS WITH OTHERS

- N/A

ACTION REQUIRED:

- N/A

PHOTOGRAPHS



Photo 1: Alignment of timber pile deflector #1, facing East



Photo 2: Delivery of bracing logs to laydown area



Photo 3: Log layout on timber pile deflector #2



Photo 4: Placement of bracing logs on deflector #2



Photo 5: Layout of first bracing logs on deflector #2



Photo 6: Bracing log, stapled to timber pile, wire rope secured with clamps

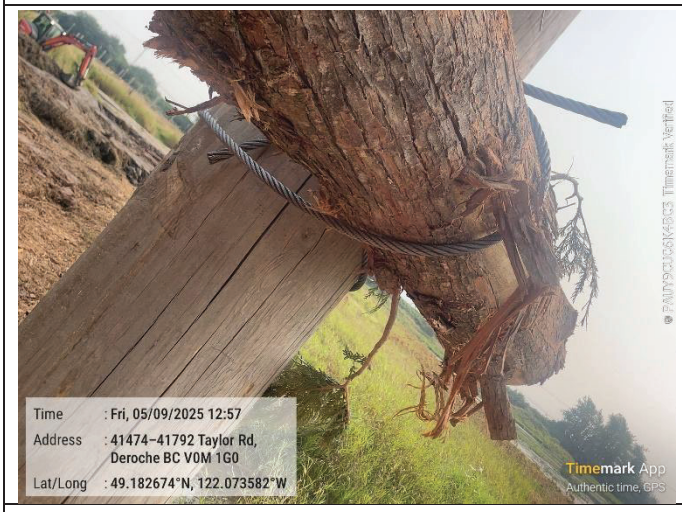


Photo 7: Bottom view of secured bracing log & timber pile

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:00AM	**OFF SITE**	5:00PM
DATE	2025-09-08				
WEATHER	Temperature: 25°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 30 US AQI (Good). Main Pollutant: PM2.5. Wind: 6.5 km/h. Humidity: 58%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: LWD
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5
Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

1x Excavator
- EX-350-03

1x mini-excavator
1x Bob cat
- SK0770-03

1x Rock Truck
- ADT30T-03

1x Superintendent
1x Foreman
1x Operator
1x pile driver

CONSTRUCTION PROGRESS

Deflector 1, reef, west branch

REVIEWER'S OBSERVATIONS

Item 1
- LWD in the reef started, as well as cabling

Item 2
- West branch near fan channels 4a/b excavation

Item 3
-

DISCUSSIONS WITH CONTRACTOR:

Item 1
- Excavator blew a small line, drip tray was used

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

-

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Stockpiling material from West branch

Photo 2:



Reef

Photo 3:



Caballing at reef

Photo 4:



West branch excavation

Photo 5:



Drip tray used on excavator

Photo 6:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	7:00AM	**OFF SITE**	5:00PM
DATE	2025-09-09				
WEATHER	Temperature: 23°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 30 US AQI (Good). Main Pollutant: PM2.5. Wind: 6.5 km/h. Humidity: 64%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: LWD
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5
Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

1x Excavator
- EX-350-03

1x mini-excavator
1x Bob cat
- SK0770-03

1x Rock Truck
- ADT30T-03

1x Superintendent
1x Foreman
1x Operator
1x pile driver

CONSTRUCTION PROGRESS

Deflector 1, reef

REVIEWER'S OBSERVATIONS

Item 1
- LWD and cabling in the reef

Item 2
- West branch near fan channels 4a/b excavation

Item 3
-

DISCUSSIONS WITH CONTRACTOR:

Item 1
-

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

-

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Reef

Photo 2:



Reef LWD

Photo 3:	**Photo 4:**
	
Deflector 2 cabling	Deflector 2 LWD
Photo 5:	**Photo 6**:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Tierra Parminter (TRP)	**ON SITE**	8:45 AM	**OFF SITE**	5:30 PM
DATE	September 11, 2025				
WEATHER	Temperature: 23°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 68 US AQI (Moderate). Main Pollutant: PM2.5. Wind: 8.3 km/h. Humidity: 70%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP

KWL Staff: Tierra Parminter (TRP)

KWL Activities: Inspection

Site Activities: east bank excavation, brace log layout (deflector #1)

Identified Hazards: List actual site hazards, Identify if PSP requires updating.

Contractor Tailgate Meeting Notes Reviewed?

(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address

Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

- 5 Crew
- B30E Dump Truck
- JD 544K Hauler
- JD 135G Excavator Ex0135-01
- Link-Belt Excavator
- Kubota mini-excavator U48-4

CONSTRUCTION PROGRESS

- Fill of bracing logs at deflector #1 in progress; should be complete by the end of day
- Installation of bracing logs at deflector #2 complete
- East flood channel to be excavated today
- Geocell to be installed today or tomorrow
- 2 failed anchors from pull test in low flow channel redrilled, holes cleaned & epoxy applied

REVIEWER'S OBSERVATIONS

- Temporary storage in lot 8-3-3
- Bracing log cabling examined; matches detail including extension length and clamp spacing
- NHC to come out tomorrow to review excavation prior to placement of geotextile & geocell at access ramp location

DISCUSSIONS WITH CONTRACTOR:

- N/A

DISCUSSIONS WITH OTHERS

- N/A

ACTION REQUIRED:

- N/A

PHOTOGRAPHS



Photo 1: Completed cable log brace installation, deflector #2



Photo 2: Close-up of cable log brace installation



Photo 3: LWD reef, deflector 2, facing Southeast



Photo 4: Sediment basin entrance, facing North

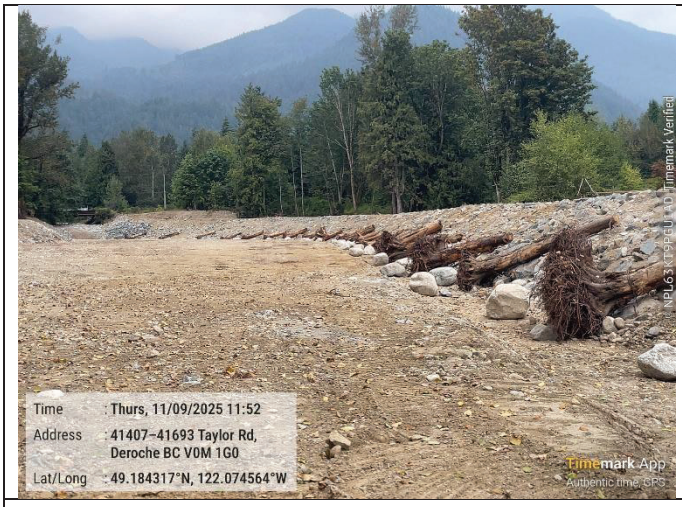


Photo 5: WRC Rootwads, anchored to boulders along sediment basin



Photo 6: Completed cable bracing at deflector #1



Photo 8: Excavation of east bank



Photo 9: Slope of access ramp, facing North

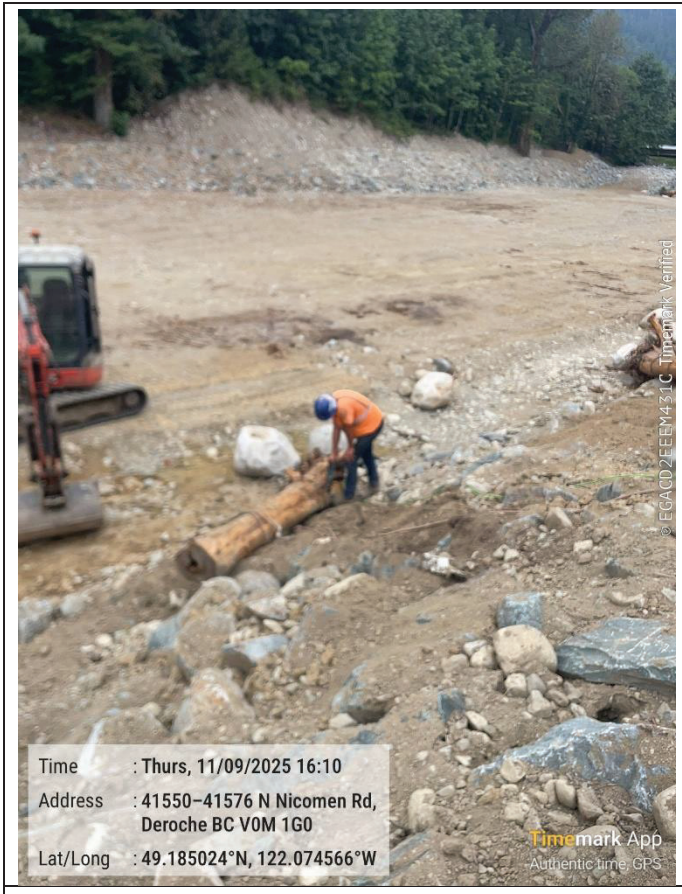


Photo 10: Redrill of holes in anchor boulders



Photo 11: Redrill of holes in anchor boulders

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Tierra Parminter (TRP)	**ON SITE**	7:30 AM	**OFF SITE**	12PM
DATE	September 12, 2025				
WEATHER	Temperature: 25°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 45 US AQI (Good). Main Pollutant: PM2.5. Wind: 10.8 km/h. Humidity: 51%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP

KWL Staff: Tierra Parminter (TRP)

KWL Activities: Inspection

Site Activities: Excavation, Geocell review (NHC), access ramp grading

Identified Hazards: List actual site hazards, Identify if PSP requires updating.

Contractor Tailgate Meeting Notes Reviewed?

(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address

Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

- Timbro - 4 Crew
- Des (NHC)
- B30E Dump Truck
- Excavator – JD 135G
- Excavator
- BW 211D-40 compaction roller
- JD T4 Bulldozer
- Bobcat SK 077
- B30E Dump Truck
- Sand Compactor

CONSTRUCTION PROGRESS

- Grading of equipment access ramp in progress, geotextile and geocell ready for installation pending NHC review.
- Geocell installation in progress after NHC review of access ramp slope

REVIEWER'S OBSERVATIONS

- Extra logs and large boulders brought & stored along maintenance access road
- Hold point for NHC review prior to geocell & geotextile installation

DISCUSSIONS WITH CONTRACTOR:

- Access gate for maintenance road to be installed Monday

Field Review Report

KERR WOOD LEIDAL
consulting engineers

DISCUSSIONS WITH OTHERS

- N/A

ACTION REQUIRED:

- N/A

PHOTOGRAPHS



Photo 1: Access ramp grade



Photo 2: Geotextile installation



Photo 3: Geocell installation



Photo 4: Close up geocell installation

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	9:00AM	**OFF SITE**	3:00PM
DATE	2025-09-15				
WEATHER	Temperature: 22°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 30 US AQI (Good). Main Pollutant: PM2.5. Wind: 4.5 km/h. Humidity: 59%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: Site finalization
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

1x Excavator
- EX-350-03

1x mini-excavator
1x Bob cat
- SK0770-03

1x Foreman
1x Operator

CONSTRUCTION PROGRESS

Tidied up site, finalized access ramp, brought in moulds for gate footings

REVIEWER'S OBSERVATIONS

Item 1
- Geotextile under access ramp looks good

Item 2
- 2 tube molds for concrete footings brought in

Item 3
-

DISCUSSIONS WITH CONTRACTOR:

Item 1
-

Item 2
-

ETC
-

Field Review Report

KERR WOOD LEIDAL
consulting engineers

DISCUSSIONS WITH OTHERS

Item 1

•

Item 2

•

ETC

•

ACTION REQUIRED:

Item 1

•

Item 2

•

ETC

•

PHOTOGRAPHS

Photo 1:



Access ramp geotextile

Photo 2:



Reef with channel reinstated

Photo 3:



Photo 4:



Deflector 1	Footing molds
Photo 5:	**Photo 6**:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	8:00AM	**OFF SITE**	3:30PM
DATE	2025-09-16				
WEATHER	Temperature: 29°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 32 US AQI (Good). Main Pollutant: PM2.5. Wind: 5.6 km/h. Humidity: 46%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: Site finalization
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

1x Excavator
- EX-350-03

1x mini-excavator
1x Bob cat
- SK0770-03

1x Foreman
1x Operator

CONSTRUCTION PROGRESS

Trucked out stockpiled sediment from west branch, poured access gate concrete

REVIEWER'S OBSERVATIONS

Item 1
- All sediment stockpiled near the site office was removed

Item 2
- Concrete poured for access gate

Item 3
-

DISCUSSIONS WITH CONTRACTOR:

Item 1
-

Item 2
-

ETC
-

Field Review Report

KERR WOOD LEIDAL
consulting engineers

DISCUSSIONS WITH OTHERS

Item 1

•

Item 2

•

ETC

•

ACTION REQUIRED:

Item 1

•

Item 2

•

ETC

•

PHOTOGRAPHS

Photo 1:



West branch stockpile sediment

Photo 2:



Concrete pouring

Photo 3:



Photo 4:



Concrete pouring	West branch stockpile sediment
Photo 5:	**Photo 6**:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	8:00AM	**OFF SITE**	3:00PM
DATE	2025-09-18				
WEATHER	Temperature: 21°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 32 US AQI (Good). Main Pollutant: PM2.5. Wind: 8.6 km/h. Humidity: 63%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: Site finalization
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5
Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

1x Excavator
- EX-350-03

1x mini-excavator
1x Bob cat
- SK0770-03

1x Foreman
1x Superintendent
1x Operator

CONSTRUCTION PROGRESS

Site cleanup

REVIEWER'S OBSERVATIONS

Item 1
- Site laydown area removal complete

Item 2
-

Item 3
-

DISCUSSIONS WITH CONTRACTOR:

Item 1
-

Item 2
-

ETC
-

Field Review Report

KERR WOOD LEIDAL
consulting engineers

DISCUSSIONS WITH OTHERS

Item 1

•

Item 2

•

ETC

•

ACTION REQUIRED:

Item 1

•

Item 2

•

ETC

•

PHOTOGRAPHS

Photo 1:



Laydown area removed

Photo 2:



Laydown area removed

Photo 3:



Photo 4:



West branch	Lock blocks back in place
Photo 5:	**Photo 6**:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	8:00AM	**OFF SITE**	12:30PM
DATE	2025-09-19				
WEATHER	Temperature: 23°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 28 US AQI (Good). Main Pollutant: PM2.5. Wind: 6.8 km/h. Humidity: 57%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: Site finalization
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5
Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

1x Excavator
- EX-350-03

1x mini-excavator
1x Bob cat
- SK0770-03

1x Foreman
1x Superintendent
1x Operator
1x NHC (Des Goold)

CONSTRUCTION PROGRESS

Site cleanup

REVIEWER'S OBSERVATIONS

Item 1
- Des's punch list was completed

Item 2
- Pipe noted in the basin entrance after being excavated

Item 3
-

DISCUSSIONS WITH CONTRACTOR:

Item 1
-

Item 2
-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

- Discussed punch list with Des

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

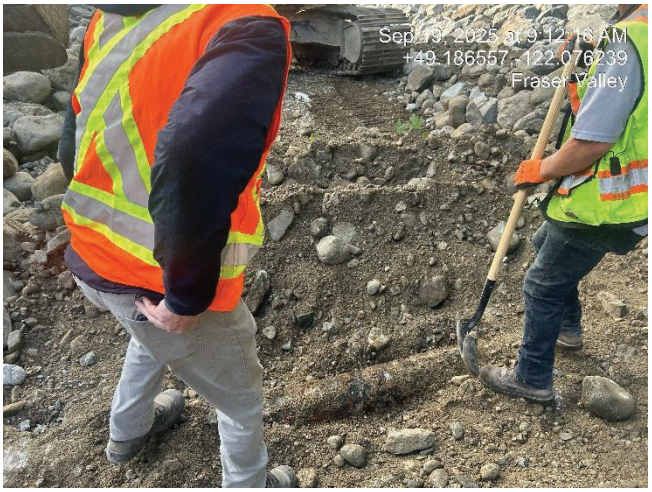
PHOTOGRAPHS

Photo 1:



Under railway bridge

Photo 2:



Pipe noted in basin access ramp

Photo 3:



Photo 4:



Adding riprap to Lot 5 corner	Fixed cable on Taylor Rd Bridge
Photo 5: 	**Photo 6**:
Lock blocks	

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	9:30AM	**OFF SITE**	1:00PM
DATE	2025-10-03				
WEATHER	Temperature: 17°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 28 US AQI (Good). Main Pollutant: PM2.5. Wind: 5.2 km/h. Humidity: 71%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES
Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: Site finalization
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS
Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5
Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE
1x Surveyor
3x Environmental (Nova Pacific)

CONSTRUCTION PROGRESS
Planting

REVIEWER'S OBSERVATIONS
Item 1
- Planting in south portion of project well underway

Item 2
-

Item 3
-

DISCUSSIONS WITH CONTRACTOR:
Item 1
- Discussed planting with Nova Pacific team, including soil to be potentially brought in

Item 2
-

ETC
-

DISCUSSIONS WITH OTHERS
Item 1
-

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Fan Channel 4a planting

Photo 2:



Fan Channel 1 planting

Photo 3:



West branch

Photo 4:



Access gate

Photo 5:

Photo 6:

Field Review Report

KERR WOOD LEIDAL
consulting engineers

PROJECT: **Deroche Creek Recovery Solution**
Client: Leq'a:mel First Nation
Project No: 2900712
Contractor: Timbro Contracting Ltd.
KWL File No.: 2838.003

PREPARED BY	Luke Komisarski	**ON SITE**	9:00AM	**OFF SITE**	12:00PM
DATE	2025-10-06				
WEATHER	Temperature: 20°C Precipitation: N/A Air Pollution Level: Good. Air Quality Index: 30 US AQI (Good). Main Pollutant: PM2.5. Wind: 5.2 km/h. Humidity: 43%. https://www.iqair.com/us/canada/british-columbia/chilliwack				
WORK AREA	Deroche Creek				

TAILGATE MEETING NOTES

Review of hazards of site per PSP
KWL Staff: Luke Komisarski
KWL Activities: Inspection
Site Activities: Site finalization
Identified Hazards: List actual site hazards, Identify if PSP requires updating.
Contractor Tailgate Meeting Notes Reviewed?
(check one) Yes ☒ No ☐ n/a ☐

EMERGENCY CONTACTS

Nearest Hospital Address
Mission Memorial Hospital
7324 Hurd St, Mission, BC V2V 3H5

Emergency Phone Numbers

Emergency Services:	911
Hospital (non-emergency):	(604) 826-6261
Police (non-emergency):	(604) 826-7161
Fire (non-emergency):	(604) 820-3793
Client Health and Safety Officer	(778) 539 6118
On-site First Aid Attendant:	(604) 798-6827
(Site Superintendent):	(604) 845-2425
(Foreman):	(604) 798-6827

EQUIPMENT AND WORKFORCE ON SITE

1x Superintendent
4x road milling crew

CONSTRUCTION PROGRESS

Road milling for repaving

REVIEWER'S OBSERVATIONS

Item 1

- Road is ready for repaving

Item 2

-

Item 3

-

DISCUSSIONS WITH CONTRACTOR:

Item 1

- Discussed with Travis asphalt milling. Was milled to 50mm

Item 2

-

ETC

-

DISCUSSIONS WITH OTHERS

Item 1

-

Item 2

-

ETC

-

ACTION REQUIRED:

Item 1

-

Item 2

-

ETC

-

PHOTOGRAPHS

Photo 1:



Milling

Photo 2:



More riprap added to this section

Photo 3:



Reseeding taking on laydown

Photo 4:



Reseeding taking on lot 8-3-3

Photo 5:



Photo 6:

Milling

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): Deroche Creek, off Taylor Rd**
Date: July 14, 2025 **Time: 8:00am to 4:00pm**	
Monitor Name: Daryl Holm	**Signature:**
Meetings: Morning tailgate	
Meeting Participants:	
Contractor(s) On Site: Timbro, KWL	**Name of Construction Representative Present: Timbro- Liam, KWL - Luke**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Clear, 21 degrees Celsius	
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐	
Completed Construction Activities (Since Last Visit): n/a	
Construction Activities: Placing rip rap and moving gravels	**Photos:**
Construction Equipment Being Used: 4 side dumps, 2 excavators and 1 articulated dp	**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			xx		

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			x		
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Spill Kits/SPER Plan	x				
Fuel Storage	x				
Other			x		
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	x				
Initial Cleaning (Mud, Seeds)	x				
Other	x				
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			x		

General Observations & Comments (Wildlife, New Sensitive Features, etc.):
No wildlife seen at this time.

Photos:

Other Comments: One gas cannot in containment but was corrected. (See figure 3)

Photos:

Upcoming Construction Events: unknown

Incident Report Required? **Yes** ☐ **No** ☒



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5

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): Deroche Creek, off Taylor Rd**
Date: July 15, 2025 **Time: 8:00am to 4:00pm**	
Monitor Name: Daryl Holm	**Signature:**
Meetings: Morning tailgate	
Meeting Participants:	
Contractor(s) On Site: Timbro, KWL	**Name of Construction Representative Present: Timbro- Liam, KWL - Luke**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Clear, 30 degrees Celsius	
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐	
Completed Construction Activities (Since Last Visit): n/a	
Construction Activities: Placing rip rap and moving gravels	**Photos:**
Construction Equipment Being Used: 4 side dumps, 2 excavators, 1 articulated dump and bulldozer.	**Photos:**

Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)

Boundary Flagging	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
General Construction	x				
Riparian Zone(s)			x		
Env. Sensitive Features			x		
Other					
Water Quality	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Turbidity			x		
Temperature			x		
DO			x		
pH			x		
Conductivity			x		
Other			x		

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			x		
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Spill Kits/SPER Plan	x				
Fuel Storage	x				
Other			x		
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	x				
Initial Cleaning (Mud, Seeds)	x				
Other	x				
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			x		

General Observations & Comments (Wildlife, New Sensitive Features, etc.):
No wildlife seen at this time.

Photos:

Other Comments: Digging catch basin at North end of site

Photos:

Upcoming Construction Events: unknown

Incident Report Required? **Yes** ☐ **No** ☒



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6

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): Deroche Creek, off Taylor Rd**
Date: July 16, 2025 **Time: 8:00am to 4:00pm**	
Monitor Name: Daryl Holm	**Signature:**
Meetings: Morning tailgate	
Meeting Participants:	
Contractor(s) On Site: Timbro, KWL	**Name of Construction Representative Present: Timbro- Liam, KWL - Luke**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Clear, 30 degrees Celsius	
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐	
Completed Construction Activities (Since Last Visit): n/a	
Construction Activities: Placing rip rap and moving gravels and loading trucks with gravels.	**Photos:**
Construction Equipment Being Used: 4 side dumps, 2 excavators, 1 articulated dump and bulldozer.	**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			xx		

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			x		
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Spill Kits/SPER Plan	x				
Fuel Storage	x				
Other			x		
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	x				
Initial Cleaning (Mud, Seeds)	x				
Other	x				
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			x		

General Observations & Comments (Wildlife, New Sensitive Features, etc.): **Photos:**

No wildlife seen at this time.

Other Comments: Digging catch basin at North end of site Placing 500kg rip rap on west bank **Photos:**

Upcoming Construction Events: 900kg rocks for the catch basin to be coming tomorrow

Incident Report Required? **Yes** ☐ **No** ☒



Figure 1

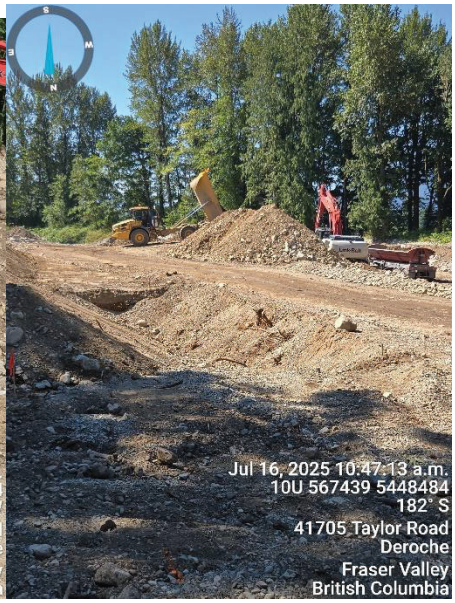


Figure 2

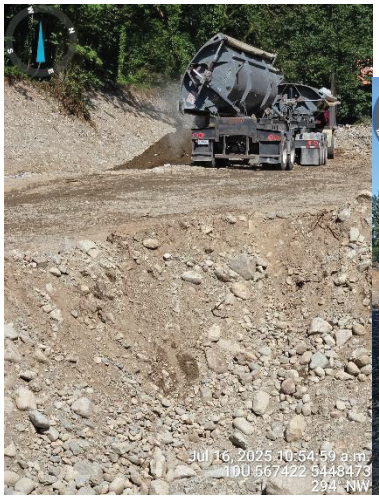


Figure 3



Figure 4



Figure 5

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): Deroche Creek, off Taylor Rd**
Date: July 17, 2025 **Time: 8:00am to 4:00pm**	
Monitor Name: Daryl Holm	**Signature:**
Meetings: Morning tailgate	
Meeting Participants:	
Contractor(s) On Site: Timbre, KWL	**Name of Construction Representative Present: Timbro- Liam, KWL - Luke**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Clear, 30 degrees Celsius	
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐	
Completed Construction Activities (Since Last Visit): n/a	
Construction Activities: Placing rip rap and moving gravels and loading trucks with gravels.	**Photos:**
Construction Equipment Being Used: 4 side dumps, 2 excavators , 1 articulated dump and bulldozer.	**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			xx		

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			x		
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Spill Kits/SPER Plan	x				
Fuel Storage	x				
Other			x		
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	x				
Initial Cleaning (Mud, Seeds)	x				
Other	x				
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			x		

General Observations & Comments (Wildlife, New Sensitive Features, etc.):
No wildlife seen at this time.

Photos:

Other Comments:

Photos:

Upcoming Construction Events: Placing geo textile fabric on slope in catch basin, 900 kg rocks to be brought in from hope.

Incident Report Required? **Yes** ☐ **No** ☒



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6

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): Deroche Creek, off Taylor Rd**
Date: July 18, 2025 **Time: 8:00am to 4:00pm**	
Monitor Name: Daryl Holm	**Signature:**
Meetings: Morning tailgate	
Meeting Participants:	
Contractor(s) On Site: Timbro, KWL	**Name of Construction Representative Present: Timbro- Liam, KWL - Luke**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Clear, 20 degrees Celsius	
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐	
Completed Construction Activities (Since Last Visit): n/a	
Construction Activities: Placing rip rap and moving gravels and loading trucks with gravels Placing 900 against borders in basin and truck and transfer loading out gravels.	**Photos:**
Construction Equipment Being Used: 4 side dumps, 2 excavators , 1 articulated dump, bulldozer and truck and transfer	**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			xx		

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			x		
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Spill Kits/SPER Plan	x				
Fuel Storage	x				
Other			x		
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	x				
Initial Cleaning (Mud, Seeds)	x				
Other	x				
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			x		

General Observations & Comments (Wildlife, New Sensitive Features, etc.):
No wildlife seen at this time.

Photos:

Other Comments:

Photos:

Upcoming Construction Events: Unknown

Incident Report Required? **Yes** ☐ **No** ☒



Figure 1



Figure 2



Figure 3



Figure 4

Leq'á:mel First Nation

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(604) 826-7976 www.leqamel.ca

Natural Resource Department: Daily Environmental Monitoring Report

Report Number:	**Location (Or Closest Address): Deroche Creek, off Taylor Rd**
Date: July 21, 2025 **Time: 8:00am to 4:00pm**	
Monitor Name: Daryl Holm	**Signature:**
Meetings: Morning tailgate	
Meeting Participants:	
Contractor(s) On Site: Timbro, KWL	**Name of Construction Representative Present: Timbro- Liam, KWL - Luke**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Clear, 24 degrees Celsius	
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐	
Completed Construction Activities (Since Last Visit): n/a	
Construction Activities: Placing rip rap and moving gravels and loading trucks with gravels Placing 900 against borders in basin and truck, loading out gravels and excavating Fan channel	**Photos:**
Construction Equipment Being Used: 4 side dumps, 2 excavators, 1 articulated dump, bulldozer and truck and transfer 1 excavator	**Photos:**

Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)

Boundary Flagging	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
General Construction	x				
Riparian Zone(s)			x		
Env. Sensitive Features			x		
Other					
Water Quality	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Turbidity			x		
Temperature			x		
DO			x		
pH			x		
Conductivity			x		
Other			x		

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			x		
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Spill Kits/SPER Plan	x				
Fuel Storage	x				
Other			x		
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	x				
Initial Cleaning (Mud, Seeds)	x				
Other	x				
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			x		

General Observations & Comments (Wildlife, New Sensitive Features, etc.):
No wildlife seen at this time. Catch basin has some of the 900kg rocks placed.

Photos:

Other Comments: Fan channel has some elevation issues

Photos:

Upcoming Construction Events: unknown

Incident Report Required? **Yes** ☐ **No** ☒

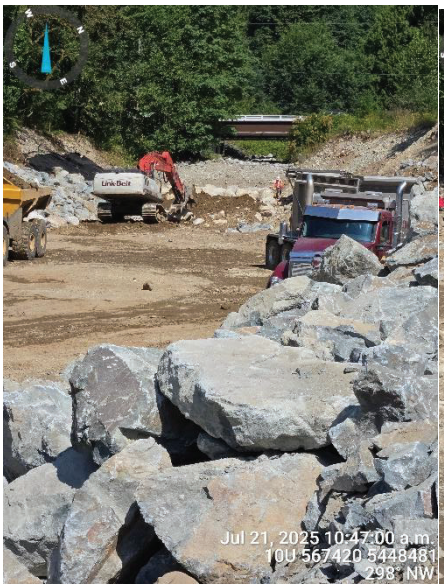


Figure 1



Figure 2



Figure 3



Figure 4

Leq'á:mel First Nation

43101 Leq'á:mel Way, Deroche BC V0M 1G0
(604) 826-7976 www.leqamel.ca

Natural Resource Department: Daily Environmental Monitoring Report

Report Number:	**Location (Or Closest Address): Deroche Creek, off Taylor Rd**
Date: July 22, 2025 **Time: 8:00am to 4:00pm**	
Monitor Name: Daryl Holm	**Signature:**
Meetings: Morning tailgate	
Meeting Participants:	
Contractor(s) On Site: Timbro, KWL	**Name of Construction Representative Present: Timbro- Liam, KWL - Luke**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Clear, 24 degrees Celsius	
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐	
Completed Construction Activities (Since Last Visit): west Bank rip rap to train bridge	
Construction Activities: Placing rip rap and moving gravels and loading trucks with gravels Placing, transfer loading out gravels and excavating, the creation of 2 new fan channels	**Photos:**
Construction Equipment Being Used: 4 side dumps, 2 excavators , 1 articulated dump, bulldozer and truck and transfer 1 excavator in Creek area	**Photos:**

Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)

Boundary Flagging	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
General Construction	x				
Riparian Zone(s)			x		
Env. Sensitive Features			x		
Other					
Water Quality	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Turbidity			x		
Temperature			x		
DO			x		
pH			x		
Conductivity			x		
Other			x		

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			x		
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Spill Kits/SPER Plan	x				
Fuel Storage	x				
Other			x		
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	x				
Initial Cleaning (Mud, Seeds)	x				
Other	x				
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			x		

General Observations & Comments (Wildlife, New Sensitive Features, etc.):	**Photos:**
Fan channels to provide new areas for fish to spawn	

Other Comments: Fan channel has some elevation issues	**Photos:**

Upcoming Construction Events: unknown

Incident Report Required? **Yes** ☐ **No** ☒



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6

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): Deroche Creek, off Taylor Rd**
Date: July 23, 2025 **Time: 8:00am to 4:00pm**	
Monitor Name: Daryl Holm	**Signature:**
Meetings: Morning tailgate	
Meeting Participants:	
Contractor(s) On Site: Timbro, KWL	**Name of Construction Representative Present: Timbro- Liam, KWL - Luke**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Clear, 24 degrees Celsius	
Ground Conditions: Dry ☒ Wet ☐ Saturated ☐	
Completed Construction Activities (Since Last Visit): west Bank rip rap to train bridge	
Construction Activities: Placing rip rap and moving gravels and loading trucks with gravels Placing, transfer loading out gravels and excavating, the creation of 2 new fan channels	**Photos:**
Construction Equipment Being Used: 4 side dumps, 2 excavators, 1 articulated dump, bulldozer, truck and transfer, 1 excavator in Creek area.	**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			xx		

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			x		
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Spill Kits/SPER Plan	x				
Fuel Storage	x				
Other			x		
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	x				
Initial Cleaning (Mud, Seeds)	x				
Other	x				
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			x		

General Observations & Comments (Wildlife, New Sensitive Features, etc.):
Upcoming Construction is a crain in the creek to drive wood piles in the ground, A excavator has a leak in a hose; contained and being repaired. No oil leaked in area Bird survey required for tomorrow morning

Photos:

Other Comments: a saw blade was found on site today (see figure 4)

Photos:

Upcoming Construction Events: unknown

Incident Report Required? **Yes** ☐ **No** ☒



Figure 1

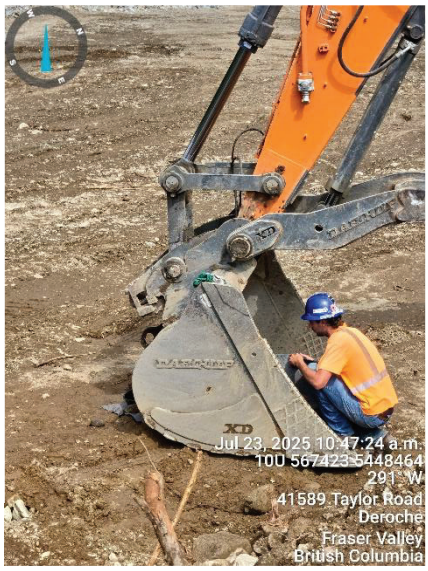


Figure 2



Figure 3



Figure 4



Figure 5

Leq'á:mel First Nation

43101 Leq'á:mel Way, Deroche BC V0M 1G0
(604) 826-7976 www.legamel.ca

Natural Resource Department: Daily Environmental Monitoring Report

Report Number:	**Location (Or Closest Address): Deroche Creek, off Taylor Rd.**
Date: July 24/ 2025 **Time: 10:00 am to 11:00 am**	
Monitor Name: Daryl Holm	**Signature:**
Meetings: Morning tailgate	
Meeting Participants:	
Contractor(s) On Site: Timbro, KWL,	**Name of Construction Representative Present: Timbro- Liam, KWL-Luke**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Clear , 24 degrees Celsius	
Ground Conditions: Dry : x Wet Saturated ☐	
Completed Construction Activities (Since Last Visit): nothing at this time	
Construction Activities: Placing rip rap on east bank , moving gravels , loading trucks with gravels ,the creation of 2 new fan channels dug a culvert next to the slough	**Photos:**
Construction Equipment Being Used: 4 side dumps, 2 excavators , 1 articulated dump, bulldozer 1 excavator in Creek area	**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					

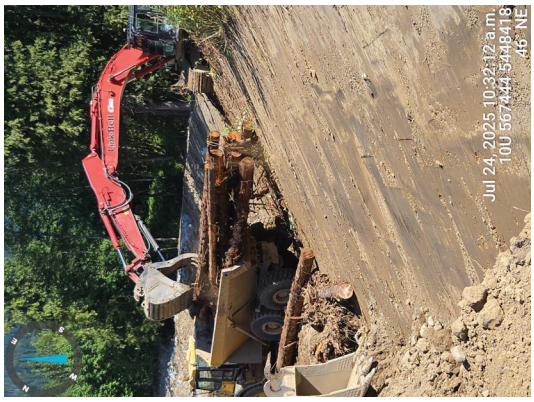
Erosion & Sediment Control	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Silt Fencing			X		
Bank Stabilization	X				
Soil Stockpiles	X				
Drainage & Diversions			X		
Detention Facilities			X		
Other			X		
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Spill Kits/SPER Plan	X				
Fuel Storage	X				
Other			X		
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	X				
Initial Cleaning (Mud, Seeds)	X				
Other	X				
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			X		

General Observations & Comments (Wildlife, New Sensitive Features, etc.): moving lwd to be placed in fan channels and across slough, Placing rip rap on east bank cont.	**Photos:**

Other Comments: nothing at this time	**Photos:**

Natural Resource Department: Daily Environmental Monitoring Report

Upcoming Construction Events: unknown
Incident Report Required? **Yes** ☐ **No** x









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): Deroche Creek, off Taylor Rd.**
Date: Sept 25/ 2025 **Time: 7:00am to 3:00pm**	
Monitor Name: Daryl Holm	**Signature:**
Meetings: Morning tailgate	
Meeting Participants:	
Contractor(s) On Site: Timbro, KWL, Green Valley Traffic Control	**Name of Construction Representative Present: Timbro- Liam, KWL-Luke, Torque and Hammer-Robin**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Clear 29 degrees Celsius	
Ground Conditions: Dry : X Wet Saturated ☐	
Completed Construction Activities (Since Last Visit): Placing piles in all areas	
Construction Activities: Removed all the swamp mats and extended the fan channel to connect to Deroche Creek. Placing large logs on the diversion channel and cabling them to the piles	**Photos:**
Construction Equipment Being Used: excavator and skid steer and 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			X		
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Spill Kits/SPER Plan	X				
Fuel Storage	X				
Other	X				
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	X				
Initial Cleaning (Mud, Seeds)	X				
Other	X				
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			X		

General Observations & Comments (Wildlife, New Sensitive Features,):	**Photos:**

Other Comments:	**Photos:**

Natural Resource Department: Daily Environmental Monitoring Report

Upcoming Construction Events:		
Incident Report Required?	**Yes ☐**	**No X**









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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:	**Location (Or Closest Address): Deroche Creek, off Taylor Rd.**
Date: July 28/ 2025 **Time: 10:00 am to 11:00 am**	
Monitor Name: Daryl Holm	**Signature:**
Meetings: Morning tailgate	
Meeting Participants:	
Contractor(s) On Site: Timbro, KWL,	**Name of Construction Representative Present: Timbro- Liam, KWL-Luke**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Clear, 25 degrees Celsius	
Ground Conditions: Dry : X Wet Saturated ☐	
Completed Construction Activities (Since Last Visit): nothing at this time	
Construction Activities: Placing rip rap on east bank , loading rock truck with trees for lwd in Creek south of Taylor Rd	**Photos:**
Construction Equipment Being Used: 4 side dumps, 2 excavators , 1 articulated dump, bulldozer 1 excavator in Creek area	**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					

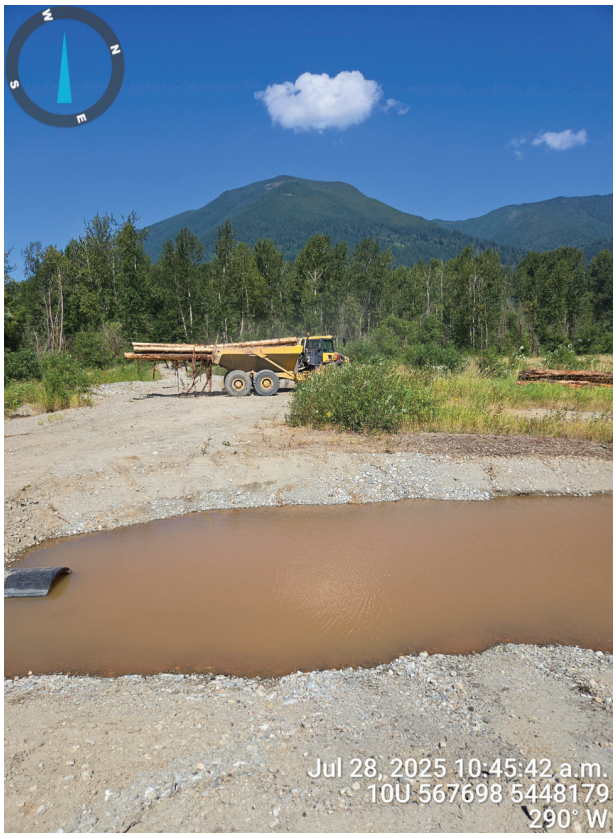
Erosion & Sediment Control	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Silt Fencing			X		
Bank Stabilization	X				
Soil Stockpiles	X				
Drainage & Diversions			X		
Detention Facilities			X		
Other			X		
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Spill Kits/SPER Plan	X				
Fuel Storage	X				
Other			X		
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	X				
Initial Cleaning (Mud, Seeds)	X				
Other	X				
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			X		

General Observations & Comments (Wildlife, New Sensitive Features, etc.): driving rock truck in Creek to dump trees in fan channels and slough	**Photos:**

Other Comments: nothing at this time	**Photos:**

Natural Resource Department: Daily Environmental Monitoring Report

Upcoming Construction Events:	**unknown**
Incident Report Required?	**Yes ☐ No X**









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Report Number:	**Location (Or Closest Address): Deroche Creek, off Taylor Rd.**
Date: July 29/ 2025 **Time: 10:00 am to 11:00 am**	
Monitor Name: Daryl Holm	**Signature:**
Meetings: Morning tailgate	
Meeting Participants:	
Contractor(s) On Site: Timbro, KWL,	**Name of Construction Representative Present: Timbro- Liam, KWL-Luke**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Clear, 30 degrees Celsius	
Ground Conditions: Dry : X Wet Saturated ☐	
Completed Construction Activities (Since Last Visit): rip rap on east bank	
Construction Activities: moving wooded debris in fan channels	**Photos:**
Construction Equipment Being Used: **4 side dumps, 2 excavators , 1 articulated dump, bulldozer** **1 excavator in Creek area**	**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			X		
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Spill Kits/SPER Plan	X				
Fuel Storage	X				
Other			X		
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	X				
Initial Cleaning (Mud, Seeds)	X				
Other	X				
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			X		

General Observations & Comments (Wildlife, New Sensitive Features, etc.):	**Photos:**

Other Comments:	**Photos:**

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Upcoming Construction Events: Crain to be in Creek mid August for pile driving
Incident Report Required? **Yes ☐** **No X**









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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:	**Location (Or Closest Address): Deroche Creek, off Taylor Rd.**
Date: July 31/ 2025 **Time: 7:00 am to 4:00 pm**	
Monitor Name: Daryl Holm	**Signature:**
Meetings: Morning tailgate	
Meeting Participants:	
Contractor(s) On Site: Timbro, KWL,	**Name of Construction Representative Present: Timbro- Liam, KWL-Luke**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Overcast 27 degrees Celsius	
Ground Conditions: Dry : X Wet Saturated ☐	
Completed Construction Activities (Since Last Visit):	
Construction Activities: Placing rip rap on both banks of Creek **Digging under Taylor Rd bridge** **Trucking in stumps from Chilliwack** **Placing lwd in low flow creek**	**Photos:**
Construction Equipment Being Used: **2 side dumps, 2 excavators , 1 articulated dump, bulldozer** **1 excavator in Creek area**	**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			X		
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Spill Kits/SPER Plan	X				
Fuel Storage	X				
Other			X		
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	X				
Initial Cleaning (Mud, Seeds)	X				
Other	X				
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			X		

General Observations & Comments (Wildlife, New Sensitive Features, etc.): lwd in fan channels for fish habitat	**Photos:**

Other Comments: **NHC will be in tomorrow to oversee the large rock placing**	**Photos:**

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









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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:	**Location (Or Closest Address): Deroche Creek, off Taylor Rd.**
Date: August 1/ 2025 **Time: 7:00 am to 4:00 pm**	
Monitor Name: Daryl Holm	**Signature:**
Meetings: Morning tailgate	
Meeting Participants:	
Contractor(s) On Site: Timbro, KWL, nhc	**Name of Construction Representative Present: Timbro- Liam, KWL-Luke, nhc- Andy**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Overcast 30 degrees Celsius	
Ground Conditions: Dry : X Wet Saturated ☐	
Completed Construction Activities (Since Last Visit): rip rap at South end of creek	
Construction Activities: Placing large rocks in South of creek **Placing cables around logs in low flow channel**	**Photos:**
Construction Equipment Being Used: **2 side dumps, 2 excavators , 1 articulated dump, bulldozer** **1 excavator in Creek area**	**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			X		
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Spill Kits/SPER Plan	X				
Fuel Storage	X				
Other			X		
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	X				
Initial Cleaning (Mud, Seeds)	X				
Other	X				
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			X		

General Observations & Comments (Wildlife, New Sensitive Features, etc.): flattening piles of wood chips to make area look finished	**Photos:**

Other Comments: One tree in work area will need to be removed due to the fact that the roots will be exposed and potentially fall	**Photos:**

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Upcoming Construction Events:		
Incident Report Required?	**Yes ☐**	**No X**









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Report Number:	**Location (Or Closest Address): Deroche Creek, off Taylor Rd.**
Date: Sept 3/ 2025 **Time: 7:00am to 4:00pm**	
Monitor Name: Daryl Holm	**Signature:**
Meetings: Morning tailgate	
Meeting Participants:	
Contractor(s) On Site: Timbro, KWL, Torque and Hammer	**Name of Construction Representative Present: Timbro- Liam, KWL-Luke, Torque and Hammer-Robin**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Clear 29 degrees Celsius	
Ground Conditions: Dry : X Wet Saturated ☐	
Completed Construction Activities (Since Last Visit): Placing piles in reef area	
Construction Activities: Torque and Hammer placing piles in reef Timbro started placing lwd in deflection channel	**Photos:**
Construction Equipment Being Used: excavator and skid steer and crain and 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			X		
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Spill Kits/SPER Plan	X				
Fuel Storage	X				
Other	X				
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	X				
Initial Cleaning (Mud, Seeds)	X				
Other	X				
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			X		

General Observations & Comments (Wildlife, New Sensitive Features,): Torque and Hammer should be completed tomorrow	**Photos:**

Other Comments:	**Photos:**

Natural Resource Department: Daily Environmental Monitoring Report

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









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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:	**Location (Or Closest Address): Deroche Creek, off Taylor Rd.**
Date: Sept 4/ 2025 **Time: 7:00am to 4:00pm**	
Monitor Name: Daryl Holm	**Signature:**
Meetings: Morning tailgate	
Meeting Participants:	
Contractor(s) On Site: Timbro, KWL, Torque and Hammer, Green Valley Traffic Control	**Name of Construction Representative Present: Timbro- Liam, KWL-Luke, Torque and Hammer-Robin**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Clear 29 degrees Celsius	
Ground Conditions: Dry : X Wet Saturated ☐	
Completed Construction Activities (Since Last Visit): Placing piles in reef area	
Construction Activities: Torque and Hammer placing piles in 2nd Diversion area Timbro finished placing lwd in deflection channel and stated on the reef	**Photos:**
Construction Equipment Being Used: excavator and skid steer and crain and 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			X		
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Spill Kits/SPER Plan	X				
Fuel Storage	X				
Other	X				
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	X				
Initial Cleaning (Mud, Seeds)	X				
Other	X				
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			X		

General Observations & Comments (Wildlife, New Sensitive Features,): The diversion channel will remain and the culvert will be removed. The slough will be brought back as close as possible to its original state	**Photos:**

Other Comments:	**Photos:**

Natural Resource Department: Daily Environmental Monitoring Report

Upcoming Construction Events:		
Incident Report Required?	**Yes ☐**	**No X**









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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:	**Location (Or Closest Address): Deroche Creek, off Taylor Rd.**
Date: Sept 5/ 2025 **Time: 7:00am to 3:00pm**	
Monitor Name: Daryl Holm	**Signature:**
Meetings: Morning tailgate	
Meeting Participants:	
Contractor(s) On Site: Timbro, KWL, Green Valley Traffic Control	**Name of Construction Representative Present: Timbro- Liam, KWL-Luke, Torque and Hammer-Robin**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Clear 29 degrees Celsius	
Ground Conditions: Dry : X Wet Saturated ☐	
Completed Construction Activities (Since Last Visit): Placing piles in all areas	
Construction Activities: Removed all the swamp mats and extended the fan channel to connect to Deroche Creek. Placing large logs on the diversion channel and cabling them to the piles	**Photos:**
Construction Equipment Being Used: excavator and skid steer and 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					

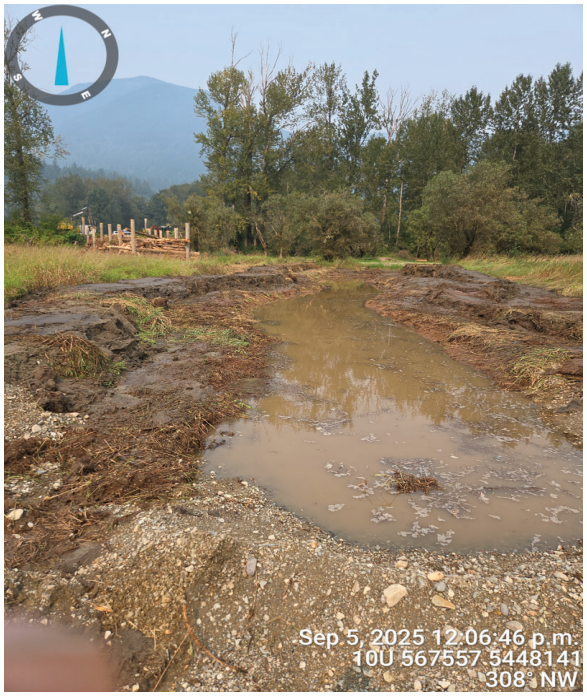
Erosion & Sediment Control	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Silt Fencing			X		
Bank Stabilization	X				
Soil Stockpiles	X				
Drainage & Diversions	X				
Detention Facilities			X		
Other			X		
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Spill Kits/SPER Plan	X				
Fuel Storage	X				
Other	X				
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	X				
Initial Cleaning (Mud, Seeds)	X				
Other	X				
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			X		

General Observations & Comments (Wildlife, New Sensitive Features,):	**Photos:**

Other Comments:	**Photos:**

Natural Resource Department: Daily Environmental Monitoring Report

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









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Report Number:	**Location (Or Closest Address):**
Date: 8/5/2025 **Time: In 7:00AM**	**Deroche Creek**
Monitor Name: Erik Still	**Signature:**
Meetings:	
Meeting Participants: **Morning Briefing**	
Contractor(s) On Site:	**Name of Construction Representative Present:**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): **16c full cloud cover**	
Ground Conditions: Dry X Wet ☐ Saturated ☐	
Completed Construction Activities (Since Last Visit): **Digging trenches and placing rip rap to help with** **creek bed erosion**	
Construction Activities: **Trenching and placing rip rap horizontally to reduce stream bed erosion during high flow, removing material from stream bed**	**Photos:**
Construction Equipment Being Used: **Link-Belt 350x4, Doosan DX350lc excavator, HM 300 Komstsu, Bobcat S770, Bomag BW 211D-40 Roller, Deer 700L dozer**	**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

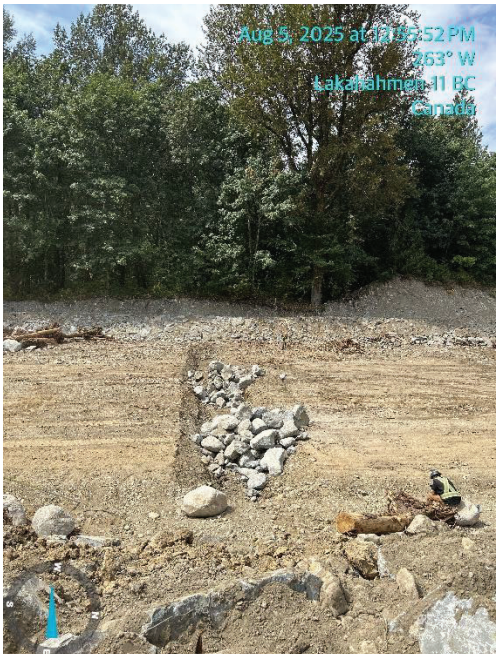
Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing	X			Salt fence could be keyed in better on West facing bank	
Bank Stabilization	X				
Soil Stockpiles	X				
Drainage & Diversions	X				
Detention Facilities	X				
Other					
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & 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			Dry with large dust clouds but no complaints from locals, water truck has been spraying on road frequently	
Air Quality	X				
Other					
Vegetation Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Invasive Plants				It seems like they've been doing their best to work around the Japanese knot weed	
Other					

General Observations & Comments (Wildlife, New Sensitive Features, etc.):	**Photos:**

Other Comments:	**Photos:**

Upcoming Construction Events:

Incident Report Required? **Yes** ☐ **No** ☐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263° W
Lakahahmen 11 BC
Canada


Aug 5, 2025 at 8:48:19 AM
227° SW
Lakahahmen 11 BC
Canada

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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:	**Location (Or Closest Address):**
Date: 8/6/2025 **Time: In 7:00AM**	**Deroche Creek**
Monitor Name: Erik Still	**Signature:**
Meetings:	
Meeting Participants:	
Contractor(s) On Site:	**Name of Construction Representative Present:**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): **25 degrees and rainy/overcast**	
Ground Conditions: Dry Wet X Saturated	
Completed Construction Activities (Since Last Visit): **Strapping up piling logs**	
Construction Activities: **Building a dam out of meter bags and polly plastic in area, they are planning to de-water**	**Photos:**
Construction Equipment Being Used: **Link-Belt 350x4, Doosan DX350lc excavator, HM 300 Komstsu, Bobcat S770, Bomag BW 211D-40 Roller, Deer 700L dozer**	**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

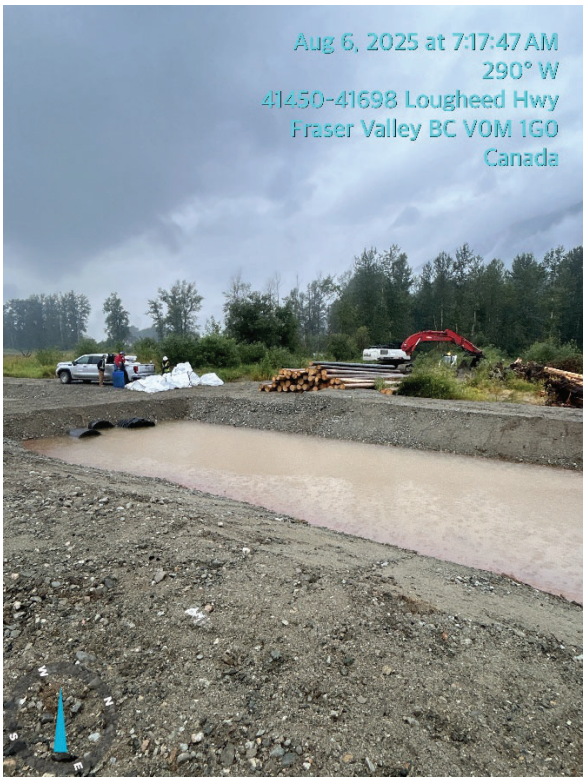
Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing	X				
Bank Stabilization	X				
Soil Stockpiles	X				
Drainage & Diversions	X				
Detention Facilities	X				
Other					
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Spill Kits/SPER Plan	X				
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:

Incident Report Required? **Yes** ☐ **No** ☐


Aug 6, 2025 at 7:17:47 AM
290° W
41450-41698 Lougheed Hwy
Fraser Valley BC V0M 1G0
Canada


Aug 6, 2025 at 2:35:06 PM
165° S
41450-41698 Lougheed Hwy
Fraser Valley BC V0M 1G0
Canada


Aug 6, 2025 at 2:30:38 PM
8° N
41450-41698 Lougheed Hwy
Fraser Valley BC V0M 1G0
Canada

Leq'á:mel First Nation

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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:	**Location (Or Closest Address):**
Date: 8/7/2025 **Time: In 7:00AM**	**Deroche Creek**
Monitor Name: Erik Still	**Signature:**
Meetings:	
Meeting Participants:	
Contractor(s) On Site:	**Name of Construction Representative Present:**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): **26 degrees and sunny**	
Ground Conditions: Dry X Wet Saturated	
Completed Construction Activities (Since Last Visit): **Meter bags were filled and placed in fish salvaging area to slow down water flow**	
Construction Activities: **Tried out two smaller water pumps that ended up not having the power to pump water out fast enough before seapage water could fill it back up.**	**Photos:**
Construction Equipment Being Used: **Link-Belt 350x4, Doosan DX350lc excavator, HM 300 Komstsu, Bobcat S770, Bomag BW 211D-40 Roller, Deer 700L dozer**	**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					

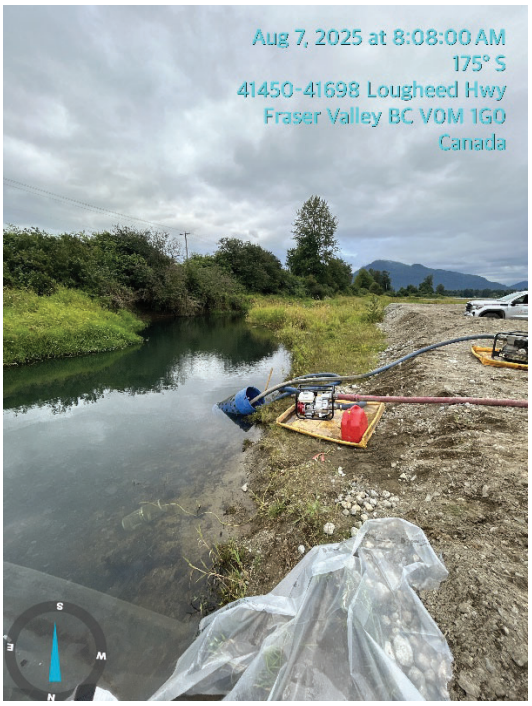
General Observations & Comments (Wildlife, New Sensitive Features, etc.):	**Photos:**

Other Comments:	**Photos:**

Upcoming Construction Events:

Incident Report Required? **Yes** ☐ **No** ☐


Aug 7, 2025 at 4:24:25 PM
151° SE
41474-41792 Taylor Rd
Fraser Valley BC V0M 1G0
Canada


Aug 7, 2025 at 8:08:00 AM
175° S
41450-41698 Lougheed Hwy
Fraser Valley BC V0M 1G0
Canada

Natural Resource Department: Daily Environmental Monitoring Report

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Report Number: Dimitri John Duroche creek	**Location (Or Closest Address):** Deroche creek
Date: September 8, 2025 **Time:** 07:31	
Monitor Name: Dimitri John	
Site Photo: 	
Meetings:	
Meeting Participants:	
Contractor(s) On Site:	**Name of Construction Representative Present:** Luke
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 1% cloud cover	
Ground Conditions: ☑ Dry ☐ Wet ☐ Saturated	
Completed Construction Activities (Since Last Visit): Log jams tied with cable	
Construction Activities: Pulling material out of side channel	



Construction Equipment Being Used:

Natural Resource Department: Daily Environmental Monitoring Report

Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)				
Boundary Flagging	**OK**	**NC**	**NA**	**Photos, Comments & Mitigation:**
General Construction	☐	☐	☐	
Riparian Zone(s)	☐	☐	☐	
Env. Sensitive Features	☐	☐	☐	
Other	☐	☐	☐	
Boundary Flagging				

Natural Resource Department: Daily Environmental Monitoring Report

Water Quality	OK	NC	NA	Photos, Comments & Mitigation:
Turbidity	☐	☐	☐	
Temperature	☐	☐	☐	
DO	☐	☐	☐	
pH	☐	☐	☐	
Conductivity	☐	☐	☐	
Other	☐	☐	☐	

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	**OK**	**NC**	**NA**	**Photos, Comments & Mitigation:**
Silt Fencing	☐	☐	☐	
Bank Stabilization	☐	☐	☐	
Soil Stockpiles	☐	☐	☐	
Drainage & Diversions	☐	☐	☐	
Detention Facilities	☐	☐	☐	
Other	☐	☐	☐	
Erosion & Sediment Control				

Natural Resource Department: Daily Environmental Monitoring Report

Fuel & Oil Management	OK	NC	NA	Photos, Comments & Mitigation:
Spill Kits/SPER Plan	☐	☐		
Fuel Storage	☐	☐		
Other	☐	☐	☐	
Fuel & Oil Management				

Natural Resource Department: Daily Environmental Monitoring Report

Equipment	OK	NC	NA	Photos, Comments & Mitigation:
Condition (leaks, etc.)	☐	☐	☐	
Initial Cleaning (Mud, Seeds)	☐	☐	☐	
Other	☐	☐	☐	
Equipment				

Natural Resource Department: Daily Environmental Monitoring Report

Waste Management	OK	NC	NA	Photos, Comments & Mitigation:
Sanitary Facilities	☐	☐	☐	
Solid Waste & Recycling	☐	☐	☐	
Special Waste & Hazardous Materials	☐	☐	☐	
Other	☐	☐	☐	
Waste Management				

Natural Resource Department: Daily Environmental Monitoring Report

Atmosphere	OK	NC	NA	Photos, Comments & Mitigation:
Dust	☐	☐	☐	
Air Quality	☐	☐	☐	
Other	☐	☐	☐	

Natural Resource Department: Daily Environmental Monitoring Report

Vegetation Management	OK	NC	NA	Photos, Comments & Mitigation
Invasive Plants	☐	☐	☐	
Other	☐	☐	☐	
Vegetation Management				

Natural Resource Department: Daily Environmental Monitoring Report

Cultural/ Archaeological Observations:	**Location of Cultural Find:** (0, 0)

General Observations & Comments (Wildlife, New Sensitive Features, etc.):

Excavator broke down and leaked oil (bio oil)

Photos:



Additional Comments/Info:

Excavating the affected soil from bio oil spill fallowing the spill trail

Photos:



Natural Resource Department: Daily Environmental Monitoring Report

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

Natural Resource Department: Daily Environmental Monitoring Report

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Report Number: Dimitri John		**Location (Or Closest Address):**
Date: September 10, 2025	**Time:** 08:04	Deroche creek

Monitor Name:
Dimitri John

Site Photo:



Meetings:

Meeting Participants:

Natural Resource Department: Daily Environmental Monitoring Report

Contractor(s) On Site:	Name of Construction Representative Present:
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 100% cloud cover. Slight wind. 17degrees	
Ground Conditions: ☑ Dry ☐ Wet ☐ Saturated	
Completed Construction Activities (Since Last Visit): Log piles tied together around LWD	
Construction Activities: Removing culverts from stream bed	



Construction Equipment Being Used:
Excavator


Link-Belt
Taken on: 10 Sep. 2025 15:33

Natural Resource Department: Daily Environmental Monitoring Report

Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)				
Boundary Flagging	**OK**	**NC**	**NA**	**Photos, Comments & Mitigation:**
General Construction	☐	☐	☐	
Riparian Zone(s)	☐	☐	☐	
Env. Sensitive Features	☐	☐	☐	
Other	☐	☐	☐	
Boundary Flagging				

Natural Resource Department: Daily Environmental Monitoring Report

Water Quality	OK	NC	NA	Photos, Comments & Mitigation:
Turbidity	☐	☐	☐	
Temperature	☐	☐	☐	
DO	☐	☐	☐	
pH	☐	☐	☐	
Conductivity	☐	☐	☐	
Other	☐	☐	☐	

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	**OK**	**NC**	**NA**	**Photos, Comments & Mitigation:**
Silt Fencing	☐	☐	☐	
Bank Stabilization	☐	☐	☐	
Soil Stockpiles	☐	☐	☐	
Drainage & Diversions	☐	☐	☐	
Detention Facilities	☐	☐	☐	
Other	☐	☐	☐	
Erosion & Sediment Control				

Natural Resource Department: Daily Environmental Monitoring Report

Fuel & Oil Management	OK	NC	NA	Photos, Comments & Mitigation:
Spill Kits/SPER Plan	☐	☐		
Fuel Storage	☐	☐		
Other	☐	☐	☐	
Fuel & Oil Management				

Natural Resource Department: Daily Environmental Monitoring Report

Equipment	OK	NC	NA	Photos, Comments & Mitigation:
Condition (leaks, etc.)	☐	☐	☐	
Initial Cleaning (Mud, Seeds)	☐	☐	☐	
Other	☐	☐	☐	
Equipment				

Natural Resource Department: Daily Environmental Monitoring Report

Waste Management	OK	NC	NA	Photos, Comments & Mitigation:
Sanitary Facilities	☐	☐	☐	
Solid Waste & Recycling	☐	☐	☐	
Special Waste & Hazardous Materials	☐	☐	☐	
Other	☐	☐	☐	
Waste Management				

Natural Resource Department: Daily Environmental Monitoring Report

Atmosphere	OK	NC	NA	Photos, Comments & Mitigation:
Dust	☐	☐	☐	
Air Quality	☐	☐	☐	
Other	☐	☐	☐	

Natural Resource Department: Daily Environmental Monitoring Report

Vegetation Management	OK	NC	NA	Photos, Comments & Mitigation
Invasive Plants	☐	☐	☐	
Other	☐	☐	☐	
Vegetation Management				

Natural Resource Department: Daily Environmental Monitoring Report

Cultural/ Archaeological Observations:	Location of Cultural Find: (0, 0)

General Observations & Comments (Wildlife, New Sensitive Features, etc.):

Removing two culverts in stream bed and back filling

Photos:



Natural Resource Department: Daily Environmental Monitoring Report

Additional Comments/Info: **Photos:**
Upcoming Construction Events:
Incident Report Required? ☐ Yes ☐ No

Natural Resource Department: Daily Environmental Monitoring Report

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Report Number: Dimitri John		**Location (Or Closest Address):** Deroche creek
Date: September 11, 2025	**Time:** 07:30	

Monitor Name:
Dimitri John

Site Photo:



Meetings:

Meeting Participants:

Natural Resource Department: Daily Environmental Monitoring Report

Contractor(s) On Site:	Name of Construction Representative Present: Liam

Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.):
100% cloud cover. No wind. 15°C

Ground Conditions: ☑ Dry ☐ Wet ☐ Saturated

Completed Construction Activities (Since Last Visit):
Culverts removed from stream bed, log pile tied together with LWD inside and sand bags removed from stream

Construction Activities:
Removing ground material for side channel



Construction Equipment Being Used:
Excavator-rock truck


Taken on: 11 Sep. 2025 08:50

Natural Resource Department: Daily Environmental Monitoring Report

Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)				
Boundary Flagging	**OK**	**NC**	**NA**	**Photos, Comments & Mitigation:**
General Construction	☐	☐	☐	
Riparian Zone(s)	☐	☐	☐	
Env. Sensitive Features	☐	☐	☐	
Other	☐	☐	☐	
Boundary Flagging				

Natural Resource Department: Daily Environmental Monitoring Report

Water Quality	OK	NC	NA	Photos, Comments & Mitigation:
Turbidity	☐	☐	☐	
Temperature	☐	☐	☐	
DO	☐	☐	☐	
pH	☐	☐	☐	
Conductivity	☐	☐	☐	
Other	☐	☐	☐	

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	**OK**	**NC**	**NA**	**Photos, Comments & Mitigation:**
Silt Fencing	☐	☐	☐	
Bank Stabilization	☐	☐	☐	
Soil Stockpiles	☐	☐	☐	
Drainage & Diversions	☐	☐	☐	
Detention Facilities	☐	☐	☐	
Other	☐	☐	☐	
Erosion & Sediment Control				

Natural Resource Department: Daily Environmental Monitoring Report

Fuel & Oil Management	OK	NC	NA	Photos, Comments & Mitigation:
Spill Kits/SPER Plan	☐	☐		
Fuel Storage	☐	☐		
Other	☐	☐	☐	
Fuel & Oil Management				

Natural Resource Department: Daily Environmental Monitoring Report

Equipment	OK	NC	NA	Photos, Comments & Mitigation:
Condition (leaks, etc.)	☐	☐	☐	
Initial Cleaning (Mud, Seeds)	☐	☐	☐	
Other	☐	☐	☐	
Equipment				

Natural Resource Department: Daily Environmental Monitoring Report

Waste Management	OK	NC	NA	Photos, Comments & Mitigation:
Sanitary Facilities	☐	☐	☐	
Solid Waste & Recycling	☐	☐	☐	
Special Waste & Hazardous Materials	☐	☐	☐	
Other	☐	☐	☐	
Waste Management				

Natural Resource Department: Daily Environmental Monitoring Report

Atmosphere	OK	NC	NA	Photos, Comments & Mitigation:
Dust	☐	☐	☐	
Air Quality	☐	☐	☐	
Other	☐	☐	☐	

Natural Resource Department: Daily Environmental Monitoring Report

Vegetation Management	OK	NC	NA	Photos, Comments & Mitigation
Invasive Plants	☐	☐	☐	
Other	☐	☐	☐	
Vegetation Management				

Natural Resource Department: Daily Environmental Monitoring Report

Cultural/ Archaeological Observations:	**Location of Cultural Find:** (0, 0)

General Observations & Comments (Wildlife, New Sensitive Features, etc.):

Photos:



Additional Comments/Info:
Log jams being finished after having to readjust some logs

Photos:

Upcoming Construction Events:

Incident Report Required? ☐ Yes ☐ No

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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:	**Location (Or Closest Address):**
Date: 8/11/2025 **Time: In 7:00AM**	**Deroche Creek**
Monitor Name: Erik Still	**Signature:**
Meetings: **Morning Briefing**	
Meeting Participants:	
Contractor(s) On Site: KWL	**Name of Construction Representative Present:**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): **34 degrees, clear and hot day**	
Ground Conditions: Dry X Wet X Saturated	
Completed Construction Activities (Since Last Visit): **Pump and set up sand bags for the salvage zone**	
Construction Activities: **De water at the old mouth of Deroche Creek. Setting up 10" pumps in the area, they are dewatering and assisting KWL and myself with the fish salvage.**	**Photos:**
Construction Equipment Being Used: **Excavator, Link Belt 360x4**	**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					

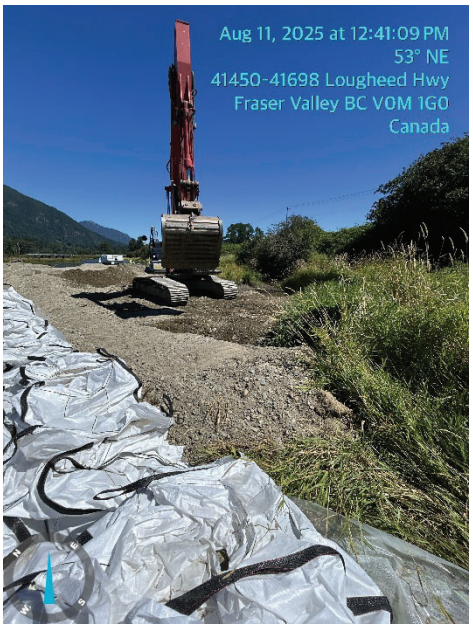
General Observations & Comments (Wildlife, New Sensitive Features, etc.):	**Photos:**

Other Comments:	**Photos:**

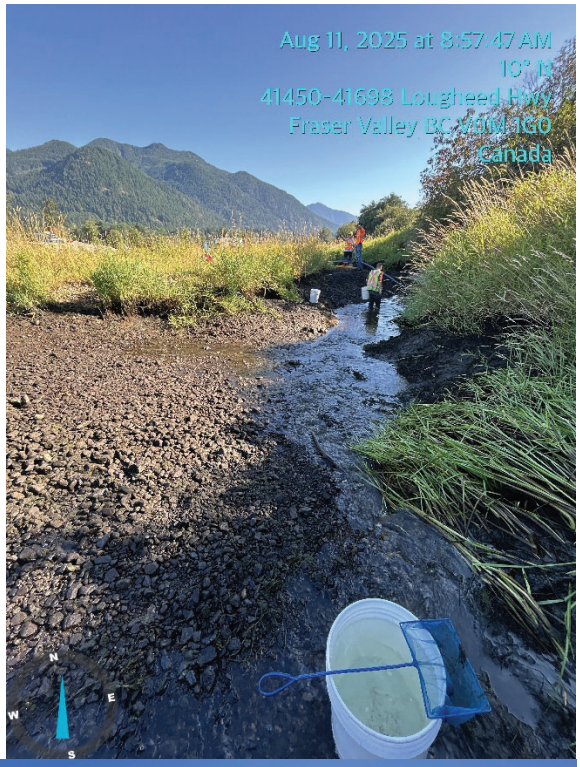
Upcoming Construction Events:

Incident Report Required? **Yes** ☐ **No** ☐


Aug 11, 2025 at 12:49:55 PM
42° NE
41450-41698 Lougheed Hwy
Fraser Valley BC V0M 1G0
Canada


Aug 11, 2025 at 12:41:09 PM
53° NE
41450-41698 Lougheed Hwy
Fraser Valley BC V0M 1G0
Canada


Aug 11, 2025 at 11:53:15 AM
248° W
41450-41698 Lougheed Hwy
Fraser Valley BC V0M 1G0
Canada


Aug 11, 2025 at 8:57:47 AM
10° N
41450-41698 Lougheed Hwy
Fraser Valley BC V0M 1G0
Canada


Aug 11, 2025 at 12:33:09 PM
128° SE
41450-41698 Lougheed Hwy
Fraser Valley BC V0M 1G0
Canada

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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:	**Location (Or Closest Address):**
Date: 8/12/2025 **Time: In 7:00AM**	**Deroche Creek**
Monitor Name: Erik Still	**Signature:**
Meetings:	
Meeting Participants:	
Contractor(s) On Site: KWL	**Name of Construction Representative Present:**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): **31 degrees, dry, hot, breezy day.**	
Ground Conditions: Dry X Wet Saturated	
Completed Construction Activities (Since Last Visit): **Finished the dewatering by noon yesterday**	
Construction Activities: **Torque and hammer on site unloading and setting up for pile driving log stoppers. Landbridge was built from old mouth of Deroche Creek connecting to Nicomen Island so pile drivers can get across to do work.**	**Photos:**
Construction Equipment Being Used: **Excavator, Link Belt 360x4**	**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:

Incident Report Required? **Yes** ☐ **No** ☐


Aug 12, 2025 at 10:14:01 AM
18° N
41450-41698 Lougheed Hwy
Fraser Valley BC V0M 1G0
Canada
Link-Belt
N
E
W
S

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Natural Resource Department: Daily Environmental Monitoring Report

Report Number:	**Location (Or Closest Address):**
Date: 8/13/2025 **Time: In 7:00AM**	**Deroche Creek**
Monitor Name: Erik Still	**Signature:**
Meetings:	
Meeting Participants:	
Contractor(s) On Site: KWL, DFO	**Name of Construction Representative Present:**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.):	
Ground Conditions: Dry X Wet Saturated	
Completed Construction Activities (Since Last Visit): Pads uploaded for pile driver	
Construction Activities: Tidying up north end of site and work is putting piling in for catching logs on west end of Deroche Creek.	**Photos:**
Construction Equipment Being Used: Link-Belt 350x4, Doosan DX350lc excavator, HM 300 Komstsu, Bobcat S770, Bomag BW 211D-40 Roller, Deer 700L Dozer	**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:

Incident Report Required? **Yes** ☐ **No** ☐


Aug 13, 2025 at 10:38:47 AM
103° E
41474-41792 Taylor Rd
Fraser Valley BC V0M 1G0
Canada
SRC840
N
E
S
W

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

9Report Number:	Location (Or Closest Address): Deroche Creek
Date: Aug 15th Time: 7:00 AM 5:00 PM	
Monitor Name:	Signature:
Meetings: morning Greff	
Meeting Participants: Everyone on site	
Contractor(s) On Site:	Name of Construction Representative Present:
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Light to heavy rain in upper Slopes	
Ground Conditions: Dry ☐ Wet ☐ Saturated ☑	
Completed Construction Activities (Since Last Visit): removed pumps from salvage zone incase water comes up	
Construction Activities: Site Clean up and pack riprap at top of the site	Photos:
Construction Equipment Being Used: excavator	Photos:

Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)

Boundary Flagging	OK	NC	NA	Comments & Mitigation	Photos:
General Construction	✓				
Riparian Zone(s)	✓				
Env. Sensitive Features	✓				
Other					
Water Quality	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Turbidity	✓				
Temperature	✓				
DO	✓				
pH	✓				
Conductivity	✓				
Other					

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	OK	NC	NA	Comments & Mitigation	Photos:
Silt Fencing					
Bank Stabilization					
Soil Stockpiles					
Drainage & Diversions					
Detention Facilities					
Other					
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Spill Kits/SPER Plan					
Fuel Storage					
Other					
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)					
Initial Cleaning (Mud, Seeds)					
Other					
Waste Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Sanitary Facilities					
Solid Waste & Recycling					
Special Waste & Hazardous Materials					
Other					
Atmosphere	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Dust					
Air Quality					
Other					
Vegetation Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Invasive Plants					
Other					

General Observations & Comments (Wildlife, New Sensitive Features, etc.):

Less waterflow in Creek then should be for the amount of rain

Photos:

Other Comments:

Photos:

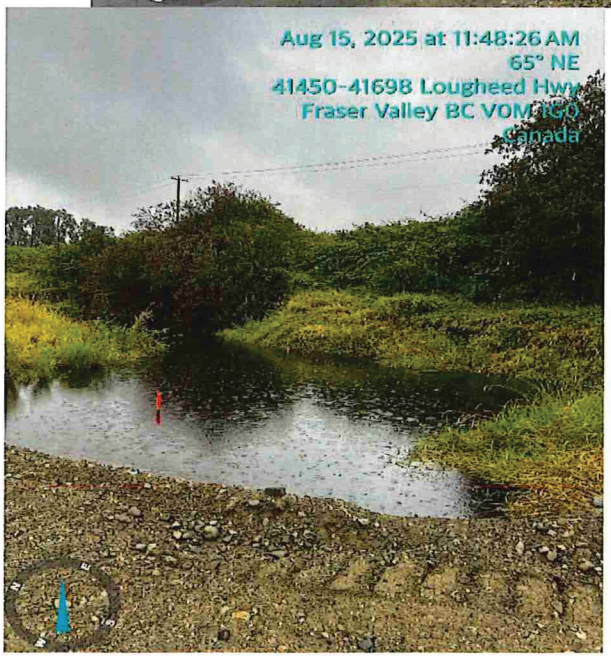
Upcoming Construction Events:

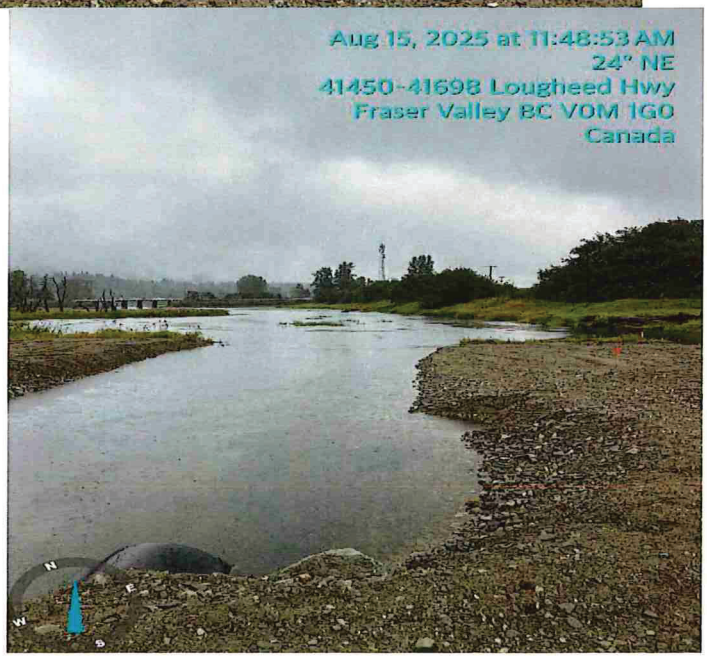
Incident Report Required? Yes ☐ No ☑


Aug 15, 2025 at 11:
41550-41576 N Nicomen Rd
Canada


Aug 15, 2025 at 11:49:37 AM
62° NE
41450-41698 Lougheed Hwy
Fraser Valley BC V0M 1G0
Canada


Fraser Valley BC V0M 1G0
Canada


Aug 15, 2025 at 11:48:26 AM
65° NE
41450-41698 Lougheed Hwy
Fraser Valley BC V0M 1G0
Canada


Aug 15, 2025 at 11:48:53 AM
24° NE
41450-41698 Lougheed Hwy
Fraser Valley BC V0M 1G0
Canada

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): Deroche Creek, off Taylor Rd.**
Date: August 26/ 2025 **Time: 2 hours**	
Monitor Name: Daryl Holm	**Signature:**
Meetings: Morning tailgate	
Meeting Participants:	
Contractor(s) On Site: Timbro, KWL,	**Name of Construction Representative Present: Timbro- Liam, KWL-Luke, nhc- Andy**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): Clear 32 degrees Celsius	
Ground Conditions: Dry : x Wet Saturated ☐	
Completed Construction Activities (Since Last Visit): unknown	
Construction Activities: Cutting logs and banding ends to be installed tomorrow with crain Leveling area where the soil supposed to be stored	**Photos:**
Construction Equipment Being Used: excavator and 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		

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			X		
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Spill Kits/SPER Plan	X				
Fuel Storage	X				
Other			X		
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	X				
Initial Cleaning (Mud, Seeds)	X				
Other	X				
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			X		

General Observations & Comments (Wildlife, New Sensitive Features, etc.):	**Photos:**

Other Comments: nothing at this time	**Photos:**

Natural Resource Department: Daily Environmental Monitoring Report

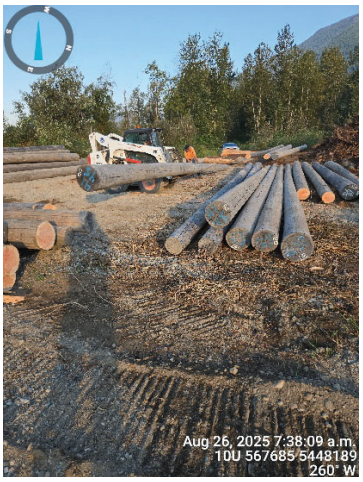
Upcoming Construction Events:		
Incident Report Required?	**Yes** ☐	**No** x





Natural Resource Department: Daily Environmental Monitoring Report





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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): Deroche Creek, off Taylor Rd.**
Date: August 27/ 2025 **Time: 7:00am - 4:00pm**	
Monitor Name: Daryl Holm	**Signature:**
Meetings: Morning tailgate	
Meeting Participants:	
Contractor(s) On Site: Timbro, KWL, Torque and Hammer	**Name of Construction Representative Present: Timbro- Liam, KWL-Luke, nhc- Andy**
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 10% cloud cover 29 degrees Celsius	
Ground Conditions: Dry : x Wet Saturated ☐	
Completed Construction Activities (Since Last Visit): unknown	

Construction Activities: Torque and Hammer tapered ends of all pilings and with crain hammered them into slough **Timbro moved Soil to prep areas for crain to be moved to the next area**	**Photos:**
Construction Equipment Being Used: excavator and skid steer and crain and 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			X		
Fuel & Oil Management	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Spill Kits/SPER Plan	X				
Fuel Storage	X				
Other			X		
Equipment	**OK**	**NC**	**NA**	**Comments & Mitigation**	**Photos:**
Condition (leaks, etc.)	X				
Initial Cleaning (Mud, Seeds)	X				
Other	X				
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			X		

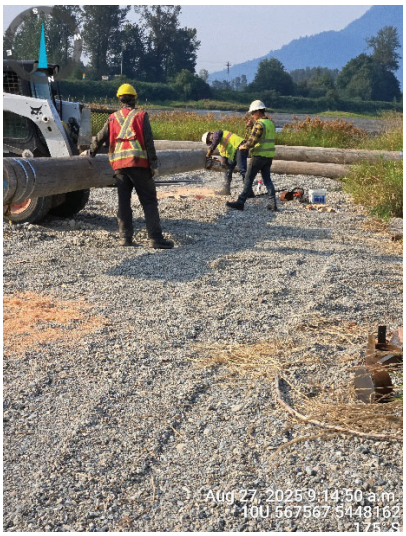
General Observations & Comments (Wildlife, New Sensitive Features, etc.):	**Photos:**

Other Comments: nothing at this time	**Photos:**

Natural Resource Department: Daily Environmental Monitoring Report

Upcoming Construction Events:		
Incident Report Required?	**Yes** ☐	**No** x









Natural Resource Department: Daily Environmental Monitoring Report



Natural Resource Department: Daily Environmental Monitoring Report

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Report Number: Dimitri John Duroche creek	**Location (Or Closest Address):** Deroche creek
Date: September 8, 2025 **Time:** 07:31	
Monitor Name: Dimitri John	
Site Photo: 	
Meetings:	
Meeting Participants:	
Contractor(s) On Site:	**Name of Construction Representative Present:** Luke
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 1% cloud cover	
Ground Conditions: ☑ Dry ☐ Wet ☐ Saturated	
Completed Construction Activities (Since Last Visit): Log jams tied with cable	
Construction Activities: Pulling material out of side channel	



Construction Equipment Being Used:

Natural Resource Department: Daily Environmental Monitoring Report

Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)				
Boundary Flagging	**OK**	**NC**	**NA**	**Photos, Comments & Mitigation:**
General Construction	☐	☐	☐	
Riparian Zone(s)	☐	☐	☐	
Env. Sensitive Features	☐	☐	☐	
Other	☐	☐	☐	
Boundary Flagging				

Natural Resource Department: Daily Environmental Monitoring Report

Water Quality	OK	NC	NA	Photos, Comments & Mitigation:
Turbidity	☐	☐	☐	
Temperature	☐	☐	☐	
DO	☐	☐	☐	
pH	☐	☐	☐	
Conductivity	☐	☐	☐	
Other	☐	☐	☐	

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	**OK**	**NC**	**NA**	**Photos, Comments & Mitigation:**
Silt Fencing	☐	☐	☐	
Bank Stabilization	☐	☐	☐	
Soil Stockpiles	☐	☐	☐	
Drainage & Diversions	☐	☐	☐	
Detention Facilities	☐	☐	☐	
Other	☐	☐	☐	
Erosion & Sediment Control				

Natural Resource Department: Daily Environmental Monitoring Report

Fuel & Oil Management	OK	NC	NA	Photos, Comments & Mitigation:
Spill Kits/SPER Plan	☐	☐		
Fuel Storage	☐	☐		
Other	☐	☐	☐	
Fuel & Oil Management				

Natural Resource Department: Daily Environmental Monitoring Report

Equipment	OK	NC	NA	Photos, Comments & Mitigation:
Condition (leaks, etc.)	☐	☐	☐	
Initial Cleaning (Mud, Seeds)	☐	☐	☐	
Other	☐	☐	☐	
Equipment				

Natural Resource Department: Daily Environmental Monitoring Report

Waste Management	OK	NC	NA	Photos, Comments & Mitigation:
Sanitary Facilities	☐	☐	☐	
Solid Waste & Recycling	☐	☐	☐	
Special Waste & Hazardous Materials	☐	☐	☐	
Other	☐	☐	☐	
Waste Management				

Natural Resource Department: Daily Environmental Monitoring Report

Atmosphere	OK	NC	NA	Photos, Comments & Mitigation:
Dust	☐	☐	☐	
Air Quality	☐	☐	☐	
Other	☐	☐	☐	

Natural Resource Department: Daily Environmental Monitoring Report

Vegetation Management	OK	NC	NA	Photos, Comments & Mitigation
Invasive Plants	☐	☐	☐	
Other	☐	☐	☐	
Vegetation Management				

Natural Resource Department: Daily Environmental Monitoring Report

Cultural/ Archaeological Observations:	**Location of Cultural Find:** (0, 0)

General Observations & Comments (Wildlife, New Sensitive Features, etc.):

Excavator broke down and leaked oil (bio oil)

Photos:



Additional Comments/Info:

Excavating the affected soil from bio oil spill fallowing the spill trail

Photos:



Natural Resource Department: Daily Environmental Monitoring Report

Upcoming Construction Events:	
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
(604) 826-7976 www.leqamel.ca

Report Number: Dimitri John		**Location (Or Closest Address):**
Date: September 10, 2025	**Time:** 08:04	Deroche creek

Monitor Name:
Dimitri John

Site Photo:



Meetings:

Meeting Participants:

Natural Resource Department: Daily Environmental Monitoring Report

Contractor(s) On Site:	Name of Construction Representative Present:
Weather Conditions (Cloud Cover, Wind, Precipitation, Temperature, etc.): 100% cloud cover. Slight wind. 17degrees	
Ground Conditions: ☑ Dry ☐ Wet ☐ Saturated	
Completed Construction Activities (Since Last Visit): Log piles tied together around LWD	
Construction Activities: Removing culverts from stream bed	



Construction Equipment Being Used:
Excavator


Link-Belt
Taken on: 10 Sep. 2025 15:33

Natural Resource Department: Daily Environmental Monitoring Report

Environmental Site Conditions (NC = Non-Compliant, NA = Not Applicable)				
Boundary Flagging	**OK**	**NC**	**NA**	**Photos, Comments & Mitigation:**
General Construction	☐	☐	☐	
Riparian Zone(s)	☐	☐	☐	
Env. Sensitive Features	☐	☐	☐	
Other	☐	☐	☐	
Boundary Flagging				

Natural Resource Department: Daily Environmental Monitoring Report

Water Quality	OK	NC	NA	Photos, Comments & Mitigation:
Turbidity	☐	☐	☐	
Temperature	☐	☐	☐	
DO	☐	☐	☐	
pH	☐	☐	☐	
Conductivity	☐	☐	☐	
Other	☐	☐	☐	

Natural Resource Department: Daily Environmental Monitoring Report

Erosion & Sediment Control	**OK**	**NC**	**NA**	**Photos, Comments & Mitigation:**
Silt Fencing	☐	☐	☐	
Bank Stabilization	☐	☐	☐	
Soil Stockpiles	☐	☐	☐	
Drainage & Diversions	☐	☐	☐	
Detention Facilities	☐	☐	☐	
Other	☐	☐	☐	
Erosion & Sediment Control				

Natural Resource Department: Daily Environmental Monitoring Report

Fuel & Oil Management	OK	NC	NA	Photos, Comments & Mitigation:
Spill Kits/SPER Plan	☐	☐		
Fuel Storage	☐	☐		
Other	☐	☐	☐	
Fuel & Oil Management				

Natural Resource Department: Daily Environmental Monitoring Report

Equipment	OK	NC	NA	Photos, Comments & Mitigation:
Condition (leaks, etc.)	☐	☐	☐	
Initial Cleaning (Mud, Seeds)	☐	☐	☐	
Other	☐	☐	☐	
Equipment				

Natural Resource Department: Daily Environmental Monitoring Report

Waste Management	OK	NC	NA	Photos, Comments & Mitigation:
Sanitary Facilities	☐	☐	☐	
Solid Waste & Recycling	☐	☐	☐	
Special Waste & Hazardous Materials	☐	☐	☐	
Other	☐	☐	☐	
Waste Management				

Natural Resource Department: Daily Environmental Monitoring Report

Atmosphere	OK	NC	NA	Photos, Comments & Mitigation:
Dust	☐	☐	☐	
Air Quality	☐	☐	☐	
Other	☐	☐	☐	

Natural Resource Department: Daily Environmental Monitoring Report

Vegetation Management	OK	NC	NA	Photos, Comments & Mitigation
Invasive Plants	☐	☐	☐	
Other	☐	☐	☐	
Vegetation Management				

Natural Resource Department: Daily Environmental Monitoring Report

Cultural/ Archaeological Observations:	Location of Cultural Find: (0, 0)

General Observations & Comments (Wildlife, New Sensitive Features, etc.):

Removing two culverts in stream bed and back filling

Photos:



Natural Resource Department: Daily Environmental Monitoring Report

Additional Comments/Info: **Photos:**
Upcoming Construction Events:
Incident Report Required? ☐ Yes ☐ No

Bird Nest Sweep Report

Surveyor: Melissa Friesen

Title: Leq’á:mel Guardian Coordinator, Environmental Technician

Date: July 24, 2025

Time: 7:15 AM – 8:00 AM

Location: Taylor Rd, Deroche Creek, Fraser Valley, BC

Weather: Clear morning, calm conditions

Purpose:

To check for any signs of active bird nesting in trees scheduled for removal and surrounding vegetation in the Deroche Creek area.

Survey Details:

- Surveyed four trees and the surrounding vegetation in the project area.
- Conducted visual observations for signs of nesting (nests, fledglings, droppings, nesting material, or territorial bird behaviour).
- Observed canopy, mid-story, and ground-level vegetation.
- Photographs were taken for documentation.

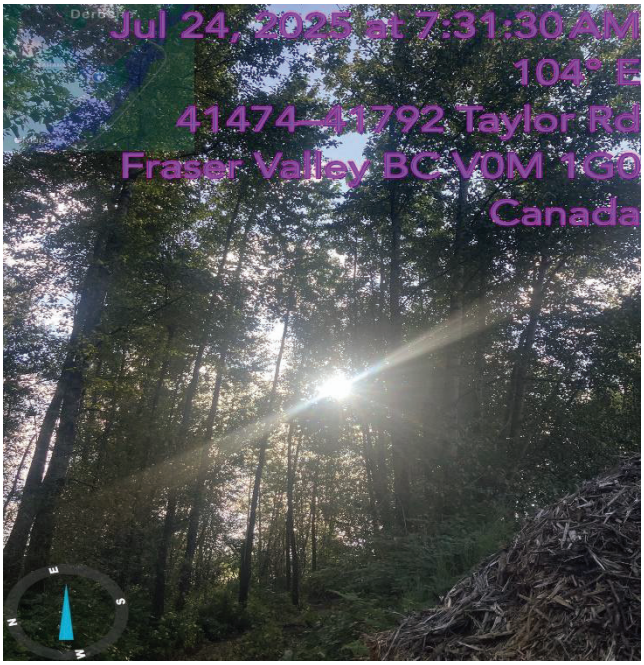
Findings:

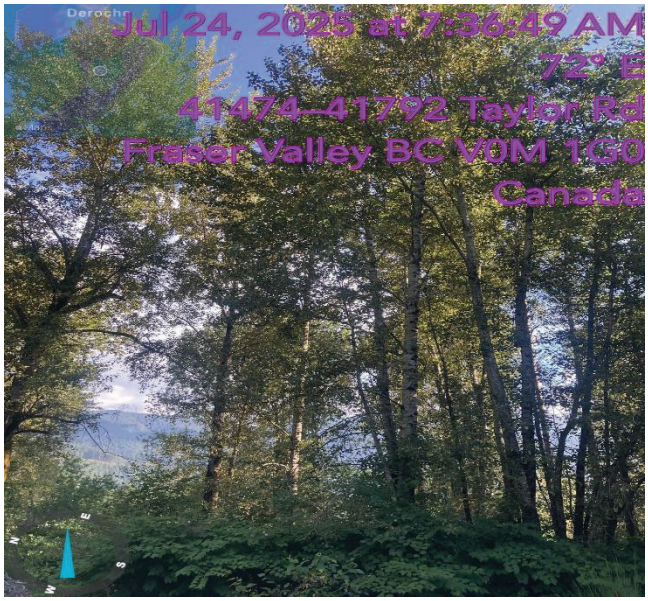
- No active nests or bird activity observed during the sweep.
- No fledglings seen or heard in the area.
- No alarm calling, defensive behaviour, or visible nesting material.
- Site appears clear of any nesting concerns at the time of inspection.

Assessment:

Based on current observations and the time of year, the area appears clear for tree removal. Contractors KWL and Timbro were informed of the findings









DEROCHE CREEK RECOVERY SOLUTION
PROJECT No. 2900712
ISSUED FOR CONSTRUCTION, JULY, 2024

DRAWING INDEX

SHEET No.	SHEET DESCRIPTION	REVISION
001	TITLE SHEET AND PROJECT LOCATION	
002	EXISTING SITE PLAN	
003	REACH 1 WORKS - PLAN AND PROFILE VIEWS	
004	REACH 2 WORKS - PLAN AND PROFILE VIEWS	
005	REACH 1 - TYPICAL SECTIONS AND PROFILES	
006	REACH 2 - TYPICAL SECTIONS AND PROFILES	
007	SEDIMENT BASIN - STANDARD SECTIONS	
008	LOT 8-3-3 GRADING PLAN	
009	OFF-SETTING WORKS	
010	OFF-SETTING WORKS - TYPICAL SECTIONS AND PROFILES	
011	PLANTING PLAN	



LOCATION MAP
NOT TO SCALE



SITE MAP
NOT TO SCALE

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
0	10 JUL 2024	ISSUED FOR CONSTRUCTION

nhc northwest hydraulic consultants

SEAL:

PROFESSIONAL ENGINEER D. J. GOOLD # 28081 BRITISH COLUMBIA 2024-07-11

PERMIT TO PRACTICE
NORTHWEST HYDRAULIC CONSULTANTS LTD.
PERMIT NUMBER: 1003221
The Association of Professional Engineers and Geoscientists of British Columbia

DEROCHE CREEK RECOVERY SOLUTION

TITLE SHEET AND PROJECT LOCATION

DESIGNED:	DJG	SHEET ID:	2900712-DER RS-001	SHEET No:
DRAFTED:	CZZ	STATUS:	ISSUED FOR CONSTRUCTION	001
CHECKED:	DJG	SCALE:	AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE:	10 JUL 2024	REV No: 0

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\mainfile-van\Projects\Active\3007814 Deroche Creek Emerg Works\96 CAD\02_Production\IFC\3007814 Deroche RS IFC-001-002.dwg, 10 Jul 2024, 06:59 PM

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Appendix N

Post Construction Regulatory Reports

KERR WOOD LEIDAL ASSOCIATES LTD.
consulting engineers

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Greater Vancouver
A300 – 4185 Still Creek Drive
Burnaby, BC V5C 6G9
T 604 294 2088

Technical Memorandum

DATE: March 3, 2026

TO: Michael Currie, Assistant Water Manager
Via email

FROM: Janice Kwo, M.Sc., RPBio

RE: **Deroche Creek Sediment Long-Term Solution Project**
Environmental Completion Report
Our File 2838.003-300

1. Introduction

This technical memorandum summarizes construction and environmental monitoring activities conducted for the Deroche Creek Sediment Long-Term Solution Project (the Project), which is located in Deroche, British Columbia. The purpose of the project was to address the sedimentation impacts from the November 2021 atmospheric storms and subsequent flooding events. The project involved construction of infrastructure to address sedimentation impacts and habitat offsetting measures.

Deroche Creek flows through Lakahahmen IR 11 where it enters Nicomen Slough, a historical side channel of the Fraser River that has had its inflow from the river regulated by diking and the "Bell Dam" since the 1930s. Lakahahmen IR 11 is located on and adjacent to the Deroche Creek alluvial fan, approximately 22 km east of the City of Mission, BC.

Ministry of Environment and Climate Change Strategy (ENV) and Leq'a:mel FN have collaborated to assess and address the impacts of sedimentation in Deroche Creek. Kerr Wood Leidal Associates Ltd. (KWL) has been retained as a subconsultant to the Engineer-of-Record, Northwest Hydraulic Consultants (NHC). KWL acted as the Qualified Environmental Professional (QEP) and LFN acted as the Environmental Monitor (EM) for the project.

2. Permitting and Approvals

The project works were undertaken in compliance with best management practices, and in accordance with the terms of the following regulatory permits and approvals. All permits listed below can be found in Enclosure A. The following permits were acquired:

- Fisheries and Oceans Canada – *Fisheries Act* Authorization (23-HPAC-01232), originally issued July 25, 2024, amended and issued January 15, 2025.
- Fisheries and Oceans Canada – Scientific Licence for fish salvage activities for federally-regulated fish species (XHAB 128 2025), issued April 4, 2025.
- BC Ministry of Water, Land and Resource Stewardship – *Water Sustainability Act* Change Approval for Works In and About a Stream (File 2011239), dated November 13, 2024.
- BC Ministry of Water, Land and Resource Stewardship – Scientific Fish Collection Permit for fish salvage activities for provincially-regulated fish species (Permit No. SU25-942716) issued April 24, 2025.
- BC Ministry of Water, Land and Resource Stewardship – General Wildlife Permit for potential salvage of amphibians during construction (Permit No. SU25-942717), issued April 28, 2025.

3. Summary of Works Undertaken

The project included the following works:

1. Construction of a sediment basin with a low-flow channel to increase area available for sediment deposition and reduce infilling of the lower channel and fan, which has the potential to impede the migration of fish during low flows and smother spawning habitat downstream. Void filled rip rap along the banks was staked.
2. Installation of bed armouring at Ministry of Transportation & Infrastructure's Taylor Road Bridge in Reach 2, downstream of the proposed sediment basin, to prevent degradation due the reduction in sediment supply.
3. Construction of two timber pile deflectors on the Deroche Creek alluvial fan perpendicular to the Taylor Road to prevent high flows from eroding the embankment of Taylor Road. Douglas fir piles were driven into the substrate and woody debris and logs were woven between the piles.

Offsetting Measures:

4. Construction of rearing habitat channels in the Deroche Creek alluvial fan (1,812 m^2). The original design had four rearing channels, but due to access issues and water levels, two channels with two branches each were constructed. Some gravel was removed from Deroche Creek to achieve the correct grade at the connection point of the habitat channels.
5. Installation of a large woody debris reef along the Highway 7 embankment to improve habitat complexity and stabilize the bank (983 m^2). The bypass channel constructed during isolation was left in place as an additional channel for fish passage.
6. Large woody debris and boulders were placed in the low-flow channel as habitat complexing features (714 m^2).
7. Enhancement of riparian habitat of Deroche Creek through invasive species removal and native planting. A total of 1,143 trees, 10,423 shrubs, and 12,000 live stakes were planted on site. The total planted area for the project was approximately 8,600 m^2, which was less than the amount required in the *Fisheries Act* Authorization (9,800 m^2). This was because the configuration of the channels was changed in the field. The creation of branched channels instead of individual channels reduced the amount of available planting area.

The total volume of excavated material from the project was 26,019 m^3. As-built drawings are available in Enclosure B.

4. Project Timing

The project construction timeline is outlined below.

March 6 & 7, 2024 – Tree clearing was conducted within the sediment basin footprint. Bird nesting surveys were completed prior to clearing. No clearing was done within 10 m of Deroche Creek, as per instruction from DFO.

June 9 to July 31, 2025 – Start of construction. The QEP allowed Timbro to work below the high-water mark of Deroche Creek since no flows were observed and it was historically dry during the summer. During this time the sediment basin and armouring of Taylor Road Bridge were completed. The fan channels were also constructed at this time since water levels in Nicomen Slough were lower than the elevation of the channels.

August 1 to September 15, 2025 – The LWD reef was constructed in the Nicomen Slough during the least-risk window for the area. This involved construction of a bypass channel through the alluvial fan, isolation of the work site, construction of the reef, and rewatering of the work site. The bypass channel was not decommissioned.

September to December, 2025 – The restoration areas were planted, and the banks of the sediment basin were staked. Works were completed by December 31, 2025.

5. Site Inspections and Monitoring

A LFN Environmental Monitor (EM) conducted full-time on-site environmental monitoring during in-stream works. Part-time monitoring occurred during low-risk activities, once in-stream work was complete. All EMs were supported and under the direction of a KWL Qualified Environmental Professional (QEP). The QEP was on site during high-risk activities (i.e., isolation, dewatering, fish salvage, rewatering). Site inspections were completed to ensure that the project works were compliant with the conditions included in all applicable environmental legislation, permits, and approvals, and BMPs.

All works below the top of bank were monitored by an EM. Turbidity was monitored during installation and removal of site isolation in Nicomen Slough. During inspections, the EM documented the following items related to compliance with the environmental permits and implementation of BMPs:

- location(s) of maintenance activities;
- weather conditions;
- environmental protection measures and materials on site;
- condition of site equipment and their set up;
- storage and handling of fuel and hazardous/waste products;
- discussions with construction supervisors and staff; and
- any environmental deficiencies, incidents, concerns, recommendations, and/or required actions.

Site photographs (Enclosure C) were also taken during each site visit.

6. Site Isolation and Fish Salvage

No fish salvage or isolation measures were required for works in Deroche Creek or the alluvial fan since these areas were not wetted at the time of construction.

Bypass and isolation measures were installed in the Nicomen Slough prior to the construction of the LWD reef. A bypass channel was constructed through the alluvial fan to the west of the existing channel. A culvert was installed in this channel to allow for machinery access to the work site. This was completed in the dry and then connected to the Nicomen Slough on August 6, 2025, during the least-risk fish window under supervision of the QEP. Turbidity was monitored approximately 20 m downstream of the bypass channel during the connection of the upstream and downstream sections. Measurements are summarized in Table 1.

Once the bypass channel was functioning, isolation measures were installed around the LWD reef work site. Bulk bags on top of poly sheeting were initially used to isolate the area on the upstream and downstream ends. A fish salvage using minnow traps and seining netting was conducted on August 6 and 7 by KWL biologists Janice Kwo, RPBio and Bridget MacGillivray, BIT. Fish salvage results are summarized in Table 2. However, due to the difference in the depth of the water between the Nicomen Slough and the work site during dewatering, the upstream isolation failed. A fill berm was constructed next to the upstream bulk bags within the work area, under supervision of the QEP. The contractor used slow start procedures to allow fish to leave the area. A 3” pump with a fish screen was used to control local turbidity. Water was pumped to a vegetated area south of the site.

Once isolation was reestablished, 3” pumps were used to lower the water levels. Based on the porous nature of the substrate, the contractor was unable to completely dewater the site. A second fish salvage was conducted on August 12 by KWL biologists Matt Sanders, RPBio, and Oskar Von Wahl, RPBio. The salvage was conducted by seine netting. The majority of species caught were invasive. A summary of the salvage results is provided in Table 3.

Once the LWD reef was completed, the QEP and Engineer-on-Record decided the bypass channel could remain in place and only the culvert would be removed. Bulk bags on poly sheeting were placed upstream and downstream of the culvert to isolate the area before removal. The area was salvaged on September 10, 2025, using an Electrofisher by KWL Biologist Janice Kwo, RPBio and LFN Guardian Erik Still. A summary of the fish salvage results is provided in Table 4. Isolation measures around the LWD reef were removed on September 10, 2025, under supervision of the QEP. Turbidity monitoring was conducted downstream of the area, and a summary is provided in Table 5.

All native species of fish captured during the salvage were released back into Nicomen Slough downstream of the work site in a slow-moving area with cover. Non-native fish species captured were humanely euthanized as per the conditions of the fish collection permits.

There were no wildlife salvages conducted and no incidental wildlife observations.

Table 1. Turbidity Measurements During Connection of Bypass Channel, ~20 m Downstream of Site, August 6, 2025

Time	Turbidity (NTU)	Comments
9:00	3.44	Prior to works
9:30 – 9:40	45 – 85	During connection of downstream section
9:40	300	Large turbidity plume for ~ 20 seconds during excavation
9:41	90	Excavation complete
9:45	25	Turbidity decreasing
10:30	5.15	Prior to connection of upstream section
10:38	20	Start of upstream connection
10:41	53	During upstream connection
10:43	70	
10:45 – 11:00	28 - 78	Minor drop in turbidity while contractor was changing buckets
11:00	70	Connection complete
11:15	10	Visible turbidity has cleared from area

Table 2. Fish Salvage Results for Nicomen Slough, August 6 and 7, 2025

Common Name	Scientific Name	Method of Capture	Status	Quantity
Bass	*Micropterus sp.*	Seine netting	Invasive	30
Brown Catfish	*Ameiurus nebulosus*	Seine netting	Invasive	3
Carp	*Cyprinus carpio*	Seine netting	Invasive	2
Pumpkinseed	*Lepomis gibbosus*	Seine netting	Invasive	43
Signal Crayfish	*Pacifastacus leniusculus*	Seine netting/Dipnetting	Native	32
Largescale Sucker	*Catostomus macrocheilus*	Seine netting	Native	9
Pacific Lamprey	*Entosphenus tridentatus*	Seine netting/Dipnetting	Native	3
Northern Pikeminnow	*Ptychocheilus oregonensis*	Seine netting	Native	12
Sculpin	*Cottus sp.*	Seine netting	Native	15

Table 3. Fish Salvage Results for Nicomen Slough, August 9, 2025

Common Name	Scientific Name	Method of Capture	Status	Quantity
Bass	*Micropterus sp.*	Seine netting	Invasive	73
Brown Catfish	*Ameiurus nebulosus*	Seine netting	Invasive	108
Carp	*Cyprinus carpio*	Seine netting	Invasive	22
Pumpkinseed	*Lepomis gibbosus*	Seine netting	Invasive	78
Signal Crayfish	*Pacifastacus leniusculus*	Seine netting/Dipnetting	Native	293
Largescale Sucker	*Catostomus macrocheilus*	Seine netting	Native	2
Pacific Lamprey	*Entosphenus tridentatus*	Seine netting/Dipnetting	Native	15
Northern Pikeminnow	*Ptychocheilus oregonensis*	Seine netting	Native	5
Sculpin	*Cottus sp.*	Seine netting	Native	16

Table 4. Fish Salvage Results for Nicomen Slough, September 10, 2025

Common Name	Scientific Name	Method of Capture	Status	Quantity
Bass	*Micropterus nigricans*	Seine netting	Invasive	15
Pumpkinseed	*Lepomis gibbosus*	Seine netting	Invasive	12
Pacific Lamprey	*Entosphenus tridentatus*	Seine netting	Native	1
Sculpin	*Cottus sp.*	Seine netting	Native	1

Table 5. Turbidity Measurements During Removal of Site Isolation in Nicomen Slough, September 10, 2025

Time	Turbidity (NTU)	Comments
9:25	2.61	Prior to works
13:44	66	~10 m downstream
	13	~20 m downstream
14:00	135	~20 m downstream
15:25	55	~20 m downstream

7. Mitigation Measures

All construction activities were conducted following B.C. Ministry of Environment's *Standards and Best Practices for Instream Works* (B.C. Ministry of Water, Land and Air Protection, 2004). Environmental mitigation measures for the construction activities were provided as follows:

- works were monitored by a QEP or EM, as required;
- isolation, dewatering, and fish salvage were conducted where required;
- spill kits were present on site; and
- discussions were held with the contractor to discuss and address any environmental deficiencies.

Please see the Construction Environmental Management Plan (CEMP) for a detailed list of mitigation measures (Enclosure D).

8. Compliance and Environmental Incidents

The following non-compliance events arose throughout the project:

- **Turbidity exceedances** – Exceedances up to 296 NTU above background conditions occurred during the connection and the decommissioning of the bypass channel in Nicomen Slough. Mitigation measures were implemented such as:
  - temporarily stopping works until turbidity decreased; and
  - using a 3” pump to remove turbid water.

  These exceedances were permitted by the EM since BMPs were implemented properly, no other feasible options were available, and work could be completed in a reasonable timeframe.
- **Disturbance of Japanese knotweed –** Along the access route to the fan channels 1 and 2 on the north side of the alluvial fan, Japanese knotweed was disturbed. On July 23, the QEP was on site and observed that a patch of knotweed had been run over by machinery. This area was flagged off to prevent access and new access route was identified with the contractor.
- **Spill/Use of machinery below the high-water mark without biodegradable hydraulic fluid** – On August 28, 2025, machinery from the pile driving subcontractor leaked approximately 1 L of hydraulic fluid on the swamp pads. Absorbent padding was placed on the swamp pads and there was no release into water. The EM noted that the machinery was not using biodegradable hydraulic fluid. The machine was immediately removed and the contractor was notified. Once the machine was switched to biodegradable hydraulic fluid, works resumed.
- **Spill** – On September 8, 2025, an excavator leaked approximately < 1L biodegradable hydraulic fluid onto the alluvial fan channel, which was dry at the time. Some was contained in the spill tray and some leaked onto the ground. The contaminated soil was excavated and removed from below the high-water mark and disposed of.

Aside from the non-compliance events above, no environmental incidents occurred during the project works.

9. Closure

We trust this submission meets your requirements for documenting the construction activities for the Deroche Creek Sediment Long-Term Solution Project

KERR WOOD LEIDAL ASSOCIATES LTD.

Prepared by:



Janice Kwo, M.Sc., RPBio (BC)
Project Biologist

Reviewed by:



Christy Juteau, M.A., RPBio (BC)
Technical Reviewer

JVK/tgv

Encl.: Enclosure A – Permit and Approval Documents
Enclosure B – As-Built Drawings
Enclosure C – Site Photographs
Enclosure D – Construction Environmental Management Plan

Statement of Limitations

This document has been prepared by Kerr Wood Leidal Associates Ltd. (KWL) for the exclusive use and benefit of the intended recipient. No other party is entitled to rely on any of the conclusions, data, opinions, or any other information contained in this document.

This document represents KWL's best professional judgement based on the information available at the time of its completion and as appropriate for the project scope of work. Services performed in developing the content of this document have been conducted in a manner consistent with that level and skill ordinarily exercised by members of the engineering profession currently practising under similar conditions. No warranty, express or implied, is made.

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Revision History

Revision #	Date	Status	Revision Description	Author
0	March 3, 2026	Final	Issued as Final	JVK

Innovation. Integrity.
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Enclosure A

Permit and Approval Documents

November 13, 2024 File Number: 2011239

Amy Vallarino
BC Ministry of Environment and Climate Change Strategy
PO BOX 9360 Stn Prov Govt
Victoria , BC V8W 9M2
Sent via email: Amy.Vallarino@gov.bc.ca

Dear Amy Vallarino,

Re: Application for approval to make changes in Deroche Creek and Nicomen Slough That Part of SW1/4 Lying West of District Lot 475, Group 1, and East of Nicomen Slough, Section 5, Township 24, East of the Coast Meridian, 29TR1A_IR, in the Vicinity of Lakahahmen IR 11 New Westminster Regional District. Unsurveyed Crown foreshore or Land Covered by Water being part of the Bed of the Deroche Creek and lands held under Permit # 29854 authorizing the Occupation of Crown Land.

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

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

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

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

The holder of this Approval must advise Water Authorizations at SouthCoastWSAReporting@gov.bc.ca with the Approval number in the subject line, five (5)

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

working days prior to commencement and five (5) working days following completion of the authorized work to facilitate the timing of auditing.

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

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.

When choosing compensation/restoration locations, it is encouraged to avoid areas that are isolated or are discontinuous from existing habitat, to avoid creating habitat sinks, and enable wildlife access.

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

The holder of this Approval must 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.

You are reminded of requirement to comply with Permit # 2024-02415 issued by the Ministry of Transportation "Permit to Construct, Use and Maintain Works within the Right of Way of a Provincial Public Highway" Under the Transportation Act and/or the industrial roads Act and/or the Motor Vehicle Act and/r as defined in the Nisga'a final agreement and the Nisga'a final Agreement Act dated May 7, 2024.

It is the Ministry's understanding that Leq'a:mel First Nation will be maintaining the sediment basin following completion of works. Future maintenance of the basin (e.g. additional sediment removal) is not authorized under this Change Approval and will require appropriate authorization. If regular maintenance is expected to be required, the holder of this Approval is encouraged to apply for a Water Licence as soon as possible.

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: Janice Kwo, KWL, Email: jkwo@kwl.ca
Pradeep Poudel, Ministry of Water, Land and Resource Stewardship, Email: Pradeep.1.Poudel@gov.bc.ca
Leq'a:mel First Nation (LFN)
Peters First Nation
Snuneymuxw First Nation
S'ólh Téméxw Stewardship Alliance Strategic Engagement Agreement
People of the River Referral Office (PRRO)

November 13, 2024 File Number: 2011239

APPROVAL

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

Ministry of Environment and Climate Change Strategy and Leq'a:mel First Nation
are hereby authorized to make changes in and about a stream as follows:

(a) The names of the streams are Deroche Creek and Nicomen Slough, herein referred to as the stream(s).

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

1. Deflection Berms/Reach 1:

   i. Clearing of vegetation and trees along the access path and within the berm footprints from Taylor Road over an approximate footprint of 2400 square metres.
   ii. Placement and compaction of subgrade and fill for the berm(s).
   iii. Installation of riprap at the head of the berm.
   iv. Install high-performance turf reinforcement (HPTRM) along the trunks of both berms, with soil amendments and revegetation augmentation.
   v. Restoration of the site with native riparian plant species and willow staking on the installed riprap at the end of the berm and placement of cleared trees between the berms in order to provide fish cover during high water conditions, all over an area of approximately 6667 square metres.

2. Sediment basin

   i. Clearing of vegetation and trees along the access path from Taylor Road to the downstream extent of the sediment basin and on the

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Fax: (604) 586-4444

east bank of Deroche Creek within the basin footprint over an area of approximately 6200 square metres.
ii. Site isolation and dewatering, including us of pumps as required.
iii. Install exclusion fencing to prevent fish access.
iv. Excavation and grading of the sediment basin.
v. Installation of riprap back-filled with an appropriate growing substrate for vegetation above the normal high-water mark.
vi. Establish a low-flow channel through the basin to convey base surface flows once they return to the creek.
vii. Restoration of the site with native riparian plant species and willow staking on the installed riprap at the end of the berm and placement of cleared trees between the berms in order to provide fish cover during high water conditions, all over an area of approximately 6328 square metres.

3. Taylor Bridge:

i. Clearing of vegetation and trees along the access path from Taylor Road.
ii. Site isolation and dewatering, including use of pumps as required.
iii. Excavation of sediment to subgrade, placement of boulders in a checkerboard pattern and filling voids using excavated sediment.
iv. Restoration of the site with native riparian planting over approximately 414 square metres.

4. Offset Measures

i. Construction of four habitat channels within the northeast and southeast portions of the Deroche Creek alluvial fan over approximately 1325 square metres.
ii. Installation of a large woody debris reef along the Highway 7 embankment to improve habitat complexity, limit erosion, and encourage natural channel migration away from the south bank of Nicomen slough, all over an area of approximately 1200 square metres.
iii. Installation of habitat complexing features, including installation of large woody debris in the sediment basin low flow channel over an area of approximately 700 square metres.
iv. Enhancement of the existing riparian habitat along Deroche Creek via planting of native shrubs and trees and removal of invasive species, all over an area of approximately 9800 square metres.

That Part of SW1/4 Lying West of District Lot 475, Group 1, and East of Nicomen Slough, Section 5, Township 24, East of the Coast Meridian, 29TR1A_IR, in the Vicinity of Lakahahmen IR 11 New Westminster Regional District. Unsurveyed Crown foreshore or Land Covered by Water

being part of the Bed of the Deroche Creek and lands held under Permit # 29854 authorizing the Occupation of Crown Land.

(c) The location of the works is at the following coordinates, as provided by the applicant are:
    1. Offset locations: 49.1825390, -122.0708980 and 49.1841060, -122.0717250.
    2. Sediment basin: 49.1851240, -122.0750980.
    3. Taylor Road Bridge location: 49.1837530.
    4. Deflection berms: 49.1828910, -122.0735630.

(d) The works authorized in this Approval must be completed on or before. December 31, 2025.

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

(f) All works associated with the Effectiveness Monitoring Plan, as outlined in clause (x) below, must be completed by December 1, 2035, ten years after the works are completed.

(g) As much as is practicable, the construction area(s) and access routes must be marked on-site prior to starting groundwork. Any vegetation removal must be minimized and limited only to the areas required for active construction, with consideration for the timing and scheduling of work.

(h) Work in the stream and stream channel must occur during the reduced risk instream work window of August 1 to September 15, so that the fisheries interests are protected:

(i) All works must be completed within the designed project footprint and in accordance with the following:

    1. “Deroche Creek Sediment Long-term Solution Project: Environmental Assessment” prepared by Kerr Wood Leidal Associates Ltd. for the BC Ministry of Environment and Climate Change Strategy dated September 15, 2023.
    2. “Deroche Creek Sediment Long-Term Solution Project: Environmental Assessment and Offsetting Plan” prepared by Kerr Wood Leidal Associates Ltd. For the BC Ministry of Environment and Climate change Strategy dated May 29, 2024.
    3. Deroche Creek Sediment Long-Term Solution Project “Construction Environmental Management Plan” prepared by Kerr Wood Leidal Associates Ltd. For the BC Ministry of Environment and Climate

Change Strategy dated September 29, 2023, and updated on December 18, 2023.

4. " Deroche Creek Recovery Solution Project: Final Hydrotechnical Design Report Rev.0" prepared by Northwest Hydraulic Consultant (NHC) for Ministry of Environment and Climate Change Strategy dated May 27, 2024.
5. "Leq'a:mel First Nation Permit Report: Archaeological Assessment Deroche Creek, Phase 1" prepared by Summit Earthworks Inc. for Leq'a:mel First Nation Lands Department dated October 31, 2023.
6. Sealed Engineering drawings IFT for Deroche Creek Recovery Solutions prepared by NHC for Ministry of Environment and Climate Change Strategy and Leq'a:mel First Nation dated 30 April 2024, including:
   v. 001 Title Sheet and Project Location
   vi. 002 Site Plan
   vii. 003 Reach 1 Works Plan and Profile Views
   viii. 004 Reach 2 Works- Plan and Profile Views
   ix. 005 Reach 1 Typical Sections and Profiles
   x. 006 Reach 2 Typical Sections and Profiles
   xi. 007 Sediment Basin- Standard Sections
   xii. 008 Lot 8-3-3 Grading Plan
   xiii. 009 Off-Setting Works
   xiv. 010 Off-Setting Works- Typical Sections and Profiles
   xv. 011 Planting Plan

(j) 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 must:

1. Ensure all best management practices and mitigation measures are in place to avoid and minimize environmental impact on the land and on fish and fish habitat of the stream.
2. Where applicable, assist in the isolation of the stream prior to the commencement of works.
3. Implement and ensure erosion and sediment control measures are constructed, installed, and maintained appropriately for the full duration of instream works.
4. Supervise all instream works authorized under this Approval.
5. When the works involve temporary diversions to isolate the work site,
   i) Monitor all diversion works daily to ensure pumps & flow bypasses are in proper working condition;
   ii) Ensure diversion works that include pump intakes be screened for fish and aquatic species in accordance with the "Interim

code of practice: End-of-pipe fish protection screens for small water intakes in freshwater" (Fisheries and Oceans Canada, 2020); and

iii) Ensure fish are prevented from entering the works.

6. When the works involve dewatering or isolation of flow and the stream is known or suspected to contain fish and/or amphibians,
   i) Attend the site prior to conducting any instream works to complete fish and wildlife search and salvage(s);
   ii) Obtain any permits needed prior to undertaking the salvage(s); and
   iii) Inspect the extraction area for fish stranding at least once after water levels have declined.
   iv) Protect the species at risk and salvage under the direction of a Qualified Environmental Professional in the event of discovery of species at risk. The works must not result in harm to species at risk.
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. 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 must 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.

(k) All work must be carried out in accordance with the Provincial "Requirements and Best Management Practices for Making Changes In and About A Stream in British Columbia" (2022). The Provincial guidance document can be found at the following link: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/wsa-cias-requirements-bmps.pdf .

(l) 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.

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

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

(o) All equipment and machinery used in or near the stream channel:

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 refueled a minimum of 30 meters 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 must be exercised during all phases of the work to prevent the release of silt, sediment, sediment-laden water, raw concrete, concrete leachate, or any deleterious substances. All control measures must meet or surpass the Requirements and Best Management Practices for Making Changes in and About a Stream in British Columbia (2022) and the "Land Development Guidelines for the Protection of Aquatic Habitat" (Fisheries and Oceans Canada and the British Columbia, 1993).

(q) Discharge and runoff water from the site into any watercourse(s) must comply with the BC Approved Water Quality Guidelines for the Protection of Aquatic Life (https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines/approved-water-quality-guidelines) and/or the applicable Local Government Bylaw(s) .

Water quality monitoring must be conducted by an appropriately Qualified Professional or a designate (in writing) Environmental Monitor on every day in which instream works are being conducted. Measurements must be taken upstream of any works taking place and within the extent of the sedimentation downstream of where instream work is actively occurring. Measurements are to be taken immediately prior to works beginning, and then at regular intervals until the works are completed and may require additional frequency during wet weather conditions. Wet weather conditions will be defined as being equal to or greater than 25 millimetres of rainfall within a 24-hour period. All excavated material and debris must be removed from the site or placed in a stable area above the high water mark of the stream. Mitigative measures must

be applied to protect the excavated material and debris from erosion and reintroduction into the watercourse. These measures may include covering the material with erosion blankets, seeding and planting with native vegetation, or as otherwise directed by a Qualified Professional.

(r) All excavated material and debris must be removed from the site or placed in a stable area above the high-water mark of the stream. Mitigative measures must be applied to protect the excavated material and debris from erosion and reintroduction into the watercourse.

(s) The holder of this Approval must ensure that instream works are designed and installed so as not to restrict fish passage and/or lead to fish stranding. The works must not result in depressions that have the ability to trap fish and other aquatic life.

(t) All temporary works (including a ford, stream crossing, flow bypass, and erosion and sediment control measures) must be removed on completion of the project, and the stream channel restored to its natural condition.

(u) All disturbed areas of the banks of the stream must be restored using native vegetation suitable for the site conditions.

(v) All rock used in the works must be clean and free of sediment producing material, durable, non-acid generating and suitably graded. Any other engineering material required for the construction of the works must be clean of any substances deleterious to aquatic life.

(w) 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 must cease if the Drought Level Classification is at Level 5. The proponent must contact WLRS and DFO 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 WLRS and DFO.

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 must 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 must be inspected regularly and maintained throughout the project.

(x) The holder of this Approval must retain an appropriately Qualified Professional to develop and implement a Five-Year effectiveness monitoring for aquatic habitat and channel function and Ten-Year Effectiveness Monitoring Plan for riparian habitat 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. Invasive species management; and
4. Monitoring water flow and function with proposed adaptive management strategies to address shortfalls.
5. Monitoring of Fish habitat (Water Quality, Water Quantity/Flow, Habitat Quantity/quality), Fish community (fish diversity, relative abundance), Riparian habitat (vegetation cover, density and survival, riparian stability)
6. Monitoring of sediment basin for its performance, functionality and stability, the monitoring parameters could be photo documentation, sediment volume, elevation of riverbed, scouring or undercut banks etc.

Annual reports must be submitted by December 1 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.

(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 must 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 pre-construction and post-construction surveys if undertaken;
5. The quantity of gravel removed;
6. Representative site photographs;
7. Whether or not they observed or were otherwise aware of any non-compliance with the terms and conditions of this Approval; and

8. A description of any environmental incidents, non-compliance or other difficulties, and how these were addressed and reported.

Sincerely,



Michael Currie
Assistant Water Manager

Province of British Columbia
Water Sustainability Act

PERMIT 29854 AUTHORIZING THE OCCUPATION OF CROWN LAND

The holders of this permit, BC Ministry of Environment and Climate Change Strategy and Leq'a:mel First Nation (29854), whose Change Approval authorizes changes in and about a stream (Deroche Creek and Nicomen Slough), are hereby authorized to occupy Crown Land by constructing, maintaining and operating the works as authorized in the Change Approval (2011239).

(a) The Crown land which is authorized to be occupied under this permit is Unsurveyed Crown foreshore or Land Covered by Water being part of the Bed of the Deroche Creek, the location of which is shown approximately on the plan listed in said Change Approval.

(b) The approximate area of the Crown Land authorized to be occupied under this permit is 0.754 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

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

January 2025 Amendment[1]

Authorization issued to
BC Ministry of Environment and Climate Change Strategy *(hereafter referred to as the "Proponent"*)

Attention to: Amy Vallarino
PO Box 9337 Stn Prov Gov't
Victoria, BC V8W 9M1

Location of Proposed Project

Municipality: Deroche
Province: British Columbia
Name of watercourse: Deroche Creek and Nicomen Slough
Longitude and latitude: 49.186157, -122.075846 (upstream) to 49.182694, -122.074070 (downstream)

Valid Authorization Period

This Authorization remains in force from the **Date of Issuance** until **December 31, 2037[2].**

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 works, undertakings or activities authorized is a part of involves:

- Flood protection works to address sediment accumulation and erosion concerns in Deroche Creek and Nicomen Slough to mitigate risks to Leq'á:mel First Nation and Deroche communities. The works are part of BC Ministry of Environment and Climate Change Strategy's response to the 2021 Atmospheric River Event.

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[1] January 2025 Amendment: This is the first amendment to *Fisheries Act* Authorization 23-HPAC-01232, originally issued on July 25, 2024. Amendments to this Authorization will be highlighted in footnotes. All previous Authorizations related to the Project are rescinded and no longer valid.
[2] January 2025 Amendment: The valid authorization period has been extended from December 31, 2036 to December 31, 2037.

The project is described in the following documents (*hereafter referred to as the "Project Plan"*):

- *Application Form for the Issuance of an Authorization under Paragraphs 34.4(2) (b) and 35(2)(b) of the Fisheries Act (Non-Emergency Situations)* prepared by Kerr Wood Leidal Associates Ltd., dated December 18, 2024;
- *Deroche Creek Sediment Long-Term Solution Project Environmental Assessment and Offsetting Plan* prepared by Kerr Wood Leidal Associates Ltd., dated May 29, 2024;
- *Deroche Creek Sediment Long-Term Solution Project Construction Environmental Management Plan* prepared by Kerr Wood Leidal Associates Ltd., dated December 18, 2023; and
- *Application Form for Authorization Holders to Request an Amendment to an Authorization* signed by Janice Kwo of Kerr Wood Leidal Associates Ltd., dated November 14, 2024.[3]

Description of Authorized works, undertakings or activities likely to result in the harmful alteration, disruption or destruction of fish habitat:

- Clearing and grubbing of riparian vegetation within the project footprint;
- Establishment of access routes and machine laydown areas;
- Excavation of sediment from and realignment of the lower kilometre of Deroche Creek, upstream of Nicomen Slough;
- Placement of rock armouring below Taylor Road bridge to establish grade control; and
- Construction of timber deflectors on the Deroche Creek fan, below the high-water mark of Nicomen Slough, to deflect flows away from the Taylor Road embankment.

The authorized works, undertakings or activities are likely to result in the following impacts to fish and fish habitat:

- Harmful alteration, disruption, or destruction of not more than 3,810 m^2 of aquatic habitat and not more than 7,400 m^2 of riparian habitat in Deroche Creek and Nicomen Slough.

The works, undertakings, or activities associated with the proposed project described above, are not expected to result in the death of fish provided that avoidance and mitigation measures described in the Project Plan and outlined in the Conditions of Authorization below are effectively implemented. Any death of fish resulting from this project should be demonstrated to have been unavoidable or accidental. DFO should be notified immediately in such circumstances via an email 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.

Conditions of Authorization

The above described works, undertakings or activities must be carried on in accordance with the following conditions.

[3] January 2025 Amendment: Project Plan document added.

1. Conditions that relate to the period during which the works, undertakings or activities can be carried on

The works, undertakings or activities that are authorized to be carried on during the following period:

From **Date of Issuance** To **September 15, 2025[4].**

If the Proponent cannot complete the works, undertakings or activities 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 The Proponent shall adhere to all designs and avoidance and mitigation measures outlined in the Project Plan for the protection of fish and fish habitat. In the event of a conflict between those measures and the conditions of this Authorization, the more precautionary condition shall prevail, so long as conditions of this Authorization are not contravened. The specific measures and standards to avoid and mitigate impacts to fish and fish habitat are outlined in the Project Plan.

2.2 Environmental Monitoring: The Proponent shall retain an appropriately Qualified Environmental Professional (QEP) to oversee measures and standards to avoid and mitigate impacts to fish and fish habitat. The QEP (or Environmental Monitors working under the direction of the QEP) shall monitor the implementation of the conditions of this Authorization and shall be onsite at all times during all works, undertakings or activities below the high water mark. The QEP shall ensure the measures and standards to avoid and mitigate impacts to fish and fish habitat are effective, and that no additional harm to fish and fish habitat occurs other than what is authorized herein.

2.3 Erosion and sediment control (ESC) measures: ESC measures must be in place and shall be monitored and maintained, such that release of sediment to fish and fish habitat is minimized or avoided at the location of the authorized works, undertakings or activities.

2.3.1 The QEP shall carry out routine quantitative (e.g., turbidity or total suspended solids) monitoring to detect increased suspended sediment in fish habitats both within and in areas adjacent to the project footprint. Monitoring shall occur during works below the high water mark (e.g., sediment excavation), and/or at any time suspended sediment from the project site and/or authorized works, undertakings or activities may exceed aquatic guidelines. The QEP shall provide direction on appropriate corrective actions as needed (e.g., suspend works, maintain or improve erosion and sediment control measures, etc.).

[4] January 2025 Amendment: The date to which the works, undertakings or activities are authorized to be carried on has been extended from September 15, 2024 to September 15, 2025.

2.3.2 All riparian areas that have been disturbed during works shall be restored to a stable condition and protected against erosion as soon as works are completed with native species suitable for the site.

2.4 Works below the high water mark: Works within Deroche Creek and Nicomen Slough River shall be conducted under dry conditions. If the work area is not naturally dry at the start of construction, instream works, undertakings or activities shall be conducted in accordance with applicable measures and standards from DFO's interim standard for in-water site isolation. 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.

2.4.1 Maintain hydrological conditions (e.g., depth and flow) downstream of the work area during all phases of the project.

2.5 Avoid deposit of deleterious substances: All equipment and machinery working on site shall be in good working order and maintained free of fluid leaks. Hydraulic machinery will use non-toxic, readily biodegradable hydraulic fluids where mechanically feasible. 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 water. Develop and implement a spill prevention and emergency response plan to avoid a spill of deleterious substances into a watercourse.

2.6 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 or activities. Instream works shall cease if the Drought Level Classification is at Level 5. The proponent shall contact DFO 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 DFO.

2.6.1 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 habitat 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).

2.7 Contingency measures: Additional measures shall be put in place if the 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.

2.8 Dates by which these measures and standards shall be implemented: The measures and standards to avoid and mitigate impacts to fish and fish habitat in Section 2 of this Authorization shall be implemented prior to, and where appropriate, during, and after the works, undertakings, and 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 retain an appropriate QEP to monitor the implementation of avoidance and mitigation measures referred to in section 2 of this Authorization and report to DFO within 90 days following completion of the work. The report

shall indicate whether the measures and standards to avoid and mitigate impacts to fish were conducted according to the conditions of this Authorization. This shall be done, by:

3.1.1 Demonstration of effective implementation and functioning:

3.1.1.1 A description of the completed works, undertakings, or activities, including dimensions (e.g., sediment basin area, low flow channel dimensions, etc.);

3.1.1.2 A comparison of the completed works, undertakings or activities with the design dimensions or design drawings provided in the Project Plan;

3.1.1.3 Dated photographs and inspection reports to demonstrate implementation and results of effectiveness monitoring of mitigation measures and standards referred to above, to limit the impacts to fish and fish habitat to what is authorized herein. Provide a figure illustrating the locations of mitigation measures and monitoring locations (e.g., ESC measures, total suspended solids, monitoring points); and

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

3.1.2 Contingency measures: Provide 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; and

3.1.3 As-builts: Provide georeferenced 'as-built' drawings and geospatial polygons that accurately represent the completed HADD (i.e., low-flow channel, riparian clearing) footprints. Geospatial polygon data should be collected using WGS 1984 to four (4) decimal places (e.g., 28.5234°N, 80.6830°W). Geospatial polygon data must be supplied in Shape File (.shp, .shx, .dbf) format and .xml or .kmz format.

In addition, the following data must also be supplied in an Excel file (i.e., metadata):
- HADD area per habitat type (based on the high water mark of Deroche Creek);
- Dates when HADD of fish habitat was completed;
- Brand name and model of the GPS unit, the coordinate system used, and guaranteed accuracy of the GPS unit.

3.2 Report Submission: All required reports and geospatial polygons (.shp files) are to be submitted to ReferralsPacific@dfo-mpo.gc.ca, with reference to DFO File Number: 23-HPAC-01232.

4. **Conditions that relate to the offsetting plan**

4.1 Scale and description of offsetting measures: The offsetting measures shall be carried out in accordance with the measures set out in the Proponent's offsetting plan, as described in the Project Plan. The offsetting measures include:

- Creation of not less than 1,325 m^2 of rearing habitat through the construction of not less than four (4) channels within the northeast and southeast portions of the Deroche Creek alluvial fan;

- Creation of not less than 1,200 m^2 of cover/rearing habitat through the installation of a large woody debris reef along the left downstream bank of Nicomen Slough;
- Installation of not less than 700 m^2 of habitat complexing features (e.g., large woody debris, boulders) throughout the realigned lower kilometre of Deroche Creek; and
- Removal of invasive species and planting of native trees and shrubs throughout not less than 9,800 m^2 of riparian habitat. The planting sites are as follows:
    - **Site 1:** Willow staking and planting riprap along the east wall of the low flow channel in the sediment basin to provide shade.
    - **Site 2:** English ivy removal and planting of native shrubs along the west bank of the sediment basin.
    - **Site 3:** Himalayan blackberry removal and planting of native trees and shrubs east of the new sediment basin.
    - **Site 4:** Himalayan blackberry removal and planting of native trees and shrubs on the northeast side of Taylor Road bridge.
    - **Site 5:** Planting of native trees and shrubs along the created rearing habitat channels on the Deroche Creek alluvial fan.

4.2 Implementation of offsetting measures: Construction of all offsetting measures shall be completed by **December 31, 2025**[5]. The proponent shall retain a QEP to monitor the implementation and effectiveness of the offsetting measures. Effectiveness monitoring shall be conducted for a period of ten (10) years post-completion of the offsetting measures described herein. The final monitoring report is due by **December 31, 2036**[6], at the end of the ten (10) year monitoring period.

4.3 Offsetting criteria to assess the implementation and effectiveness of the offsetting plan: The Proponent will be considered to have met the requirements of this Authorization as it pertains to fish habitat offsetting measures once they are able to demonstrate fulfilment of the criteria described **in Section 7** of the Proponent's offsetting plan and summarized in the following table:

Component	Monitoring Metric	Performance Measures
Fish Habitat	Water Quality	Water quality will be consistent with BC Water Quality Guidelines for the Protection of Aquatic Life and within typical ranges of water temperatures suitable for target fish species and life stages.
	Water Quantity/Flow	Habitat continuously wetted with average target water depths and velocities as described in the Proponent's offsetting plan.
	Habitat Quantity/Quality	Habitat areas consistent with as-builts. Large woody debris structures are to be in sufficient condition; normal wear and tear with limited localized damage.
Fish Community	Diversity	Assemblage composed of some or all of the predicted fish species (i.e., Chum/Coho salmon) and life stages (e.g., juvenile/adult).

[5] January 2025 Amendment: The date by which the construction of all offsetting measures shall be completed by has been extended from December 31, 2024 to December 31, 2025.
[6] January 2025 Amendment: The date by which the final monitoring report is due has been extended from December 31, 2035 to December 31, 2036.

	Relative Abundance	Catch per unit effort of juvenile salmonids is consistent with, or greater, than the reference sites identified in the Proponent's offsetting plan.
Riparian Habitat	Vegetation Cover	80% cover, stable to increasing native plant composition and cover, and less than 5% invasive species plant coverage.
	Density and Survival	100% survival of planted trees and at least 80% survival of planted shrubs.
	Riparian Stability	Stable site conditions, improved vegetation success, and continued succession.

4.4 Contingency measures: If the results of monitoring as required in Section 5 indicate that the offsetting measures are not completed by the date specified and/or are not functioning according to the above criteria in Section 4.3, the Proponent shall give written notice to DFO and retain a QEP to implement contingency measures and associated monitoring measures to ensure the offsetting is completed and/or functioning as required by this Authorization.

4.4.1 Scale and description of contingency measures: If the results of the monitoring determine that offsetting measures are not functioning appropriately, the QEP will determine the cause(s) for failure, develop a contingency plan to address the failure, and implement corrective actions within one calendar year. The contingency offsetting measures shall be approved by DFO, in an amendment to this Authorization, prior to implementation. Final determination of the suitability and sufficiency of the contingency measures to offset for the harmful alteration, disruption or destruction of fish habitat, account for time lag, and development of criteria to assess the effectiveness of contingency offsetting, is at the discretion of DFO.

4.4.2 Monitoring measures to ensure offsetting contingency is completed and/or functioning as required: Contingency measures shall be monitored per the requirements described in the DFO approved Contingency Offsetting Plan.

4.5 The Proponent shall not carry on any works, undertakings or activities that will adversely impact the offsetting measures.

5. **Conditions that relate to monitoring and reporting of implementation of the offsetting plan (described in section 4):**

5.1 Schedule(s) and criteria: The Proponent shall retain a QEP to monitor the implementation and effectiveness of offsetting measures according to the timeline and criteria below:

5.1.1 Effectiveness monitoring shall commence in 2026[7], the year after offsetting measures have been constructed, and shall be carried out over a period of 10 years, with monitoring occurring in years 1, 2, 3, 5, 7, and 10, at a time during each monitoring year that allows for the criteria described in Condition 4.3 of this Authorization to be assessed.

[7] January 2025 Amendment: The year by which effectiveness monitoring shall commence has been extended from 2025 to 2026.

5.1.2 In the event of the implementation of contingency measures, monitoring of contingency measures shall occur according to a frequency described in the DFO approved Contingency Offsetting Plan.

5.2 Reporting of the offsetting measures: The QEP shall report to DFO on whether the offsetting measures were implemented and functioning according to the conditions of this Authorization by providing the following:

5.2.1 Offsetting Construction: Within 90 days of the completion of offsetting construction, provide a written assessment to DFO on whether the offsetting measures were constructed in accordance with the conditions of this Authorization. The report shall include, at a minimum, the following:

5.2.1.1 Geo-referenced 'as-built' drawing(s) of the completed offsetting measures, including areal footprints;

5.2.1.2 A description of the completed offsetting measures, including dimensions (e.g., area, elevation, slope, etc.) and materials used;

5.2.1.3 A comparison of the completed offsetting measures with the proposed offsetting measures described in the Proponent's offsetting plan and in Condition 4.1 of this Authorization;

5.2.1.4 Dated photographs of the offsetting measures post-offset construction;

5.2.1.5 Establishment of fixed photo points that will be used to document changes of the offsetting measures over time;

5.2.1.6 A summary of the effectiveness of mitigation measures and standards implemented during construction of the offsetting measures; and

5.2.1.7 Recommendations as to whether additional offsetting measures are required to meet the requirements of the Authorization.

5.2.2 Offsetting Effectiveness: The QEP, on behalf of the Proponent, shall report on the effectiveness of the offsetting measures in accordance with the conditions of this Authorization. Monitoring reports are required for each year of monitoring following construction of offsetting measures. The reports are to be submitted to DFO by December 31 of each monitoring year. The reports shall include, at a minimum, the following:

5.2.2.1 A description of the methods used to assess the offsetting measures.

5.2.2.2 Updates to the geo-referenced 'as-built' drawing(s) delineating the area of the offsetting measures, including areal footprints, if there have been any changes to the offsetting habitats;

5.2.2.3 An assessment of the success of the offsetting measures (to date) in accordance with the criteria listed in the Proponent's offsetting plan and in Condition 4.3 of this Authorization;

5.2.2.4 An assessment of the stability of the offsetting measures, identifying any signs of potential erosion, accretion, failure, movement or other physical alteration that may affect the stability and long-term success of the offsetting measures;

5.2.2.5 Geo-referenced and dated photographs or video documenting the offsetting measures for the respective monitoring period (including at fixed photo points to document changes over time);

5.2.2.6 Identification of any function concerns related to the offsetting measures and a description of any remedial measures taken; and

5.2.2.7 The final Offsetting Effectiveness Monitoring Report (Year 10), shall include an evaluation of whether the offsetting measures undertaken counterbalanced the authorized impacts to fish and fish habitat resulting from the authorized works, undertakings or activities.

5.2.3 Geospatial Polygons and Data: The Proponent shall provide a geospatial polygon that accurately represents the completed offset footprint(s). Geospatial polygon data should be collected using WGS 1984 to four (4) decimal places (e.g., 28.5234°N, 80.6830°W). Geospatial polygon data must be supplied in Shape File (.shp, .shx, .dbf) format and .xml or .kmz format.

In addition to the geospatial polygon, the following data must also be supplied in an Excel file (i.e. metadata):

- Area of the offset per habitat type (based on high water mark);
- Target species of offset habitat;
- Dates offsetting completed, date of maintenance, and date monitored;
- Brand name and model of GPS unit, the coordinate system used, and guaranteed accuracy of GPS unit.

5.3 Report Submission: All required reports and geospatial polygons (Shape files) are to be submitted to ReferralsPacific@dfo-mpo.gc.ca, with reference to DFO File Number: 23-HPAC-01232**.**

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 works, undertakings or activities that are likely to result in impacts to fish and fish habitat as described herein.

This authorization does not purport to release the Proponent from any obligation to obtain permission from any private landowner 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.

At the date of issuance of this authorization, no individuals of aquatic species listed under the *Species at Risk Act* (SARA) were identified in the vicinity of the authorized works, undertakings or activities.

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 (http://www.dfo-mpo.gc.ca/pnw-ppe/CONTACT-eng.html) or to the DFO-Pacific Observe, Record and 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.

A copy of this authorization will 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 works, undertakings or activities 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 works, undertakings or activities, the Proponent named in this authorization shall advise DFO in advance.

Date of Issuance: January 15, 2025

Approved by: Rotinsky, Brenda Digitally signed by Rotinsky, Brenda Date: 2025.01.15 09:41:43-08'00'

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

Fisheries and Oceans Canada | Pêches et Océans Canada

Licence Number: XHAB 128 2025
Valid From: 01-Jun-2025
Expiry Date: 31-May-2026

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 associated with a construction project to provide a long-term solution to sediment accumulation in Deroche Creek, British Columbia to mitigate future impacts on infrastructure and salmon habitat.

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 shall be retained under the authority of this licence.

Licence Holder:
FIN: 130455

300 - 4185 STILL CREEK DRIVE
BURNABY BC V5C 6G9

KERR WOOD LEIDAL ASSOCIATES LTD.

Contact Number: 604-293-2088
Fax Number: 604-294-2090

Contact Party:
FIN: 138800 LILLEY, PATRICK

Contact Number: 604-812-2578
Fax Number: 604-294-2080

Individuals or groups assisting with the authorized activity:

All employees of Kerr Wood Leidal Associates Ltd. are authorized to fish under this licence.

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

Species:	CHINOOK SALMON (Oncorhynchus tshawytscha); CHUM SALMON (Oncorhynchus keta); PINK SALMON (Oncorhynchus gorbuscha); SOCKEYE SALMON (Oncorhynchus nerka); COHO SALMON (Oncorhynchus kisutch);
Life Stage:	Juvenile
Gear:	Dip Net Trap, Gee/Minnow (Set Duration Max: 24 Hours) Seine Net Electroshocker
Licence Area:	Deroche Creek within and immediately downstream of Lakahahmen (Leq'a:mel) IR 11, near confluence with Nicomen Slough. UTM Coordinates: 10U 567551 E, 5448285 N
To be Retained:	0

Reporting Requirements:

XHAB 128 2025 **Due Date** 31-Jul-2026

The Appendix 1 must be completed within 60 days of completion of the fishing activities outlined in this licence and submitted to the mailbox: DFO.FIALicense-LicenseSFI.MPO@dfo-mpo.gc.ca

Additional Information:

Activities authorized in this licence may be subject to orders issued by DFO. Notices of orders can be found online at: https://notices.dfo-mpo.gc.ca/fns-sap/index-eng.cfm?pg=fishery_search&ID=all.

The use of ALL of these licence(s) is subject to any conditions which are issued by DFO. The licence holder must ensure that they have received the licence conditions, and may NOT conduct any fishing activity with any of these licence(s) unless in receipt of the licence.

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 individuals or groups assisting the Licence Holder (herein referred to as Operator) 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.

Document(s) to be carried while fishing: 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 and release of the species identified in the Species, Quantity of Fish, Area(s) and Gear section of this licence.

This licence does not authorize fishing for non-anadromous (freshwater) species or Steelhead trout 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: Nothing in this license must be construed as authority to cause the death of fish by means other than fishing or the harmful alteration, disruption or destruction of fish habitat which are prohibited under subsections 34.4(1) and 35(1) of the *Fisheries Act*.

To avoid and mitigate the potential for prohibited effects to fish and fish habitat and to determine if a request for review is required, we recommend you visit the Department's Project Near Water website at: https://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html.

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

Notification 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 licenced activities taking place and include the details and locations of fishing. Notification shall occur by telephone during normal business hours. If you are unable to notify the local office on evenings or weekends, advise the DFO Radio Room at 1-800-465-4336 prior to fishing under this licence.

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 or the name and phone number of the person who owns the gear.

Fishing gear shall not be set or used in such a manner or in such a place that they or any equipment that is attached to any of them interferes with the public right of navigation. Fishing gear that interferes with safe navigation can be removed under the *Canadian Navigable Waters Act*.

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: The Licence Holder is only permitted to fish using only the fishing gear specified in the Species, Quantity of fish, Area(s) and Gear part of this licence.

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 take care when working in potential salmonid spawning habitat to avoid or minimize streambed disturbance.

If non-tended gear is permitted (i.e. minnow traps) under this licence, the Licence Holder/Operator must ensure that when setting non-tended gear that it will 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.

When fishing with a seine net, if permitted under this licence, the Licence Holder/Operator must record the water temperature, length, position, and duration of each seine netting event. Net loads of fish should not contain excessive numbers of fish. No more than 1/3 of the net volume should contain fish.

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

If electrofishing is permitted under this licence and 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. If salmonid spawning behaviour is noted at any time, the Licence Holder/Operator is required to cease all electrofishing activities.

(c) Electrofishing may only be used after extensive use of other gear during sampling activity indicates no presence of juvenile salmonids. 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 captured. 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 animal domestic movements: If you are considering moving dead fish or parts of fish collected under this licence from within British Columbia to outside of British Columbia, you are required to apply and receive a permit from the Canadian Food Inspection Agency (CFIA) prior to proceeding. For more information regarding a CFIA domestic movement control permit, visit: https://inspection.canada.ca/about-the-cfia/find-a-form/form-cfia-acia-5743/eng/1410362945783/1410362946643.

Disposition of fish: Any fish captured and collected for sampling, or incidental mortalities associated with non-lethal fishing and sampling methods permitted under the authority of this licence are not permitted to be sold and are prohibited from being utilized for human consumption or personal use purposes unless authorized by Fisheries & Oceans Canada.

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.

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.

Additional precautionary measures that shall be taken to avoid the introduction and/or transportation of aquatic invasive species (AIS) into other waters:

1. Inspect and clean plants, animals, mud, and sediment from all equipment used below the high watermark.
2. Drain all water from equipment used below the high watermark.
3. Dry all parts of equipment completely before leaving the site.
4. All organic matter and wash water generated during cleaning must be disposed of on land.

For further information, please visit:

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

Reporting requirements for fishing activities: The Licence Holder/Operator must complete the Section 52 Licence Report Form (Appendix 1 of licence), by project, in the format provided by Fisheries and Oceans Canada. The completed Section 52 Licence Report Form must be submitted to Fisheries and Oceans Canada electronically via email to: DFO.FIALicense-LicenseSFI.MPO@dfo-mpo.gc.ca within 60 days of completion of the fishing activities as outlined in this licence.

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. A breach of licence conditions is a *Fisheries Act* offence.

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.

130455

FIN	Licence Holder - Print Name	Signature	Date

Licence Issued: 04 April 2025

Licence Printed: 04 April 2025
Licence Issued By: JEFFREY READER, Fisheries and Oceans Canada

FISH COLLECTION PERMIT
FISH SALVAGE

File: 34770-20

Permit No.: **SU25-942716**

Permit Holder: **Ministry of Environment & Climate Change Strategy** – Amy Vallarino
PO Box 9339 Stn Prov Govt
Victoria, BC V8W 9M1

Authorized Persons: Gadwyn Gan, Janice Kwo, Matt Sanders, Jaime Dimillo, Andrew Baylis, Sherri Jonkman, Justin Southam, Erica Harvey, Sonya Oetterich, Dan Brown, Heather Kingcott, Oskar Von Wahl, Forrest Bjornson, Christy Juteau, Enrico Barbon, Patrick Lilley

Leq'a:mel First Nation Guardians: Erik Still, Megan Friesen, Emilia Hale, Melissa Friesen, Dimitri John, Samantha Mitchell, Darian McKamey, Anna Osetska, Ryan Cameron, Tina Pederson.

Pursuant to section 18 of the Angling and Scientific Collection Regulation, B.C. Reg. 125/90, the above-named persons are authorized to collect fish for scientific purposes (from non-tidal waters) subject to the terms set forth in this Permit:

Permitted Sampling Period: June 1, 2025 – December 31, 2025
Permitted Waterbodies: Deroche Creek (100-070200), Nicomen Slough (100)
Permitted Sampling Techniques: AG, DN, EF, MT, SN (subject to permit terms)
Potential Species: BCB, RSC, PMB, CP, LMB, RB, CAS, LNC, CCT, BNH, NSC, LDC, CRA, TSB (subject to permit terms)
Provincial Terms: (Permit holder and authorized persons must be aware of all terms):
See Appendix A.
Region Specific Terms:
See Appendix A.

Authorized by:

Elizabeth Shebib, Wildlife Biologist
A person authorized by the Regional Manager
Recreational Fisheries & Wildlife Programs
South Coast Region

Date: April 24, 2025

Permit Fee: $25.00

APPENDIX A
FISH COLLECTION PERMIT TERMS

Any Variation of the following terms will require explicit authorization by the appropriate regional Fish & Wildlife Section Head.

PROVINCIAL TERMS

1. This collecting permit is **only** valid for species listed as threatened, endangered, or extirpated under the *Species at Risk Act* (SARA) **in conjunction with a permit issued under Section 73 of SARA from Fisheries and Oceans Canada.**

   NOTE: Contact the Department of Fisheries and Oceans for fish collecting permits for salmon or eulachon https://www.pac.dfo-mpo.gc.ca/fm-gp/licence-permis/forms/licence-sci-permis-eng.pdf or for SARA listed species https://www.dfo-mpo.gc.ca/species-especes/sara-lep/permits-permis/index-eng.html#apply.

2. Any specimen's surplus to scientific requirements and any species not authorized for collection in this permit must be immediately and carefully released at the point of capture.

3. Fish collected under authority of this permit must not be used for food or any purpose other than the objectives set out in this permit. Dead fish must be disposed of in a manner that will not constitute a health hazard, nuisance, or a threat to wildlife.

4. No fish collected under authority of this permit must be transplanted unless separately authorized by the Federal/Provincial Introductions and Transfers Committee.

5. The permit holder must, within 90 days (120 days for the Kootenay/Boundary region and Peace region) of the expiry of this permit, submit a report of fish collection activities. Interim reports may also be required and must be submitted as required by the permit issuer. All submissions must be filed electronically to: https://www2.gov.bc.ca/fish-data-submission-process.

   Reporting specifications, information and templates are available from this website and outline the mandatory information requirements. Prior notification of submission or questions regarding data report standards can be made to: fishdatasub@gov.bc.ca

6. The permit holder must comply with all Workers' Compensation Board requirements and other regulatory requirements. The permit holder is responsible for ensuring authorized persons listed on the permit are properly certified for specific sampling methods or activities (e.g., electroshocking).

7. Any workers not listed on the permit must be supervised by the permit holder or one of the authorized persons named on the permit.

8. All sampling equipment that has been previously used outside of B.C. must be cleaned of mud and dirt and disinfected with 100mg/L chlorine bleach before using in any water course to prevent the spread of fish pathogens (e.g., whirling disease) and/or invasive plant species. Any washed off dirt or mud must be disposed of in a manner such that it cannot enter a watercourse untreated.

9. No electrofishing is to take place in waters having a temperature less than five degrees C.

10. No sampling of fish in waters having a temperature greater than twenty degrees C.

11. 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.

12. When work requires de-watering or isolation of the worksite in the stream, a permit for the salvage of fish and wildlife (Scientific Fish Collection permit) must be obtained prior to commencing work. All required salvage permits must be obtained from FrontCounter BC: https://portal.nrs.gov.bc.ca/web/client/home.

PROVINCIAL TERMS CONTINUED

13. Any fish or wildlife salvage must be carried out by a qualified environmental professional registered with a professional association (such as an RPBio). The qualified professional conducting salvage work must adhere to the conditions below in addition to those required in the Scientific Fish Collection permit.

- Salvage activities must be conducted to the Provincial Resource Information Standards Committee (RISC) standards for capture, data collection, handling, and release:

STREAM ISOLATION

- The QP must follow the standards and practices outlined in the Work Area Isolation Appendix found in the Standards and Best Practices for Instream Works. http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf
- A QP must ensure that the worksite has be substantively isolated to prevent any fishes from entering the work area and efforts must be made to exclude fish from entrapment during installation of isolation works. (See section 14.2 of the Standards and Best Practices for Instream Works (MWLAP 2004).
- Dewatering must not result in HADD to fish habitat or the death of fish unless authorized by Fisheries and Oceans Canada.
- While dewatering the work site and dewatering during fish capture, all pump intakes are required to meet the federal COP for fish intake screening guidelines https://www.dfo-mpo.gc.ca/pnw-ppe/codes/screen-ecran-eng.html.

FISH CAPTURE

- Qualified professionals must determine appropriate sampling methods from the RISC standards based on water body type and habitat conditions https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/nr-laws-policy/risc/fishml04.pdf.
- Qualified professionals must use a risk hierarchy of passive to active and low risk to higher risk in collection methods (e.g., minnow traps, fyke nets, beach pole seines, electroshocking, angling).
- Qualified professional must conduct a **minimum of three** non-lethal collection methods in all fish salvages.
- For active collection methods a minimum of two consecutive passes of each method that produces a zero catch must be completed as per total population removal methodology (at a minimum 95% fish removal must be achieved). (https://www.wildsalmoncenter.org/resources/field-protocols-best-monitoring-practices/).
- Where work site isolation cannot be fully achieved (e.g., fast flowing streams, imperfect seal due to substrate) additional efforts are needed to prevent harm to fish. At the end of each workday, a passive form of fish capture (e.g., baited minnow traps) are to be placed in the isolation site. If fish are captured overnight, you must restart isolation procedures at the start of the workday.
- If species at risk are captured, work must stop until proper permits are obtained.

DATA COLLECTION

- Sampling/data collection is a requirement of the Scientific Collection Permit. Sample size requirements are listed in the table below.
- Scientific Fish Collection Permits require a Fish Data Submission Template to be completed. Step 4 (Stream Site Data) of the Fish Data Submission Template must be filled out for the location where fish are salvaged from. https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/fish/fish-and-fish-habitat-data-information/fish-data-submission/submit-fish-data.

FISH RELEASE

- Fish must be released following RISC standards.
- All species are to be released in the same watercourse downstream of the work areas or a sufficient distance upstream (5 channel widths to a maximum of 100 meters) into waters of equivalent baseline quality and habitat type (pool, riffle, run).

Minimum Standards During Salvage for Fish Collection Sampling Effort*

Fish Species	Age Class	Size range	Minimum Sampling Size for lengths	Sample column required (from Individual Fish Data form)	Notes
Salmonids, including RB, CT(CCT), DV, BT, GR, LT, KO	fry	20 to 80 mm	up to 30 after 30 count	J (if possible), K	
	juvenile	81 mm-250 mm	Measure all fish caught	J, K, L	
	adult	greater than 250 mm	Measure all fish caught	J, K, L, M, N	
Coarse Fish (cyprinids, stickleback, dace, shiner, carp, pikeminnow)		under 200 mm	up to 30 after 30 count	J, K	
	Adult	over 200 mm	All	J, K, L, M	
Sport other (bass, perch, sunfish, walleye, northern pike)		all	up to 30 after 30 count	J, K, L	
Sculpin sp.		0-150mm (total length)	up to 30 after 30 count	J, K	
		Over 150mm	All	J, K, L	
Burbot, Lamprey		0-150 mm (total length)	All	J, K, L, N	
Listed Species (salish sucker, sturgeon, etc.)		All	All		Refer to SAR permit for conditions
All fishes not listed above		All	minimum 10 of each then count only	J, K, L	

Abbreviations for salmonids

RB-Rainbow
CT(CCT)-Cutthroat
DV-Dolly Varden
BT- Bull Trout
GR- Arctic Grayling
LT- Lake Trout
KO- Kokanee

BRITISH COLUMBIA

REGION SPECIFIC TERMS

South Coast Region

1. All streams sampled, for which a watershed code does not presently exist, will require a map showing the location of the stream and sampling location with the map scale identified at time of reporting.
2. Electrofishing and minnow trapping can harm or kill non-target species of management concern such as the endangered Coastal Giant Salamander (within the Chilliwack River drainage system), Oregon Spotted Frog, and Pacific Water Shrew (within the lower Fraser River Valley). Any incidental captures (alive or dead) of any red-listed or blue-listed wildlife species must be reported to the Ministry of Water, Land, and Resource Stewardship, South Coast Region. For further information on these species or to report incidental captures, please contact the Fish and Wildlife Branch by e-mail at SCFishandAquaticWildlife@gov.bc.ca.
3. All non-native fish species captured under this permit are to be humanely euthanized and disposed of appropriately. Within 48 hours of capture, a record of the species, capture location, date, waterbody, number, size range (mm) and digital imagery must be submitted to the Fish and Wildlife Branch by email at SCFishandAquaticWildlife@gov.bc.ca. Non-native fish species include but are not limited to: American Shad; Black Catfish; Black Crappie; Brown Catfish; Carp; Goldfish; Largemouth or Smallmouth Bass; Pumpkinseed Sunfish; and Weather-fish.
4. Please refer to the following website for the least risk in-stream work windows: https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-licensing-rights/working-around-water/regional-terms-conditions-timing-windows. Where possible, collection should be conducted during the least risk word windows identified. The exception is seasonal or ephemeral streams where sampling may not be possible during the prescribed window due to flow conditions.
5. The permit holder must refer to the following when sampling Salish Sucker, Nooksack Dace, and Stickleback species.

   Salish sucker sampling guidelines - https://portal.nrs.gov.bc.ca/documents/10184/0/SalishSuckerCollectionGuidelines2015.pdf/5893755c-1c3f-b85b-419c-a4ce50ffac71

   Nooksack dace sampling guidelines – https://portal.nrs.gov.bc.ca/documents/10184/0/NooksackDaceCollectionGuidelines2015.pdf/339d65e0-23b5-10bb-b33f-a7dbf74d5d39

   Stickleback species pairs sampling guidelines - http://www.dfo-mpo.gc.ca/species-especes/publications/sara-lep/stickleback-epinoches/index-eng.html

BRITISH COLUMBIA

APPENDIX B
ADVISORY

GENERAL

- It is the permit holder's responsibility to be aware of all applicable laws and the limits of this permit.
  For example,
  - This permit **does not** authorize the collection of fish in national or provincial parks.
  - This permit does not authorize the collection of fish in tidal waters.
  - This permit does not authorize the collection of eulachon or for salmon, other than kokanee.
  - This permit is NOT authority to angle for fish without a valid angling licence.

  It is the responsibility of the permit holder to obtain proper authorization.
- The Province is not liable for any illness contracted through fish handling. It is the responsibility of the permit holder to inform themselves of possible health hazards, and to ensure that all reasonably necessary safety measures are undertaken.
- If applicable, the permit holder is responsible for renewing this permit. The issuer is not obliged to send a reminder notice.

LEGISLATION

Below is a non-exhaustive list of provisions under the *Wildlife Act* and regulations that are relevant to this permit. It is the permit holder's responsibility to be aware of any provisions under the *Wildlife Act* or regulations that may apply to this permit.

Wildlife Act

Suspension and cancellation of permits

25 (1) A regional manager, for any cause he or she considers sufficient, and after providing an opportunity for the person to be heard, may suspend or cancel a permit held by a person, may order that the person is ineligible to obtain or renew a permit for a period and, if he or she does make an order, must inform the person of the period of ineligibility.

(2) An officer may, without the necessity of holding a hearing, exercise the powers of a regional manager under this section to suspend a permit and, if a permit is suspended by an officer, the matter must be referred to the regional manager, who may confirm, reduce, extend or terminate the suspension.

Documents not transferable

81 Except as authorized by regulation or as otherwise provided under this Act, a licence, permit or limited entry hunting authorization is not transferable, and a person commits an offence if the person

(a) allows his or her licence, permit or limited entry hunting authorization to be used by another person, or

(b) uses another person's licence, permit or limited entry hunting authorization.

Failure to pay fine

85 (1) This section applies if a person

(a) fails to pay, within the time required by law, a fine imposed as a result of the person's conviction for an offence under this Act or the *Firearm Act*, and

(b) has been served with notice of this section.

(2) In the circumstances referred to in subsection (1),

(a) the person's right to apply for or obtain a licence, permit or limited entry hunting authorization under this Act is suspended immediately and automatically on the failure to pay the fine,

(b) all licences, permits and limited entry hunting authorizations issued to that person under this Act are cancelled immediately and automatically on the failure to pay the fine,

(b.1) the person must not apply for employment as an assistant guide,

(b.2) the person must not guide as an assistant guide, and

(c) the person commits an offence if, before that fine is paid, the person

(i) applies for, or in any way obtains, a licence, permit or limited entry hunting authorization under this Act,

(ii) does anything for which a licence, permit or limited entry hunting authorization under this Act is required,

(iii) applies for employment as an assistant guide, or

(iv) guides as an assistant guide.

Proof of identity and authorization

97 (1) In this section, **"authorization"** means a licence, permit or limited entry hunting authorization issued under this Act.

(2) Subject to subsection (5), a person who is required to hold an authorization must, on the request of an officer,

(a) state the person's name and address,

(b) produce prescribed photo identification, and

(c) demonstrate in accordance with subsection (3) that the person holds the authorization.

(3) A person may demonstrate that the person holds an authorization by

(a) producing the authorization, or

(b) unless the regulations require that the original authorization be produced,

(i) producing a legible copy of the authorization, or

(ii) if authorized by the regulations, stating a number assigned to the person by the director as an identification number for the person.

(4) Subject to subsection (5), a person who would be required to hold a licence or permit issued under this Act were the person not exempt under section 11 (9) or 12 (b) must, on the request of an officer,

(a) state the person's name and address, and

(b) produce prescribed photo identification.

(5) Subsections (2) (b) and (4) (b) do not apply to a person in a prescribed class of persons.

(6) A person who contravenes subsection (2) or (4) commits an offence.

Wildlife Act General Regulation

Proof of identity

21.01 (1) For the purposes of section 97 (2)(b) and (4)(b) of the Act, the following photo identification is prescribed:

(a) valid photo identification issued to a person by any of the following:

(i) the government of Canada;

(ii) the government of a province or territory, or an agent of the government of a province or territory, in which the person has a current address;

(iii) the Nisga'a Nation, if the person is a Nisga'a citizen;

(iv) a treaty first nation, if the person is a treaty first nation member of the treaty first nation;

(b) in the case of a person who is a non-resident alien,

(i) valid photo identification in the form of

(A) a passport, or

(B) a driver's licence issued to the person by a foreign jurisdiction in which the person has a current address, or

(ii) a copy of a photo identification referred to in subparagraph (i) that has been certified as a true copy by

(A) a lawyer, or

(B) a notary who is a member in good standing under the *Notaries Act*

(c) in any case, a valid NEXUS card.

(2) For the purposes of section 97 (5) of the Act, persons under 16 years of age are prescribed as exempt from the requirement to produce photo identification.

Freshwater Fish Regulation

Offences

2 A person commits an offence where the person

(a) has in possession,

(b) transports, or

(c) traffics in

live fish unless authorized by a permit or a licence.

Ministry of Water, Land and Resource Stewardship

PERMIT

78470-25

WILDLIFE ACT

PERMIT SU25-942717

PERMIT HOLDER	**MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY** PO BOX 9339 STN PROV GOVT VICTORIA BC V8W 9M1 ATTENTION: AMY VALLARINO PHONE: (778) 943 -6904

IS AUTHORIZED UNDER s. 2(c)(i), 2(j), 2(k)(i), 2(m), and 2(o) of the Permit Regulation, B.C. Reg. 253/2000,

TO	**Live capture, temporarily possess, transport and release to a nearby suitable habitat , and dispose of dead invasive species.** American Bullfrog (*Lithobates catesbeianus*) Green Frog (*Lithobates clamitans*) Northern Pacific Tree Frog (*Pseudacris regilla*) Northern Red-legged Frog (*Rana aurora*) Northwestern Salamander (*Ambystoma gracile*) Coastal Tailed Frog (*Ascaphus truei*) Western Painted Turtle (*Chrysemys picta bellii*) Northern Alligator Lizard (*Elgaria coerulea*) Common Gartersnake (*Thamnophis sirtalis*) Northwestern Gartersnake (*Thamnophis ordinoides*) Terrestrial Gartersnake (*Thamnophis elegans*) House Mouse (*Mus musculus*) Brown Rat (*Rattus norvegicus*) Roof Rat (*Rattus rattus*) Common Muskrat (*Ondatra zibethicus*) Coast Mole (*Scapanus orarius*) Townsend's Mole (*Scapanus townsendii)* Cinereus Shrew (*Sorex cinereus*) Dusky Shrew (*Sorex obscurus*) Trowbridge's Shrew (*Sorex trowbridgii*) Vagrant Shrew (*Sorex vagrans*) Western Jumping Mouse (*Zapus princeps*) Pacific Jumping Mouse (*Zapus trinotatus)* **In specific areas:** Deroche Creek - 10U 567420 m E 5448467 m N Nicomen Slough - 10U 567694 m E 5448163 m N

SUBJECT TO THE FOLLOWING:

TERMS OF PERMIT	The permit holder must follow the attached British Columbia **Interim Hygiene Protocols for Amphibian field staff and researchers**. The permit holder must comply with the terms in Appendix A.

COMPLIANCE ADVISORY	Failure to comply with any term of this permit is an offence under the *Wildlife Act*, and may result in any or all of prosecution, suspension of the permit, cancellation of the permit, ineligibility for future permits, and denial of future permit requests.
PERIOD OF PERMIT	This permit is only valid from June 1, 2025 to May 31, 2026.
DATE OF ISSUE	April 28, 2025

 **SIGNATURE OF ISSUER**	**Elizabeth Shebib, Wildlife Biologist** A person authorized by the Regional Manager Recreational Fisheries & Wildlife Programs South Coast Region	**PERMIT FEE** Exempt **HCTF SURCHARGE** Exempt

BRITISH COLUMBIA

APPENDIX A
TERMS OF PERMIT

PERMIT SU25-942717

REPORTING REQUIREMENTS:

1. The permit holder must maintain an accurate up to date record of the wildlife hunted, trapped or killed under the permit that includes the following information:

    a) common name of the wildlife;
    b) location* where the wildlife was taken,
    c) the date the wildlife was hunted, trapped or killed;
    d) the sex and age class of the wildlife taken;
    e) the bands or tags on the wildlife; and
    f) a description of all nests, dams or other structures destroyed or removed.

    *includes a UTM grid location in NAD83 to + or – 100m accuracy (zone 2 digits, easting 6 digits, northing 7 digits)

    NOTE: A blank reporting form (Appendix D) is attached to the end of this permit for your convenience

2. The permit holder must submit the original copy of this record to FrontCounter BC, Ministry of Water, Land and Resource Stewardship **within 21 days** of the permit's expiry.

3. The permit holder must produce a copy of the record referred to in paragraph 1 on the demand of an officer.

4. If a species at risk (red or blue) is captured – the above information needs to be submitted within **7 days** of the capture and notification must be submitted without delay to Ministry of Water, Land and Resource Stewardship (FrontCounterBC.Surrey@gov.bc.ca). Please include a description of the wildlife, the above information and a photo documenting identifying characteristics.

ADDITIONAL REPORTING REQUIREMENTS:

1. The permit holder must within 90 days of the expiry of this permit submit data and a written report of activities related to this permit. The data and written report must be submitted on-line to https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/wildlife/wildlife-data-information/submit-wildlife-data-information.

    This website contains the data templates, report specifications and describes which data is mandatory to submit. Interim reports may also be required and must be submitted as required by Regional Biologists.

GENERAL CONDITIONS:

1. The permit holder must comply with all laws applicable to the activities carried out under this permit.

2. This permit extends to the permit holder's employees or contractors only when they are engaged in the direct performance of their duties on behalf of the permit holder.

3. All work is to be undertaken by trained professionals with experience in capturing and handling Amphibians, Reptiles, Pacific Water Shrew and Small Mammals.

4. Regardless of period of permit dates, salvage of amphibians shall not occur once the amphibians enter their overwintering phase between: October 31 – March 1.

5. Regardless of period of permit dates, salvage of reptiles (including turtles) shall not occur once the reptiles enter their overwintering phase between: October 31 – March 15.

6. The permit holder must take all reasonably necessary steps to ensure that public safety is not jeopardized, and fish or wildlife habitat is not damaged by any action taken under authority of this permit.

7. Capture and handling of specimens to be in accordance with the Standards for Live Animal Capture and Handling Guidelines established by the Ministry of Environment.

   https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/inventory-standards/terrestrial-ecosystems-biodiversity

   Further guidelines can be obtained on the Canadian Council on Animal Care website at https://www.ccac.ca/en/standards/guidelines/types-of-animals.html

8. The permit holder must ensure that the wildlife are treated in a humane manner and are not subjected to any unnecessary harm or suffering.

9. No intentional mortality of red or blue listed species is to occur. All reasonable steps must be taken to ensure accidental mortality does not occur.

10. Lizards must not be relocated further than 60m distance from capture sites, unless there are no suitable areas within 60m. Lizards must be moved to a location containing natural habitat features that may provide refuge (i.e. talus, rock outcrop, etc.) and away from any roads and trails.

11. Snakes must not be relocated further than 500m from any capture site, unless there are no suitable areas within 500m that support the microhabitat characteristics preferred by each species. All release sites must contain similar microhabitat characteristics as the capture location, such as refuge features (i.e. rocks/talus, shrubs, coarse woody debris, small mammal burrows, etc.) and thermal characteristics (i.e. aspect) and should be located a minimum of 100m from any road or trail.

12. In the case of needing to salvage and translocate reptiles from a den site, the permit holder must contact FrontCounter BC, Ministry of Water, Land and Resource Stewardship upon discovery of the den site. Post-salvage monitoring plans must be developed in conjunction with Regional Biologists and species experts. The permit holder must ensure implementation of the monitoring plan.

13. Works carried out in and around Western Painted Turtle habitat must only be carried out when ambient air temperature is at or above 8 degrees Celsius. At temperatures lower than 8 degrees Celsius, turtles are slow-moving and often seek refuge in emergent vegetation and/or waterbody substrate. This behaviour limits their ability to evade harm and reduces visual detectability by monitors resulting in increased risk or turtle mortality.

14. Contact: Briar.hunter@gov.bc.ca and SCFishandAquaticWildlife@gov.bc.ca upon capture of any turtle species (including eggs) so that it can be identified and marked, if necessary. Do not release or euthanize any turtles until they have been identified by a member of the Western Painted Turtle Recovery Team.

15. All other small mammals and other organisms incidentally captured must be released unharmed; except wildlife species listed under *Wildlife Act Designation and Exemption Regulation (BC Reg 168/90),* Schedule "C" which must be humanely euthanized.

16. If working in potential Pacific Water Shrew habitat, works must be consistent with the most current Draft Best Management Practices for Pacific Water Shrew in Urban and Rural Areas,

September 2010, by Craig, Vennesland and Kym Welstead. It is the responsibility of the contractor/permit holder to obtain the most current version.

17. In addition to reporting condition requirements in this permit (i.e. reporting all captured wildlife within 21 days of permit expiry date), the permit holder must provide upon conclusion of this year's project, a copy of the final project report to Front Counter BC, Ministry of Water, Land and Resource Stewardship. The final project report must include an inventory of all wildlife species listed under *Wildlife Act Designation and Exemption Regulation (BC Reg 168/90),* Schedule "C" that were captured and euthanized.

18. All activities completed under this permit will follow methods described in the most recent Application and Animal Care Application (ACA) and associated documents. Salvage and handling of amphibians shall follow the methodology outlined in Best Management Practices for Amphibian and Reptile Salvages in British Columbia, 2016, by British Columbia Ministry of Forests Lands and Natural Resource Operations**, noting different salvage methodology in lotic and lentic habitat.** Inventory/survey methods shall be consistent with methodology outlined in Inventory Methods for Tailed Frog and Pacific Giant Salamander, 2000, by the Resource Inventory Committee.

BRITISH COLUMBIA

APPENDIX B
ADVISORY

PERMIT SU25-942717

GENERAL

- It is the permit holder's responsibility to be aware of all applicable laws and the limits of this permit. For example, this permit does not give the permit holder authority to access or travel though any private land without permission from the landowner.
- The Province is not liable for any illness contracted through wildlife handling. It is the responsibility of the permit holder to inform themselves of possible health hazards, and to ensure that all reasonably necessary safety measures are undertaken.
- If applicable, the permit holder is responsible for renewing this permit. The issuer is not obliged to send a reminder notice.

LEGISLATION

Below is a non-exhaustive list of provisions under the *Wildlife Act* and regulations that are relevant to this permit. It is the permit holder's responsibility to be aware of any provisions under the *Wildlife Act* or regulations that may apply to this permit.

Wildlife Act

Property in Wildlife

2 (1) Ownership in all wildlife in British Columbia is vested in the government.

(4) If a person by accident or for the protection of life or property kills wildlife, that wildlife, despite subsection (3), remains the property of the government.

(5) Despite anything in this Act, no right of action lies, and no right of compensation exists, against the government for death, personal injury or property damage caused by

(a) wildlife, or

(b) an animal that escapes or is released from captivity or is abandoned

in British Columbia

Trafficking in wildlife

22 A person who traffics live wildlife or wildlife meat, except as authorized by regulation or a permit, commits an offence.

Documents not transferable

81 Except as authorized by regulation or as otherwise provided under this Act, a licence, permit or limited entry hunting authorization is not transferable, and a person commits an offence if the person

(a) allows his or her licence, permit or limited entry hunting authorization to be used by another person, or

(b) uses another person's licence, permit or limited entry hunting authorization.

Failure to pay fine

85 (1) This section applies if a person

(a) fails to pay, within the time required by law, a fine imposed as a result of the person's conviction for an offence under this Act or the *Firearm Act*, and

(b) has been served with notice of this section.

(2) In the circumstances referred to in subsection (1),

(a) the person's right to apply for or obtain a licence, permit or limited entry hunting authorization under this Act is suspended immediately and automatically on the failure to pay the fine,

(b) all licences, permits and limited entry hunting authorizations issued to that person under this Act are cancelled immediately and automatically on the failure to pay the fine,

(b.1) the person must not apply for employment as an assistant guide,

(b.2) the person must not guide as an assistant guide, and

(c) the person commits an offence if, before that fine is paid, the person

(i) applies for, or in any way obtains, a licence, permit or limited entry hunting authorization under this Act,

(ii) does anything for which a licence, permit or limited entry hunting authorization under this Act is required,

(iii) applies for employment as an assistant guide, or

(iv) guides as an assistant guide.

Proof of identity and authorization

97 (1) In this section, **"authorization"** means a licence, permit or limited entry hunting authorization issued under this Act.

(2) Subject to subsection (5), a person who is required to hold an authorization must, on the request of an officer,

(a) state the person's name and address,

(b) produce prescribed photo identification, and

(c) demonstrate in accordance with subsection (3) that the person holds the authorization.

(3) A person may demonstrate that the person holds an authorization by

(a) producing the authorization, or

(b) unless the regulations require that the original authorization be produced,

(i) producing a legible copy of the authorization, or

(ii) if authorized by the regulations, stating a number assigned to the person by the director as an identification number for the person.

(4) Subject to subsection (5), a person who would be required to hold a licence or permit issued under this Act were the person not exempt under section 11 (9) or 12 (b) must, on the request of an officer,

(a) state the person's name and address, and

(b) produce prescribed photo identification.

(5) Subsections (2) (b) and (4) (b) do not apply to a person in a prescribed class of persons.

(6) A person who contravenes subsection (2) or (4) commits an offence.

Permit Regulation

General offence – failure to comply with permit

8 A person who holds a permit under the Act or this regulation commits an offence if the person fails to comply with a term of the permit.

Wildlife Act General Regulation

Proof of identity

21.01 (1) For the purposes of section 97 (2)(b) and (4)(b) of the Act, the following photo identification is prescribed:

(a) valid photo identification issued to a person by any of the following:

(i) the government of Canada;

(ii) the government of a province or territory, or an agent of the government of a province or territory, in which the person has a current address;

(iii) the Nisga'a Nation, if the person is a Nisga'a citizen;

(iv) a treaty first nation, if the person is a treaty first nation member of the treaty first nation;

(b) in the case of a person who is a non-resident alien,

(i) valid photo identification in the form of

(A) a passport, or

(B) a driver's licence issued to the person by a foreign jurisdiction in which the person has a current address, or

(ii) a copy of a photo identification referred to in subparagraph (i) that has been certified as a true copy by

(A) a lawyer, or

(B) a notary who is a member in good standing under the *Notaries Act;*

(c) in any case, a valid NEXUS card.

(2) For the purposes of section 97 (5) of the Act, persons under 16 years of age are prescribed as exempt from the requirement to produce photo identification.

BRITISH COLUMBIA

APPENDIX C
PERMIT SU25-942717

STANDARD OPERATING PROCEDURES:
HYGIENE PROTOCOLS FOR AMPHIBIAN FIELDWORK - 2008

ECOSYSTEMS BRANCH, MINISTRY OF ENVIRONMENT, BRITISH COLUMBIA

Interim Hygiene Protocols for Amphibian field staff and researchers

PURPOSE

To describe hygiene protocols to be used by amphibian field staff and researchers to reduce risk of disease transmission among sites and among animals within a site.

DESCRIPTION

Over the past few decades emerging infectious diseases such as the amphibian chytrid fungus (*Batrachochytrium dendrobatidis*) and ranavirus have been implicated in the decline of amphibian populations from many sites around the world. It is thought that field staff could act as potential vectors of transmission introducing these diseases into new sites and to naïve species. The risk of this mode of transmission is not fully understood compared to other modes of transmission, for example by vectors such as waterfowl and other wildlife. However, to reduce the risk, it is essential that all field workers incorporate the hygiene protocol into their research plans as Standard Operating Procedure (SOP).

To encourage compliance, the SOP below aims to strike a balance between reducing risk of disease transmission and increasing ease of protocol implementation under field conditions.

The protocols below address two levels of disease transmission: 1) the risk of disease transmission between sites; and 2) the risk of disease transmission among individuals within a site.

RESPONSIBILITY

This protocol applies to all field staff working in aquatic habitats sampling amphibians in freshwater lentic and lotic wetlands.

MATERIALS

- Plastic tote or box to store field equipment.
- Buckets and totes for mixing bleach solution and soaking equipment
- Spray bottle for bleach solution
- Scraper, brushes, hand-brushes
- Rubber dishwashing gloves, rubber apron
- Clean plastic containers and bags for temporarily holding animals
- Household bleach (contains active ingredient 5-6.5% sodium hypochlorite solution)
- Vinyl or nitrile gloves for handling amphibians
- Sterilizing solutions (ethanol) and alcohol burner/lighter for disinfecting instruments if toe-clipping or marking animals.
- Container for waste disposal

STANDARD OPERATING PROCEDURES (SOP)

I. SOP when moving between sites

Definition of site

At geographic scales of tens of kilometres, watersheds and major geographical barriers should be used to designate separate sites.

Each tributary of a river should be considered a separate site. Wetlands, ponds and lakes separated by dry land should be considered separate sites.

Site designation is particularly difficult at smaller geographic scales and with small isolated water bodies. At scales less than 500 m, if the water bodies remain separate under high water/flood conditions then they should be considered separate sites. Within a stream (at distances less than 500 m) sampling should occur in a downstream direction where possible. Each stream and each upstream location should be considered separate sites.

Equipment treatment

Equipment such as wetsuits, waders, footwear, nets, buckets, and traps may act as vectors of disease spread. In this SOP we recommend household bleach for disinfection because it is widely available, and it is easy to dispose under field conditions if the precautions below are followed. However, there are a number of other disinfectants that have been tested (Table 1) that offer a variety of other advantages. The SOP can be used with these chemical disinfectants instead of bleach, but manufacturer's recommendations and Material Safety Data Sheet requirements for use and disposal must be followed. It is important to ensure that disinfectants do not leave a residue on equipment, as the residue can be harmful to amphibians.

1. Before leaving a site, field workers must scrub using a hand brush and rinse using the pond/stream water to remove mud, algae, plants, snails and other invertebrates from all equipment. Disinfection procedures work best on cleaned equipment, free of debris.
2. A bleach solution with 0.2 % sodium hypochlorite and exposure time of 10 minutes has been shown to be effective against *Bd* (Johnson et al 2003). Commercial household bleach sold in North America often contains 6.15% sodium hypochlorite, but concentrations can vary. To prepare the disinfectant solution, add 32 ml of household bleach to 1 litre of water. This translates to approximately 3.5 cups (0.85 litre) of bleach to one tall bucket or tote (~ 25 litres) of water. In the absence of municipal/well water supply, water from the pond or stream can be used.
3. All equipment must be soaked in the bleach solution for a minimum of 15 minutes. Small items such as dipnets, and sample containers can be immersed in the bleach solution in a bucket or plastic tote. Larger items such as chest waders, paddles, boats, canoes, meter sticks and other survey equipment should be thoroughly soaked with the bleach solution using a spray bottle.
4. The bleach solution can be rinsed off after 15 minutes with clean water from a well or municipal supply. However, if clean treated water is not available, the items can be hung out to dry, preferably in sunlight, so that the bleach evaporates completely from the equipment.
5. The bleach solution can damage exposed skin and clothing. Dishwashing gloves and rubber aprons should be worn to protect clothing and skin from exposure to the bleach solution.
6. The SOP is most easily carried out back at the laboratory or field station. All equipment should be stored in a waterproof box or tote during transportation to prevent contaminating the vehicle and preventing the vehicles from acting as secondary sources of cross contamination.
7. If the equipment needs to be used immediately at another site prior to returning to the laboratory or field station, the SOP should be carried out on a road or other impermeable surface away from the waterbody, so that no bleach contaminated water enters surface water bodies. If time permits, all equipment should be dried completely between sites. This is facilitated by having two sets of gear, one of which is drying while the other is in use. If the equipment needs to be used immediately at another site, residual bleach from nets and other equipment should be rinsed off using water from the second site, again working away from the waterbody. Even trace amounts of residual bleach can adversely affect amphibians on contact.
8. In the field, the bleach solution is best disposed far from the waterbody by pouring over an asphalt, hard roadbed or concrete surface where it breaks down in sunlight and evaporates. Ensure no bleach water enters surface waters directly.
9. Washing road vehicles at a carwash between watersheds is desirable. All off-road vehicles, boats, canoes, and other floatation devices should be subject to the same SOP as sampling equipment. Large equipment, such as boats and seine nets, are most easily handled by spraying with or soaking in the bleach solution and then rinsing off at a carwash using high pressure hot water rinses.

Special Sites

The above SOP should be sufficient to reduce the risk of disease transmission under most circumstances. However, at sites where there have been known disease outbreaks or sites with highly endangered amphibian populations extra precautions are necessary. The simplest solution would be to have dedicated field gear that is used only at that site.

II. SOP under Special Circumstances

The above SOP should be implemented under all normal operating conditions. However, if for unforeseen and unplanned reasons it is not possible to adhere strictly to the above SOP the following precautions can be taken to reduce the risk of disease transmission.

1. At a minimum, all equipment should be scrubbed and rinsed thoroughly to remove debris, algae, invertebrates and mud.
2. Complete drying between sites can reduce the risk of transmission of chytrid fungus (*Bd*) but is not effective against ranavirus.
3. If it is possible to heat water, equipment should be soaked in water > 60°C for 30 minutes. This method may be practical for small equipment such as dipnets that come in direct contact with the animals.

III. SOP for handling amphibians within a site

It is important to assume that not all animals from a site are infected and that handling multiple animals without adequate caution will significantly increase the risk of between animal disease transmissions. The following SOP should be followed to ensure that handling by field staff does not increase the risk of an animal being exposed to a pathogen.

1. All field staff must ensure that their hands are well cleaned and free of residual chemicals such as sunscreen and insecticides at the start of the survey.
2. All field staff must wear disposable gloves when capturing amphibians. Non- powdered vinyl and nitrile gloves are preferred, as latex has been shown to have toxicity towards frog embryos and tadpoles.
3. Gloves should be changed between animal captures. If under unforeseeable circumstances access to gloves is limited, it is better to capture animals with bare hands and wash hands thoroughly in water to which the animals are habitually exposed, rather than to use the same pair of gloves to handle multiple animals.
4. Captured animals must be housed in separate disinfected containers or disposable bags such as plastic Ziploc bags.
5. The duration of restraint should be as short as possible. The greatest stress and risk of disease transmission between animals is during restraint. Every effort should be made to process animals at the site of capture and avoid captivity.

Containers used to house individuals should not be reused unless the containers have been treated using 4% bleach solution as described in SOP #1 above.

6. Fresh disposable gloves must be worn when measuring, swabbing or marking the animal. Surgical instruments such as scissors used for toe clipping should be dipped in 70% ethanol and flamed briefly between uses. A *bic* lighter is useful and effective for flaming surgical instruments in the field. Wiping down with ethanol alone kills the pathogens but does not completely destroy the pathogen DNA. This may increase the number of false positives if the animals are being sampled for disease prevalence

7. Instruments used for inserting PIT tags and other tags should also be sterilized between animals. Fresh disposable syringes should be used for each animal.
8. The tuberculin syringes used for fluorescent elastomer paint injections present a special problem. The needles can neither be changed between animals nor is it practical to use a fresh syringe for each marked animal. At this time the recommendation is that the needles should be sterilized with appropriate viricide/bactericide (or dipped in 70% ethanol) and rinsed with distilled water between making animals. The efficacy of this method in preventing between animal disease transmission needs to be assessed.

FURTHER INFORMATION

When in doubt, field staff should use the precautionary principle and use the highest standards of cleanliness possible. An additional half hour spent following the most stringent SOP is well worth the effort. A number of other protocols, using a variety of disinfection agents are listed below.

RELEVANT LITERATURE

Daszak P, Cunningham AA, Hyatt AD. 2001. Draft guidelines for international translocation of amphibians with respect to infectious diseases. Attachment 6. *In*: Speare R and Steering Committee of Getting the Jump on Amphibian Disease.

Developing management strategies to control amphibian diseases: Decreasing the risks due to communicable diseases. School of Public Health and Tropical Medicine, James Cook University: Townsville. 2001: 150-156.

Department of Environment and Heritiage. 2006. Threat abatement plan for infection of amphibians with chytrid fungus resulting in chytridiomycosis. Department of Environment and Heritage, Commonwealth of Australia. http://www.deh.gov.au/biodiversity/threatened/publications/tap/chytrid/

Gutleb, A. C., M. Bronkhorst, J. H. J. van den berg, and A. J. Murk. 2001. Latex laboratory gloves: an unexpected pitfall in amphibian toxicity assays with tadpoles. Environmental Toxicology and Chemistry **10**:119-121.

Johnson M, Berger L, Philips L, Speare R**.** 2003. Fungicidal effects of chemical disinfectants, UV light, dessication and heat on the amphibian chytrid, *Batrachochytrium dendrobatidis.* Diseases of Aquatic Organisms 57:255-260.

Speare, R., L. Berger, L. F. Skerratt, R. A. Alford, D. Mendez, S. Cashins, N. Kenyon, K. Hauselberger, and J. J. L. Rowley. 2004. Hygiene protocol for handling amphibians in field studies. Amphibian Disease Group, James Cook University, Townsville 4811, Australia. http://www.jcu.edu.au/school/phtm/PHTM/frogs/field-hygiene.pdf

US Forest Service Intermountain Region. Technical Chemical Information for Disinfecting Aquatic Invasive Species (excellent resource for calculating disinfectant dilutions) http://www.fs.fed.us/r4/resources/aquatic/guidelines/chemical_tech_final.xls

Webb, R., D. Mendez, L. Berger, and R. Speare. 2007. Additional disinfectants effective against the amphibian chytrid fungus Batrachochytrium dendrobatidis. Diseases of Aquatic Organisms 74:13-16.

Wellington, R. and R. Haering. 2001. Hygiene protocol for the control of diseases in frogs. New South Wales National Parks and Wildlife Service Threatened Species Management Information Circular No 6, Hurstville, Australia. www.npws.gov.au/wildlife/licence/frog.html

Table 1

Summary of disinfectant concentrations and exposure times found to be effective against *Bd*. Table reproduced with modification from Speare et al (2004) with additional information from Johnson et al (2003) and Webb et al (2007).

DISINFECTANT	CONCENTRATION	TIME	REFERENCE
Disinfecting surgical equipment and scales			
Ethanol	70%	1 min	Speare et al 2004 Webb et al 2007
Virkon	1mg/ml	1 min	Speare et al 2004
Benzalkonium chloride	1 mg/ml	1 min	Speare et al 2004
Disinfecting collection equipment, containers, footwear, waders, boats, nets and other field gear			
Household bleach (sodium hypochlorite 4% to 6%)	4% to 1% (0.2 to 0.01% Sodium hypochlorite)	10 min to 30 sec	Speare et al 2004 Johnson et al 2003 Webb et al 2007
Didecyl dimethyl ammonium chloride	1 to 1000 dilution	30 sec	Speare et al 2004
Quaternary ammonium compound 128	Full strength to $1x10^{-3}$	5 mins to 30 sec	Johnson et al 2003
Virkon	1 mg/ml 2 g/litre	5 min, 20 sec 1 min	Johnson et al 2003 Webb et al 2007
F10 Super Concentrate Disinfectant	0.7 ml/litre	1 min	Webb et al 2007
TriGene Viricidal Surface Disinfectant Cleaner	0.2 ml/litre	1 min	Webb et al 2007
DDAC	2 ml/litre	1 min	Webb et al 2007
Sodium chloride	10%	5 min, 2 min	Johnson et al 2003
Potassium permanganate	2%	10 min, 5 min	Johnson et al 2003
Hot wash for cloth bags and clothing	60 $^{\circ}$C or greater	15 mins	Speare et al 2004
Heat	60 $^{\circ}$C	30 minutes	Speare et al 2004 Webb et al 2007
Complete drying (footwear only)	Effective against *Bd* but not ranavirus	3 hrs or greater	Speare et al 2004
Sterilising UV light (1000 mW m^{-2} wavelength 254 nm)	Effective against ranavirus but not *Bd*	1 min	Speare et al 2004 Johnson et al 2003

APPENDIX D
RECORD OF WILDLIFE HUNTED, TRAPPED OR KILLED
PERMIT SU25-942717

- The permit holder **MUST** maintain an accurate up-to-date record.
- The permit holder **MUST** submit the original copy of this record to FrontCounter BC, Ministry of Water, Land and Resource Stewardship **within 21 days** of the permit's expiry or annually as indicated in "Appendix A – Terms of Permit – Reporting Requirements" of this permit.
- The permit holder must produce a copy of this record on the demand of an officer

*If more room is required, please use a sheet of blank paper

Common name of wildlife	Location where wildlife was taken	Date wildlife was hunted, trapped or killed	Sex and age class of wildlife	Bands or tags on wildlife	Description of all nests, dams or other structures destroyed or removed

_____ _____

Signature of Permit Holder Date

FrontCounter BC
Ministry of Water, Land and Resource Stewardship
Locations: https://portal.nrs.gov.bc.ca/web/client/locations

Innovation. Integrity.
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Enclosure B

As-Built Drawings

DEROCHE CREEK RECOVERY SOLUTION
PROJECT No. 2900712

AS-CONSTRUCTED CHECK PRINT, DECEMBER 30, 2025

DRAWING INDEX		
SHEET No.	SHEET DESCRIPTION	REVISION
001	TITLE SHEET AND PROJECT LOCATION	A
003	REACH 1 WORKS - PLAN AND PROFILE VIEWS	A
004	REACH 2 WORKS - PLAN AND PROFILE VIEWS	A
005	REACH 1 - TYPICAL SECTIONS AND PROFILES	A
006	REACH 2 - TYPICAL SECTIONS AND PROFILES	A
007A/B	SEDIMENT BASIN - STANDARD SECTIONS	A
009	OFF-SETTING WORKS	A
010	OFF-SETTING WORKS - TYPICAL SECTIONS AND PROFILES	A



LOCATION MAP
NOT TO SCALE



SITE MAP
NOT TO SCALE

CLIENT: Ministry of Environment and Climate Change Strategy, British Columbia

REV.	DATE	DESCRIPTION
A	30 DEC 2025	AS-CONSTRUCTED CHECK PRINT

nhc northwest hydraulic consultants

SEAL:

DEROCHE CREEK RECOVERY SOLUTION

TITLE SHEET AND PROJECT LOCATION

DESIGNED: DJG	SHEET ID: 2900712-DER RS-001	SHEET No:	
DRAFTED: CZZ	STATUS: AS-CONSTRUCTED CHECK PRINT	001	
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 30 DEC 2025	REV No: A	

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

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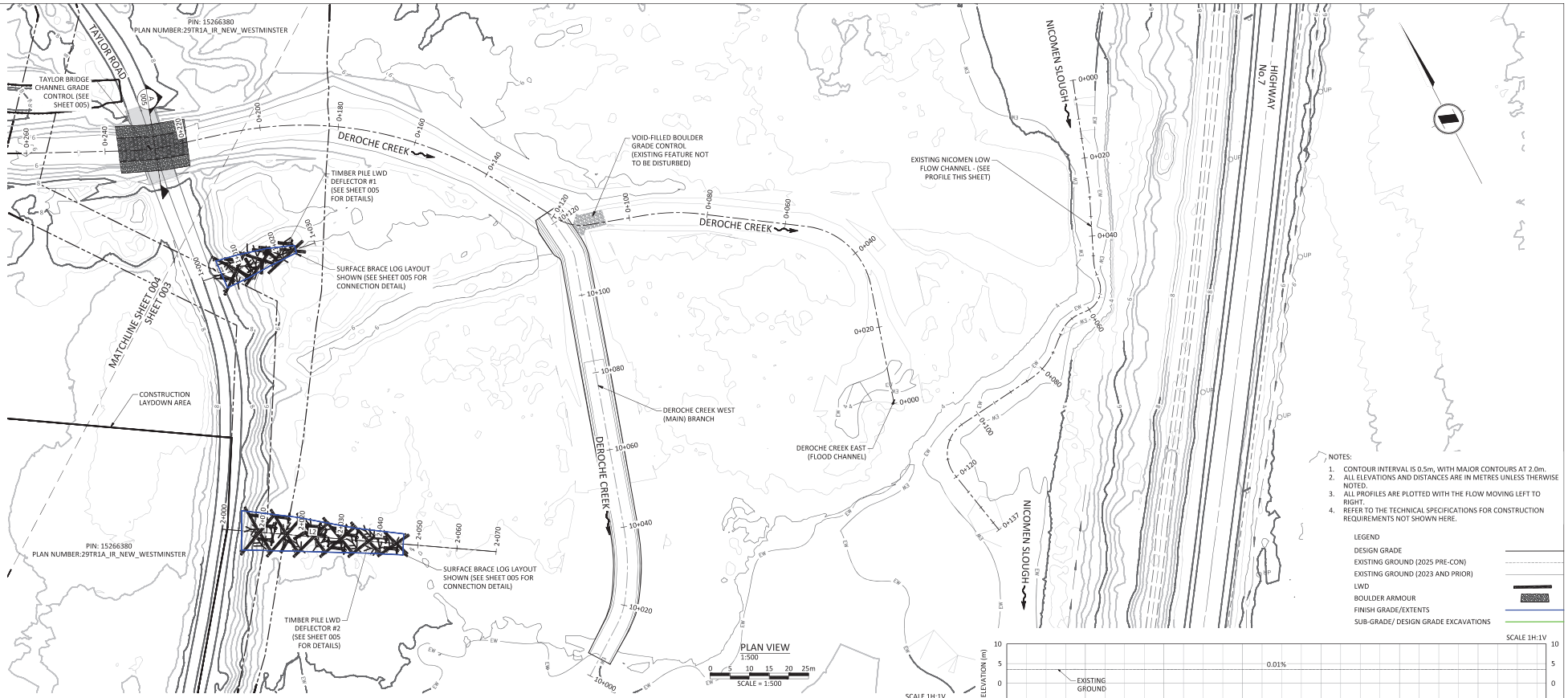
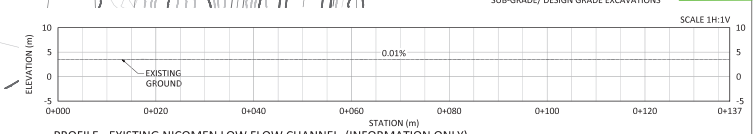


NOTES:

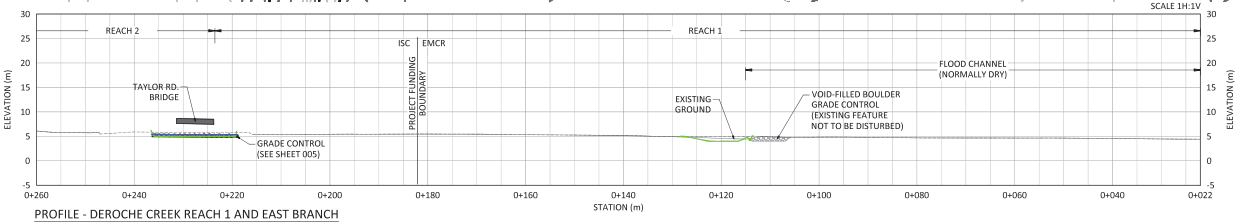
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS THERWISE NOTED.
3. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.
4. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.

LEGEND

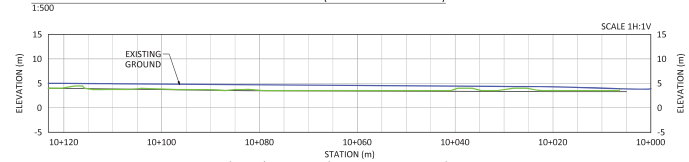
- DESIGN GRADE
- EXISTING GROUND (2025 PRE-CON)
- EXISTING GROUND (2023 AND PRIOR)
- LWD
- BOULDER ARMOUR
- FINISH GRADE/EXTENTS
- SUB-GRADE/ DESIGN GRADE EXCAVATIONS



PROFILE - EXISTING NICOMEN LOW FLOW CHANNEL (INFORMATION ONLY)
1:500



PROFILE - DEROCHE CREEK REACH 1 AND EAST BRANCH
1:500



PROFILE - DEROCHE CREEK WEST (MAIN) CHANNEL (INFORMATION ONLY)
1:500

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
A	30 DEC 2025	AS-CONSTRUCTED CHECK PRINT

nhc northwest hydraulic consultants

SEAL:

DEROCHE CREEK RECOVERY SOLUTION
REACH 1 WORKS
PLAN AND PROFILE

DESIGNED:	DJG	SHEET ID:	2900712-DER RS-002	SHEET No:
DRAFTED:	CZZ	STATUS:	AS-CONSTRUCTED CHECK PRINT	003
CHECKED:	DJG	SCALE:	AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE:	30 DEC 2025	REV No: A

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\mainfile-van\projects\Active\3007814 deroche creek emerg works\96 CAD\02_production\2025 CIP\3007814 Deroche RS CIP-002_004.dwg, 31 Dec 2025, 10:29 AM



AS-BUILT MINUS DESIGN ELEVATION TABLE

NUMBER	MINIMUM ELEVATION	MAXIMUM ELEVATION	COLOUR
1	-1.511	-0.200	
2	-0.200	-0.150	
3	-0.150	-0.100	
4	-0.100	-0.050	
5	-0.050	0.000	
6	0.000	0.050	
7	0.050	0.100	
8	0.100	0.150	
9	0.150	0.200	
10	0.200	1.903	

PLAN VIEW
1:500

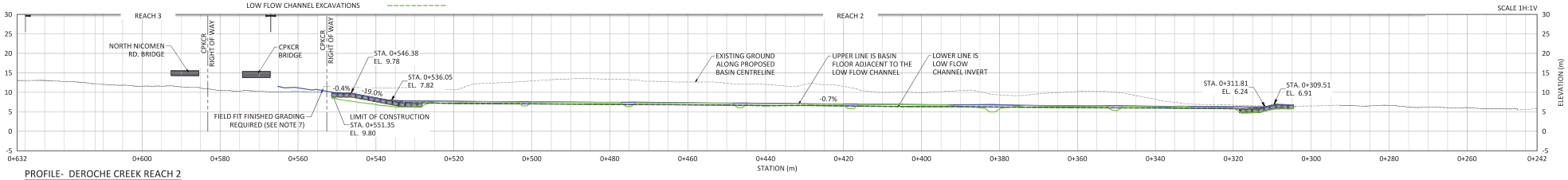
SCALE = 1:500

NOTES:

1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
3. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.
4. FOR ROCK GRADATIONS REFER TO THE TABLE ON SHEET 006.
5. IN ALL MANNERS EXCEPT FOR GRADATION, ALL ROCK SHALL CONFORM TO MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE STANDARD SPECIFICATION 205.
6. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.
7. AT THE LIMITS OF CONSTRUCTION, EXISTING BED MATERIAL SHALL BE USED TO RE-BURY THE DESIGN SURFACE AND FIELD FIT A SMOOTH TIE-IN WITH THE UPSTREAM CHANNEL.

LEGEND

- DESIGN GRADE
- EXISTING GROUND (2025 PRE-CON)
- EXISTING GROUND (2023 AND PRIOR)
- DEFLECTOR LWD
- BOULDER ARMOUR
- STANDARD RIPRAP
- SUBSTRATE-FILLED RIPRAP
- WRC ROOTWADS
- FINISHED GRADE/ EXTENTS
- SUB-GRADE/ DESIGN GRADE EXCAVATIONS
- LOW FLOW CHANNEL EXCAVATIONS



PROFILE- DEROCHE CREEK REACH 2
1:500

CLIENT:

Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
A	30 DEC 2025	AS-CONSTRUCTED CHECK PRINT

nhc northwest hydraulic consultants

SEAL:

DEROCHE CREEK RECOVERY SOLUTION
REACH 2 WORKS

PLAN AND PROFILE VIEWS

DESIGNED: DJG	SHEET ID: 2900712-DER RS-003	SHEET No:	004
DRAFTED: CZZ	STATUS: ISSUED FOR CONSTRUCTION		
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 30 DEC 2025	REV No:	A

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

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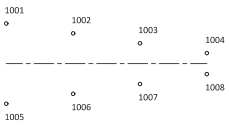
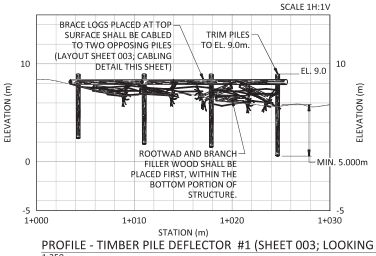


PILING PLAN - DEFLECTOR #1
1:250

PILE LAYOUT TABLE - DEFLECTOR #1		
PILE #	EASTING (m)	NORTHING (m)
1001	567505.93	5448262.56
1002	567512.54	5448260.55
1003	567519.16	5448258.55
1004	567525.77	5448256.55
1005	567504.73	5448254.45
1006	567511.63	5448254.44
1007	567518.54	5448254.43
1008	567525.45	5448254.42

TIMBER PILE DEFLECTOR #1 ALIGNMENT LAYOUT						
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L1	1+000.000	567501.20	5448259.12	098° 28' 01.01"	30.000	

WORKPOINT TABLE - TAYLOR BRIDGE ARMOURING			
WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP101	567495.22	5448292.99	5.92
WP102	567504.69	5448288.95	5.86
WP103	567496.24	5448295.82	4.92
WP104	567505.12	5448291.93	4.87
WP105	567498.26	5448301.47	4.92
WP106	567505.97	5448297.91	4.87
WP107	567499.27	5448304.29	5.92
WP108	567506.40	5448301.04	5.88
WP109	567515.67	5448298.00	5.82
WP110	567514.67	5448295.19	4.82
WP111	567512.64	5448289.54	4.82
WP112	567511.63	5448286.72	5.81



PROFILE - TIMBER PILE DEFLECTOR #1 (SHEET 003; LOOKING NORTH)
1:250

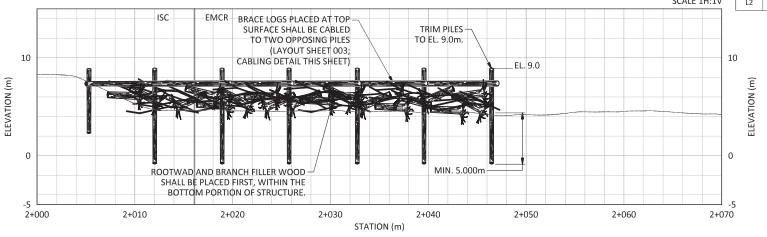


PILING PLAN - DEFLECTOR #2
1:250

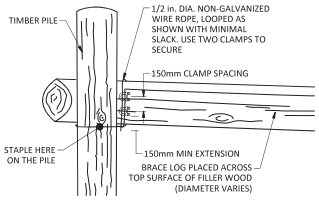
PILE LAYOUT TABLE - DEFLECTOR #2		
PILE #	EASTING (m)	NORTHING (m)
2001	567483.71	5448202.35
2002	567489.33	5448198.33
2003	567494.95	5448194.32
2004	567500.57	5448190.30
2005	567506.19	5448186.28
2006	567511.81	5448182.26
2007	567517.43	5448178.24

PILE LAYOUT TABLE - DEFLECTOR #2		
PILE #	EASTING (m)	NORTHING (m)
2008	567478.26	5448193.60
2009	567484.35	5448190.33
2010	567490.43	5448187.06
2011	567496.52	5448183.79
2012	567502.61	5448180.52
2013	567508.69	5448177.25
2014	567514.78	5448173.98

TIMBER PILE DEFLECTOR #2 ALIGNMENT LAYOUT						
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L2	2+000.000	567476.59	5448200.71	121° 53' 59.96"	70.000	



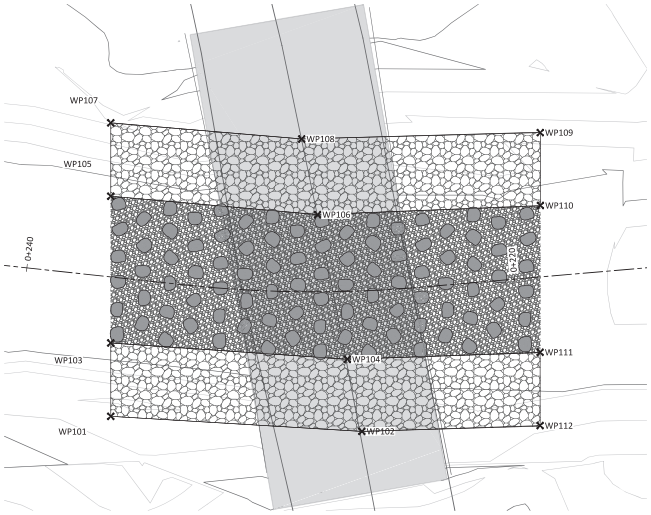
PROFILE - TIMBER PILE DEFLECTOR #2 (SHEET 003; LOOKING NORTH)
1:250



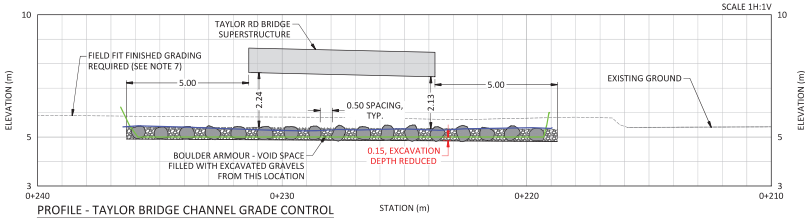
BRACE LOG CABLING DETAIL
1:25

LEGEND
- DESIGN GRADE
- EXISTING GROUND (2025 PRE-CON)
- EXISTING GROUND (2023 AND PRIOR)
- LARGE WOODY DEBRIS
- TIMBER PILE
- VOID-FILLED BOULDER ARMOURING
- FINISHED GRADE/ EXTENTS
- SUB-GRADE/ DESIGN GRADE EXCAVATIONS

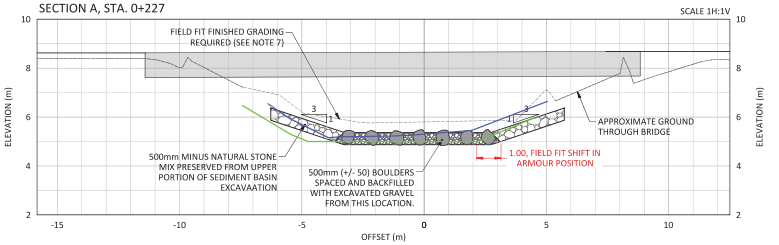
NOTES:
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
3. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.
4. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
5. IN ALL MANNERS EXCEPT FOR GRADATION, ROCK QUALITY SHALL CONFORM TO MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE STANDARD SPECIFICATION 205.
6. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.
7. AT TAYLOR BRIDGE EXISTING BED MATERIAL SHALL BE USED TO RE-BURY THE DESIGN SURFACE AND FIELD FIT A SMOOTH TIE-IN WITH THE CHANNEL UP- AND DOWNSTREAM.



TAYLOR BRIDGE CHANNEL ARMOURING
1:150



PROFILE - TAYLOR BRIDGE CHANNEL GRADE CONTROL (SHEET 003; LOOKING EAST)
1:100



A / 003 TAYLOR BRIDGE CHANNEL GRADE CONTROL (LOOKING SOUTH)
1:100

CLIENT:

Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
A	30 DEC 2025	AS-CONSTRUCTED CHECK PRINT

nhc northwest hydraulic consultants

SEAL:

DEROCHE CREEK RECOVERY SOLUTION
REACH 1

TYPICAL SECTIONS AND PROFILE DETAILS

DESIGNED: DJG	SHEET ID: 2900712-DER RS-004	SHEET No:	
DRAFTED: CZZ	STATUS: AS-CONSTRUCTED CHECK PRINT	005	
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 30 DEC 2025	REV No: A	

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

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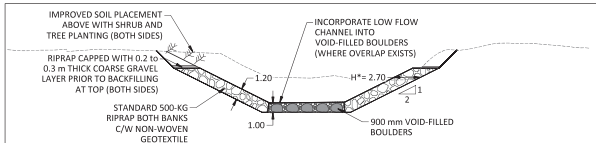
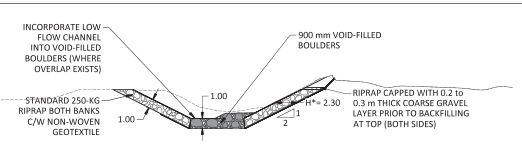
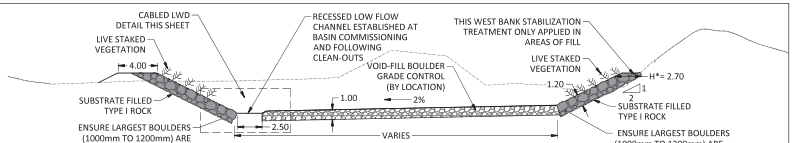


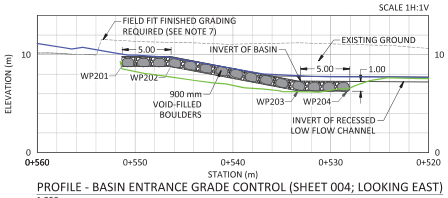
TYPICAL SECTION - BASIN ENTRANCE ARMOUR (SEE SHEET 004)
1:250



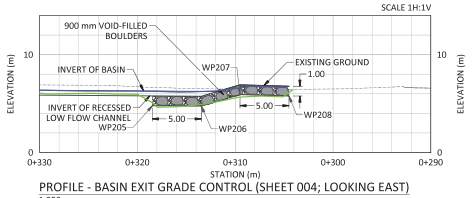
TYPICAL SECTION - BASIN EXIT ARMOUR (SEE SHEET 004)
1:250



TYPICAL SECTION - BASIN (SEE SHEET 004)
1:250



PROFILE - BASIN ENTRANCE GRADE CONTROL (SHEET 004; LOOKING EAST)
1:250



PROFILE - BASIN EXIT GRADE CONTROL (SHEET 004; LOOKING EAST)
1:250

ENTRANCE GRADE CONTROL WORKPOINTS TABLE

WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP201	567361.22	5448566.68	8.80
WP202	567363.57	5448562.29	8.74
WP203	567369.12	5448550.51	6.30
WP204	567371.06	5448545.87	6.26

EXIT GRADE CONTROL WORKPOINTS TABLE

WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP205	567439.09	5448350.55	4.78
WP206	567440.80	5448345.86	4.75
WP207	567442.17	5448342.15	5.91
WP208	567443.91	5448337.47	5.77

BASIN MAINTENANCE ACCESS ALIGNMENT LAYOUT

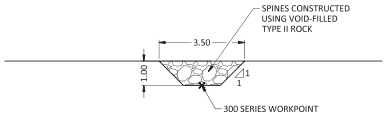
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L2	5+000.000	567436.58	5448357.58	083° 59' 09.03"	9.673	
C2	5+009.673	567446.20	5448358.59	119° 46' 07.66"	9.992	8.000
C1	5+026.784	567457.27	5448347.47	132° 57' 25.88"	44.956	57.000
L1	5+071.740	567489.32	5448317.62	110° 21' 45.47"	18.959	

WEST BANK STABILIZATION ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L11	3+000.000	567357.14	5448564.62	157° 30' 27.32"	2.803	
C9	3+002.803	567358.21	5448562.03	149° 56' 14.47"	2.907	11.000
L12	3+005.709	567359.66	5448559.52	142° 22' 01.61"	7.605	
C10	3+013.314	567364.30	5448553.50	153° 08' 19.07"	3.948	10.500
L13	3+017.262	567366.08	5448550.00	163° 54' 36.53"	34.242	
C11	3+051.504	567375.57	5448517.10	158° 44' 00.11"	12.649	70.000
L14	3+064.153	567380.15	5448505.32	153° 33' 23.68"	10.947	
C12	3+075.100	567385.02	5448495.52	156° 43' 38.64"	3.320	30.000
L15	3+078.420	567386.34	5448492.47	159° 53' 53.60"	17.959	
C13	3+096.379	567392.51	5448475.61	169° 55' 09.83"	10.494	30.000
L16	3+106.873	567394.33	5448465.33	179° 56' 26.06"	25.234	
C14	3+132.107	567394.36	5448440.09	167° 11' 53.43"	31.136	70.000
L18	3+163.243	567401.20	5448409.98	154° 27' 20.79"	23.184	
C16	3+186.427	567411.20	5448389.07	151° 03' 18.30"	5.935	50.000
L19	3+192.362	567414.07	5448383.87	147° 39' 15.81"	32.521	
C15	3+224.884	567431.47	5448356.40	152° 15' 55.54"	10.462	65.000
L17	3+235.346	567436.33	5448347.15	156° 52' 35.26"	11.832	

EAST BANK STABILIZATION ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L5	4+000.000	567364.60	5448568.54	148° 11' 05.50"	5.815	
C4	4+005.815	567367.66	5448563.59	154° 10' 14.71"	4.387	20.995
C5	4+017.349	567372.00	5448552.93	143° 10' 38.73"	9.399	15.858
L7	4+026.748	567377.55	5448545.52	126° 11' 53.53"	22.305	
C6	4+049.053	567395.55	5448532.34	139° 21' 17.98"	29.393	64.000
L8	4+078.446	567414.53	5448510.24	152° 30' 42.42"	9.419	
C7	4+087.864	567418.87	5448501.88	163° 16' 57.04"	48.500	129.000
L9	4+136.364	567432.74	5448455.70	174° 03' 11.66"	107.249	
C8	4+243.613	567443.85	5448349.03	170° 38' 17.75"	3.576	30.000
L10	4+247.189	567444.43	5448345.51	167° 13' 23.84"	7.393	



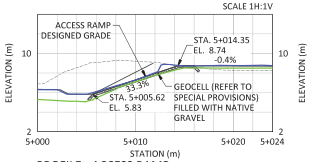
TYPICAL SECTION - GRADE CONTROL SPINE
1:100

GRADE CONTROL SPINE WORKPOINTS TABLE

WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP301	567393.69	5448529.45	6.39
WP302	567375.58	5448517.03	6.83
WP303	567412.07	5448507.78	6.12
WP304	567385.73	5448494.04	6.72
WP305	567424.84	5448478.65	5.90
WP306	567393.90	5448470.28	6.55

GRADE CONTROL SPINE WORKPOINTS TABLE

WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP307	567430.27	5448448.70	5.69
WP308	567394.39	5448444.92	6.41
WP309	567433.83	5448414.20	5.45
WP310	567402.65	5448406.96	6.09
WP311	567436.62	5448383.10	5.36
WP312	567418.34	5448377.21	5.74



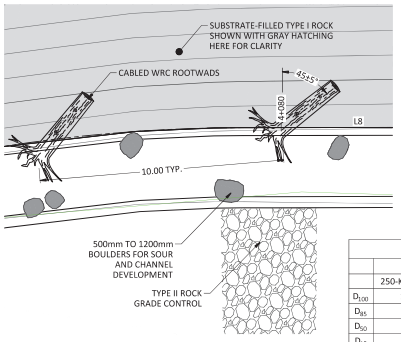
PROFILE - ACCESS RAMP (SHEET 004; LOOKING NORTH)
1:250

WEST BANK STABILIZATION OFFSET/ELEVATION TABLE

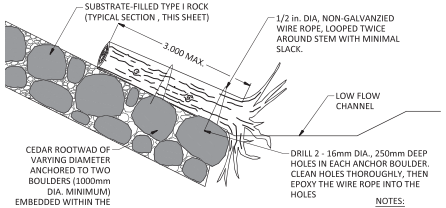
STATION	O/S TO TOE OF CUT	ELEV TOE OF CUT	O/S TO TOP OF CUT	ELEV TOP OF CUT
3+000.000	0.16	8.60	7.53	12.31
3+002.803	0.11	8.60	7.36	12.24
3+005.709	0.13	8.48	7.86	12.16
3+010.000	0.14	7.65	9.60	12.08
3+013.314	0.15	6.99	10.86	11.95
3+017.262	-0.64	6.20	10.85	11.96
3+020.000	-0.84	6.09	10.73	11.90
3+030.000	0.27	6.63	10.39	11.84
3+040.000	0.27	6.63	9.79	11.66
3+050.000	0.27	6.62	9.33	11.41
3+060.000	0.26	6.61	9.19	11.19
3+070.000	0.28	6.56	9.56	11.22
3+080.000	0.28	6.49	9.37	11.08
3+090.000	0.28	6.43	9.00	10.79
3+096.379	0.28	6.37	8.44	10.44
3+100.000	0.31	6.34	8.31	10.35
3+110.000	0.28	6.29	8.07	10.28
3+120.000	0.28	6.24	8.05	10.16
3+130.000	0.28	6.19	7.39	9.77
3+140.000	0.26	6.13	7.32	9.66
3+150.000	0.27	6.05	7.49	9.69
3+160.000	0.21	5.95	7.51	9.66
3+170.000	0.28	5.84	7.41	9.46
3+180.000	0.28	5.75	7.34	9.30
3+190.000	0.28	5.65	7.09	9.13
3+200.000	0.27	5.53	6.94	8.96
3+210.000	0.27	5.42	6.97	8.85
3+220.000	0.28	5.30	7.07	8.77
3+230.000	0.28	5.19	7.34	8.74
3+235.346	-0.91	4.77	6.98	8.72
3+240.000	0.10	5.31	6.72	8.73
3+247.178	0.11	5.77	5.96	8.70

EAST BANK STABILIZATION OFFSET/ELEVATION TABLE

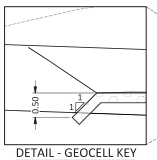
STATION	O/S TO TOE OF CUT	ELEV TOE OF CUT	O/S TO TOP OF CUT	ELEV TOP OF CUT
4+000.000	0.37	8.60	7.77	12.30
4+003.275	0.37	8.60	7.62	12.26
4+007.661	0.37	8.24	8.24	12.15
4+010.000	0.39	7.90	8.78	12.11
4+017.298	-0.41	6.40	10.54	11.97
4+020.000	-0.50	6.09	10.78	11.92
4+026.696	0.46	6.43	10.49	11.86
4+030.000	0.32	6.39	10.09	11.82
4+040.000	0.27	6.25	10.24	11.59
4+050.000	0.21	6.12	10.06	11.37
4+060.000	0.12	6.01	10.43	11.29
4+070.000	0.06	5.92	10.44	11.14
4+080.000	0.21	5.85	10.60	11.05
4+090.000	0.18	5.79	10.50	10.96
4+100.000	0.18	5.71	10.07	10.67
4+110.000	0.21	5.65	9.60	10.34
4+120.000	0.25	5.58	9.63	10.27
4+130.000	0.26	5.52	9.66	10.22
4+136.313	0.22	5.47	9.45	10.08
4+140.000	0.27	5.45	9.37	10.00
4+150.000	0.28	5.38	9.01	9.74
4+160.000	0.28	5.31	8.98	9.66
4+170.000	0.28	5.24	9.17	9.68
4+180.000	0.28	5.17	8.77	9.46
4+190.000	0.28	5.13	8.36	9.26
4+200.000	0.28	5.10	8.10	9.10
4+210.000	0.28	5.08	7.83	8.93
4+220.000	0.28	5.05	7.68	8.83
4+230.000	0.28	5.03	7.58	8.77
4+240.000	0.27	5.00	7.07	8.73
4+243.562	-0.61	4.76	7.16	8.73
4+247.138	0.19	5.16	6.93	8.73
4+250.000	0.35	5.90	5.87	8.67
4+254.531	0.34	5.77	6.17	8.69



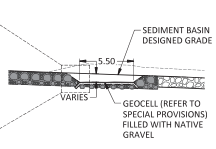
DETAIL - LOW FLOW CHANNEL PLAN
1:100



DETAIL - WRC ROOTWAD
1:50



DETAIL - GEOCELL KEY
1:50



TYPICAL SECTION - ACCESS RAMP (LOOKING WEST)
1:250

GRADATION TABLE - IMPORTED ROCK MATERIALS

	ROCK DIAMETER (mm)					
	250-KG RIPRAP	500-KG RIPRAP	TYPE I ROCK	TYPE II ROCK	900mm BOULDERS	500mm BOULDERS
D_{100}	1000	1250	1250	750	-	-
D_{85}	830	1050	1050	610	-	-
D_{50}	575	725	725	425	900 (± 100)	500 (± 50)
D_{15}	270	340	550	350	-	-
D_0	200	250	450	300	-	-

NOTES:
1. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
2. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.
3. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
4. FOR ROCK GRADATIONS REFER TO THE TABLE ON THIS SHEET.
5. IN ALL MANNERS EXCEPT FOR GRADATION, ROCK QUALITY SHALL CONFORM TO MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE STANDARD SPECIFICATION 205.
6. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.
7. AT THE LIMITS OF CONSTRUCTION, EXISTING BED MATERIAL SHALL BE USED TO RE-BURY THE DESIGN SURFACE AND FIELD FIT A SMOOTH TIE-IN WITH THE UPSTREAM CHANNEL.

LEGEND
- DESIGN GRADE
- EXISTING GROUND (2025 PRE-CON)
- EXISTING GROUND (2023 AND PRIOR)
- SUBSTRATE FILLED RIPRAP
- BOULDER ARMOUR
- STANDARD RIPRAP
- 6-INCH MINUS STREAM GRAVEL
- FINISHED GRADE/ EXTENTS
- SUB-GRADE/ DESIGN GRADE EXCAVATIONS

CLIENT:
BRITISH COLUMBIA — Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
A	30 DEC 2025	AS-CONSTRUCTED CHECK PRINT

nhc northwest hydraulic consultants

SEAL:

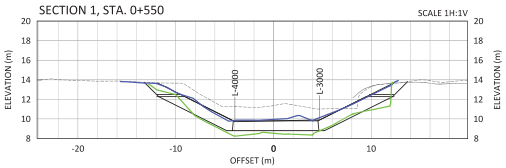
DEROCHE CREEK RECOVERY SOLUTION
REACH 2
TYPICAL SECTIONS AND PROFILE DETAILS

DESIGNED:	DJG	SHEET ID: 2900712-DER RS-005	SHEET No: 006
DRAFTED:	CZZ	STATUS: AS-CONSTRUCTED CHECK PRINT	
CHECKED:	DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE: 30 DEC 2025	REV No: A

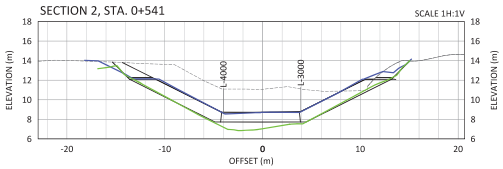
SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\mainfile-svr\projects\Active\300\78\4 deroche creek emerg works\05 CAD\02_production\2025 CPD\300784 Deroche RS CVP-005_005-006.dwg, 02 Jan 2026, 10:06 AM

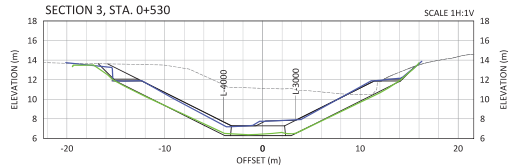
SECTION 1, STA. 0+550



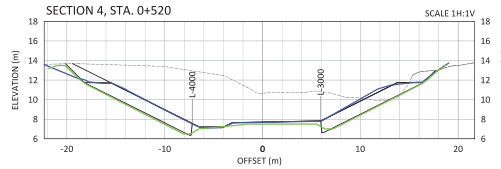
SECTION 2, STA. 0+541



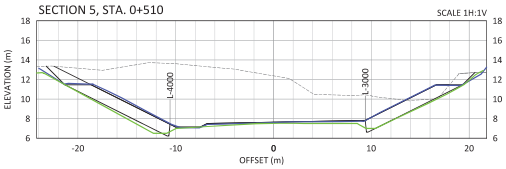
SECTION 3, STA. 0+530



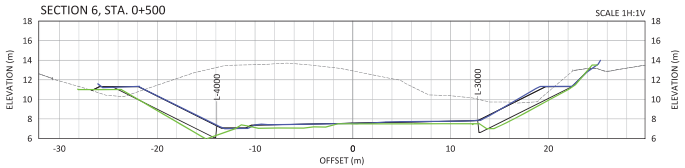
SECTION 4, STA. 0+520



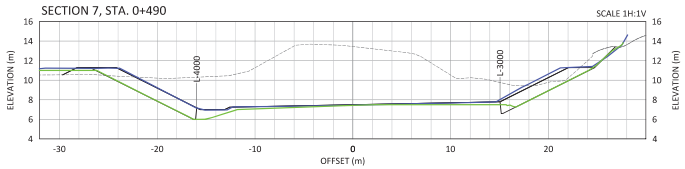
SECTION 5, STA. 0+510



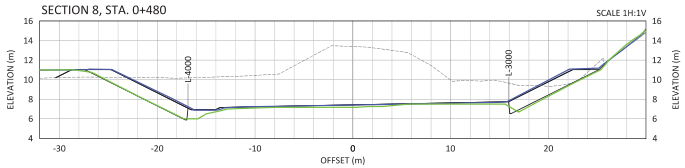
SECTION 6, STA. 0+500



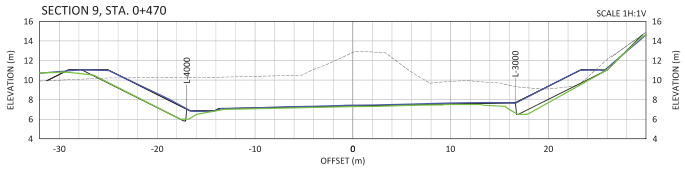
SECTION 7, STA. 0+490



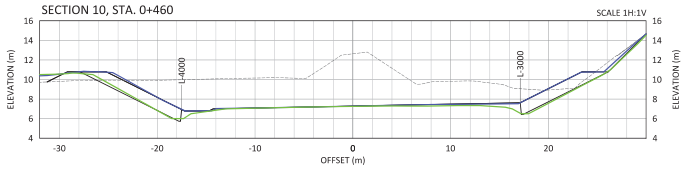
SECTION 8, STA. 0+480



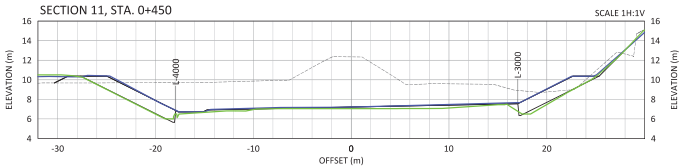
SECTION 9, STA. 0+470



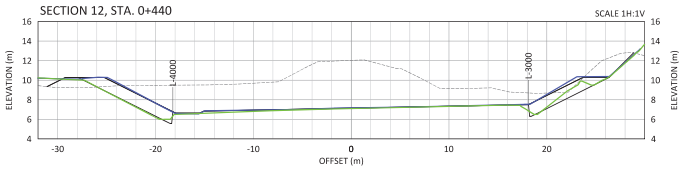
SECTION 10, STA. 0+460



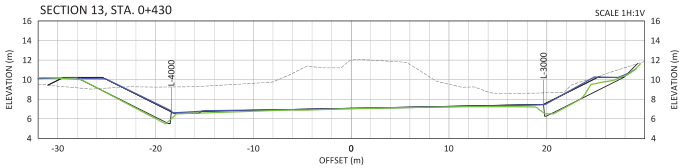
SECTION 11, STA. 0+450



SECTION 12, STA. 0+440



SECTION 13, STA. 0+430



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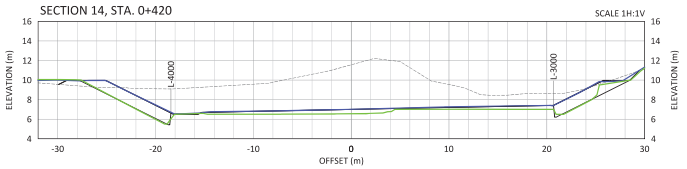
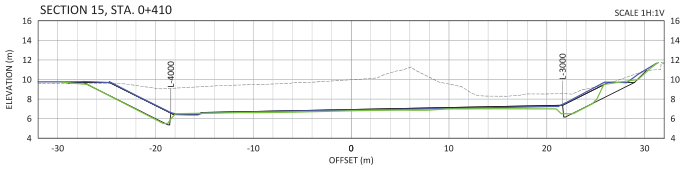


SECTION 15, STA. 0+410



LEGEND

- DESIGN GRADE
- EXISTING GROUND (2025 PRE-CON)
- EXISTING GROUND (2023 AND PRIOR)
- FINISHED GRADE/ EXTENTS
- SUB-GRADE/ DESIGN GRADE EXCAVATIONS

NOTES:

1. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
2. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
3. REFER TO SHEET 006 FOR L-3000 AND L-4000 ALIGNMENT TABLES, AND OFFSET/ ELEVATION TABLES

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
A	30 DEC 2025	AS-CONSTRUCTED CHECK PRINT

nhc northwest hydraulic consultants

SEAL:

DEROCHE CREEK RECOVERY SOLUTION

SEDIMENT BASIN

STANDARD SECTIONS

DESIGNED:	DJG	SHEET ID:	2900712-DER RS-006A	SHEET No:
DRAFTED:	CZZ	STATUS:	AS-CONSTRUCTED CHECK PRINT	007A
CHECKED:	DJG	SCALE:	AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE:	30 DEC 2025	REV No: A

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

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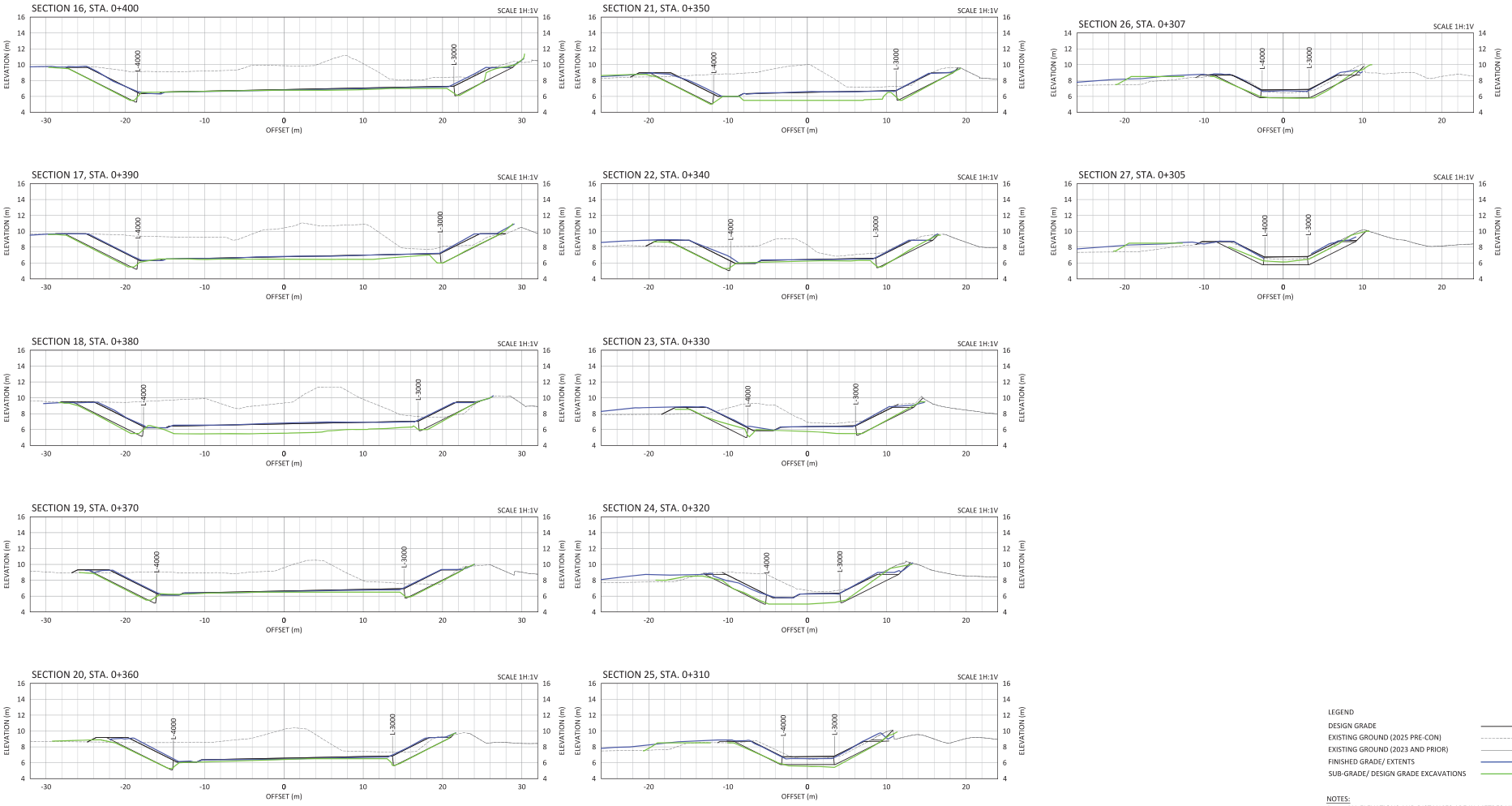

LEGEND

- DESIGN GRADE
- EXISTING GROUND (2025 PRE-CON)
- EXISTING GROUND (2023 AND PRIOR)
- FINISHED GRADE/ EXTENTS
- SUB-GRADE/ DESIGN GRADE EXCAVATIONS

NOTES:

1. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
2. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
3. REFER TO SHEET 006 FOR L-3000 AND L-4000 ALIGNMENT TABLES, AND OFFSET/ ELEVATION TABLES

CLIENT:

Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
A	30 DEC 2025	AS-CONSTRUCTED CHECK PRINT

nhc northwest hydraulic consultants

SEAL:

DEROCHE CREEK RECOVERY SOLUTION

SEDIMENT BASIN

STANDARD SECTIONS

DESIGNED: DJG	SHEET ID: 2900712-DER RS-006B	SHEET No:	007B
DRAFTED: CZZ	STATUS: AS-CONSTRUCTED CHECK PRINT		
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 30 DEC 2025	REV No: A	

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

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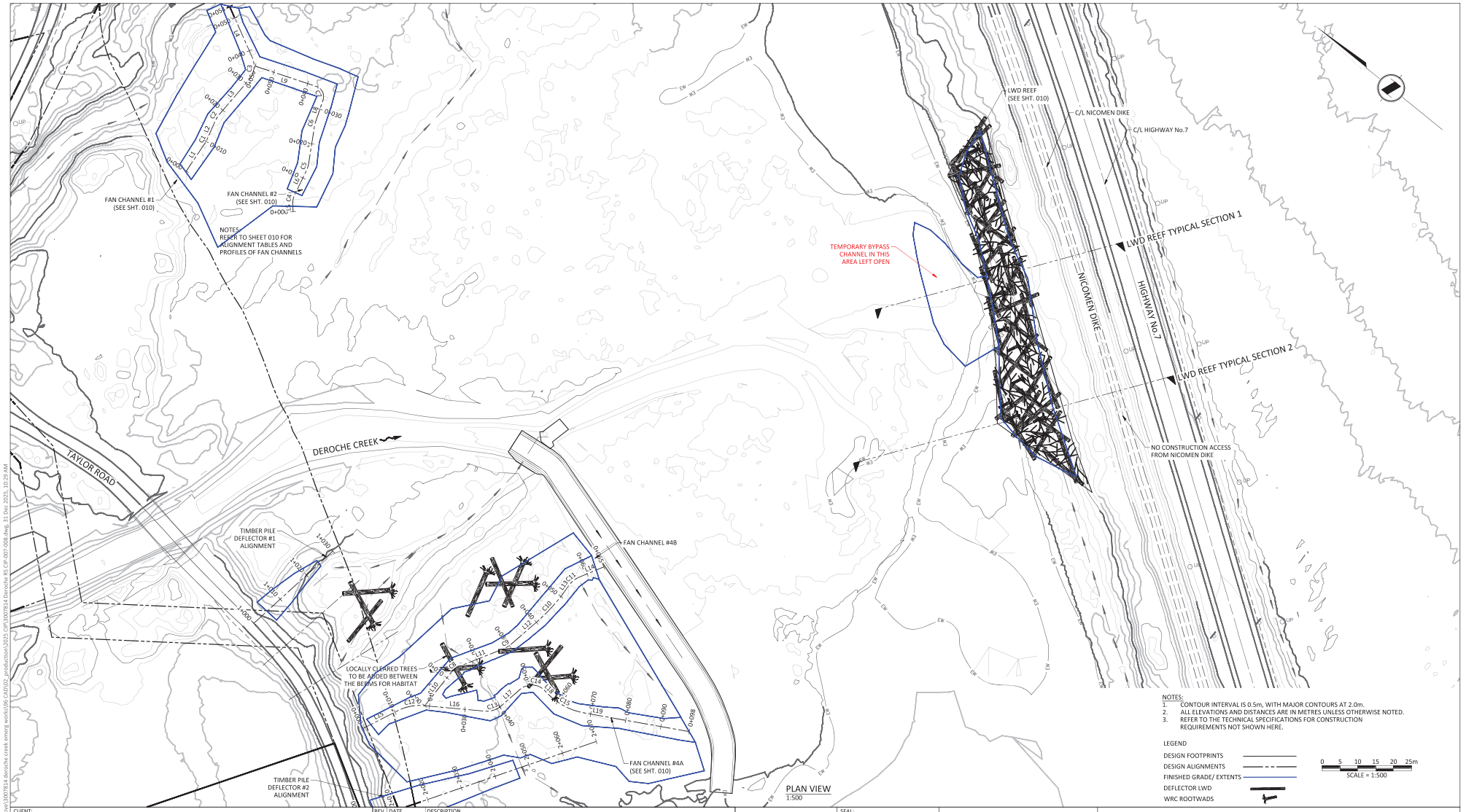

PLAN VIEW
1:500

NOTES:
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
3. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.

LEGEND
DESIGN FOOTPRINTS
DESIGN ALIGNMENTS
FINISHED GRADE/ EXTENTS
DEFLECTOR LWD
WRC ROOTWADS

0 5 10 15 20 25m
SCALE = 1:500

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
A	30 DEC 2025	AS-CONSTRUCTED CHECK PRINT

nhc northwest hydraulic consultants

SEAL:

DEROCHE CREEK RECOVERY SOLUTION
OFF-SETTING WORKS

PLAN

DESIGNED:	DJG	SHEET ID:	2900712-DER RS-007	SHEET No:
DRAFTED:	CZZ	STATUS:	AS-CONSTRUCTED CHECK PRINT	009
CHECKED:	DJG	SCALE:	AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE:	30 DEC 2025	REV No: A

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

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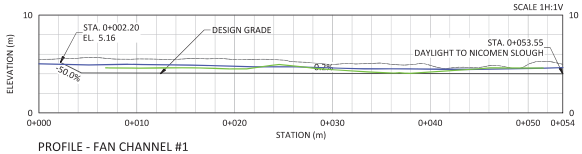
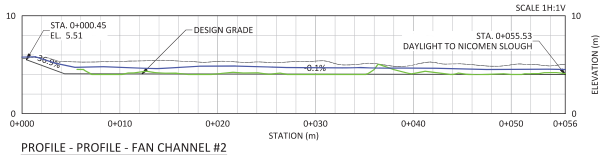
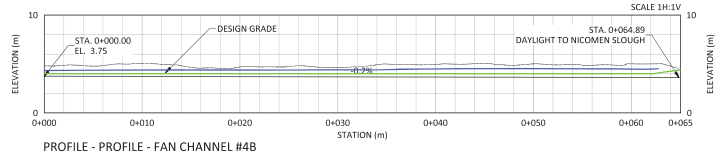


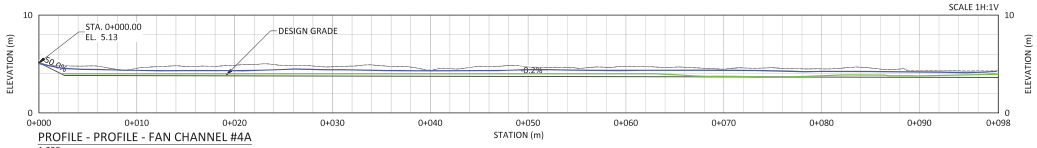
PROFILE - FAN CHANNEL #1
1:250



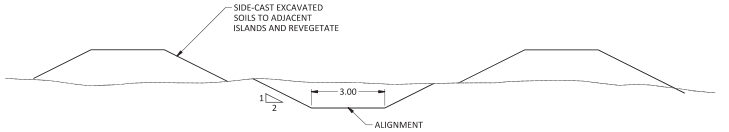
PROFILE - PROFILE - FAN CHANNEL #2
1:250



PROFILE - PROFILE - FAN CHANNEL #4B
1:250



PROFILE - PROFILE - FAN CHANNEL #4A
1:250



TYPICAL SECTION, FAN CHANNEL 1-4 (SEE SHEET 006)
1:100

FAN CHANNEL 1 ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L1	0+000.000	567587.67	5448353.81	084° 43' 22.57"	9.603	
C1	0+009.603	567597.23	5448354.70	079° 42' 17.99"	0.876	5.000
L2	0+010.478	567598.09	5448354.85	074° 41' 13.41"	5.591	
C2	0+016.069	567603.49	5448356.33	083° 06' 40.13"	2.647	9.000
L3	0+018.716	567606.10	5448356.65	091° 32' 06.85"	12.487	
C3	0+031.202	567618.59	5448356.31	059° 15' 14.14"	6.761	6.000
L4	0+037.963	567624.09	5448359.59	026° 58' 21.43"	15.584	

FAN CHANNEL 4B ALIGNMENT LAYOUT

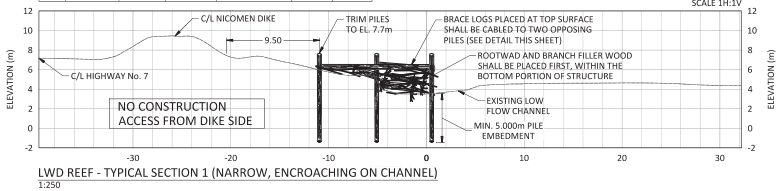
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L10	0+000.000	567513.46	5448207.36	089° 22' 36.42"	11.567	
C8	0+011.567	567525.02	5448207.48	104° 17' 29.80"	3.644	7.000
L11	0+015.211	567528.52	5448206.59	119° 12' 23.17"	12.873	
C9	0+028.084	567539.75	5448200.31	109° 31' 33.31"	2.703	8.000
L12	0+030.787	567542.29	5448199.41	099° 50' 43.45"	9.437	
C10	0+040.224	567551.59	5448197.80	094° 00' 00.50"	12.133	50.000
L13	0+052.357	567563.67	5448197.19	085° 56' 32.41"	1.360	
C11	0+053.718	567565.03	5448197.28	102° 06' 25.77"	3.950	7.000
L14	0+057.667	567568.84	5448196.47	118° 16' 19.14"	7.372	

FAN CHANNEL 4A ALIGNMENT LAYOUT

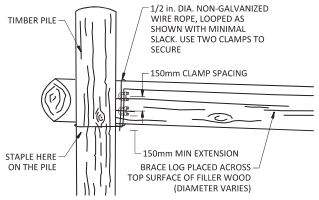
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L15	0+000.000	567497.68	5448216.74	113° 54' 24.97"	11.011	
C12	0+011.011	567507.74	5448212.28	129° 57' 41.57"	7.285	13.000
L16	0+018.296	567513.25	5448207.66	146° 00' 58.18"	17.373	
C13	0+035.669	567522.96	5448193.26	122° 49' 57.73"	4.856	6.000
L17	0+040.525	567526.93	5448190.70	099° 38' 57.28"	7.026	
C14	0+047.551	567533.86	5448189.52	151° 38' 52.27"	7.606	5.000
L18	0+055.157	567537.99	5448184.00	186° 48' 39.77"	1.138	
C15	0+056.295	567537.85	5448182.87	170° 20' 38.75"	11.877	19.000
L19	0+068.172	567540.10	5448171.40	150° 59' 43.67"	29.902	

FAN CHANNEL 2 ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L5	0+000.000	567597.76	5448323.44	049° 11' 11.75"	2.329	
C4	0+002.329	567599.52	5448324.96	063° 01' 35.03"	2.416	5.000
L6	0+004.744	567601.66	5448326.05	076° 51' 58.30"	7.553	
C5	0+012.297	567609.01	5448327.76	068° 21' 15.22"	2.080	7.000
L7	0+014.377	567610.94	5448328.53	059° 50' 32.14"	10.801	
C6	0+025.177	567620.28	5448333.95	064° 46' 24.55"	0.861	5.000
L8	0+026.038	567621.05	5448334.32	069° 42' 16.95"	6.687	
C7	0+032.725	567627.33	5448336.64	024° 29' 21.38"	4.735	3.000
L9	0+037.460	567629.09	5448340.51	339° 16' 25.80"	18.069	



LWD REEF - TYPICAL SECTION 1 (NARROW, ENCROACHING ON CHANNEL)
1:250



BRACE LOG CABLING DETAIL
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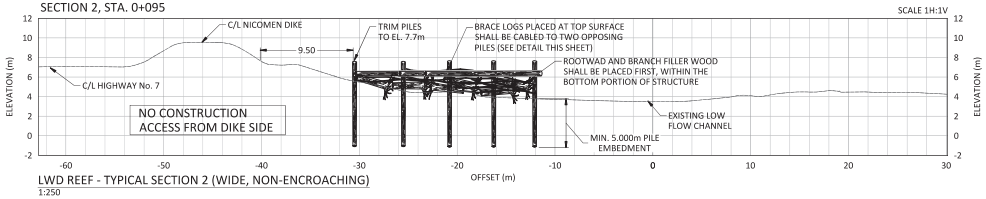
SECTION 2, STA. 0+095



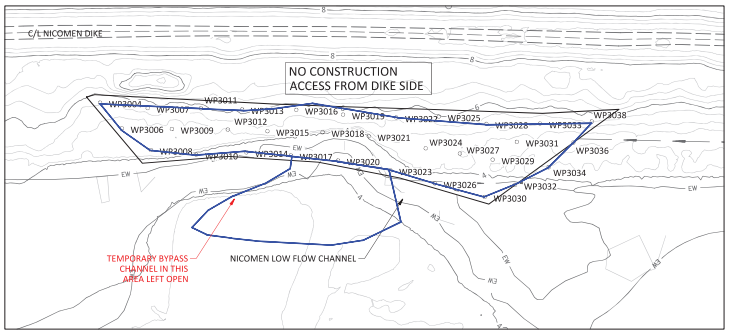
LWD REEF - TYPICAL SECTION 2 (WIDE, NON-ENCROACHING)
1:250

LEGEND

- DESIGN GRADE
- EXISTING GROUND (2023 AND PRIOR)
- DEFLECTOR LWD
- WRC ROOTWADS
- FINISHED GRADE/ EXTENTS
- SUB-GRADE/ DESIGN GRADE EXCAVATIONS

NOTES:

1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
3. CROSS-SECTIONS ARE VIEWED DOWNSTREAM.
4. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.



PILING PLAN - LWD REEF
1:500

PILE LAYOUT TABLE - LWD REEF			PILE LAYOUT TABLE - LWD REEF			PILE LAYOUT TABLE - LWD REEF		
PILE #	EASTING (m)	NORTHING (m)	PILE #	EASTING (m)	NORTHING (m)	PILE #	EASTING (m)	NORTHING (m)
3004	567736.93	5448188.08	3016	567713.80	5448155.27	3027	567688.07	5448132.11
3006	567730.10	5448187.21	3017	567706.59	5448161.28	3028	567690.20	5448124.25
3007	567730.67	5448180.54	3018	567707.04	5448153.25	3029	567683.37	5448127.17
3008	567723.15	5448184.66	3019	567707.75	5448147.78	3030	567677.85	5448132.68
3009	567724.39	5448178.72	3020	567700.46	5448153.76	3031	567683.71	5448121.04
3010	567717.27	5448177.41	3021	567701.20	5448145.80	3032	567676.53	5448126.14
3011	567724.70	5448171.44	3022	567701.35	5448139.00	3033	567684.27	5448115.03
3012	567718.06	5448169.20	3023	567692.93	5448145.89	3034	567675.81	5448118.45
3013	567719.92	5448164.50	3024	567692.78	5448137.38	3036	567677.29	5448111.45
3014	567712.09	5448168.56	3025	567696.75	5448131.58	3038	567678.84	5448105.92
3015	567713.36	5448162.59	3026	567685.74	5448139.73			

CLIENT:

Ministry of Environment and Climate Change Strategy
BRITISH COLUMBIA

REV.	DATE	DESCRIPTION
A	30 DEC 2025	AS-CONSTRUCTED CHECK PRINT

nhc northwest hydraulic consultants

SEAL:

DEROCHE CREEK RECOVERY SOLUTION
OFF-SETTING WORKS

TYPICAL SECTIONS AND PROFILE

DESIGNED: DJG	SHEET ID: 2900712-DER RS-008		SHEET No: 010
DRAFTED: CZZ	STATUS: AS-CONSTRUCTED CHECK PRINT		
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 30 DEC 2025		REV No: A

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nanlfile-svr\projects\Active\300783.4 deroche creek emerg works\05 CAD\02_production\2025 CFP\300783.4 Deroche RS CFP-007-008.dwg, 31 Dec 2025, 10:29 AM

Innovation. Integrity.
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Enclosure C

Site Photographs

Enclosure C – Site Photographs

PHOTOGRAPHS



Photo 1: Japanese knotweed disturbed along fan channel access path.



Photo 2: Generator located on spill tray

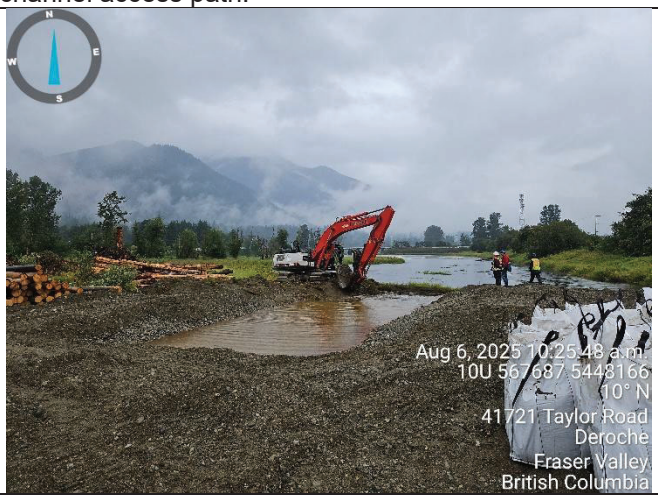

Photo 3: Connection of the upstream end of the bypass channel to the Nicomen Slough.



Photo 4: Isolation of the LWD Reef worksite using bulk bags and poly sheeting.



Photo 5: Construction of fill berm on the upstream side of the LWD reef site.



Photo 6: Spill of hydraulic fluid on swamp mats.

Enclosure C – Site Photographs

PHOTOGRAPHS



Photo 7: LWD Reef constructed in isolation



Photo 8: Pumping turbid water from the LWD reef worksite into adjacent grassy area prior to removal of isolation measures.



Photo 9: Removal of downstream isolation.



Photo 10: Isolated area after culvert removal in bypass channel. Turbid water is settling before release.



Photo 11: Constructed fan channel and riparian planting



Photo 12: Sediment basin and low flow channel

Enclosure C – Site Photographs

PHOTOGRAPHS



Photo 13: Planting area adjacent to sediment basin.



Photo 14: Timber pile deflector.



Photo 15: LWD reef in Nicomen Slough



Photo 16: Deroche Creek, downstream of sediment basin.

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Enclosure D

Construction Environmental Management Plan

KERR WOOD LEIDAL
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Deroche Creek Recovery Solution Project

Construction Environmental Management Plan

Final Report – Revision 2
June 3, 2025
KWL Project No. 2838.003

Prepared for:
BC Ministry of Environment and Climate Change Strategy

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Report Submission

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1. Introduction

1.1 Project Description

The Ministry of Environment and Climate Change Strategy (ENV) and Leq'a:mel First Nation (LFN) are working to address the impacts of sedimentation in Deroche Creek that resulted from significant precipitation and flooding during the November 2021 Atmospheric River Event (ARE). Kerr Wood Leidal Associates Ltd. (KWL) has been retained as a subconsultant to the Engineer-of-Record, Northwest Hydraulic Consultants (NHC), to provide environmental services during design, permitting support, contract administration, construction management, and construction environmental monitoring for the Project.

KWL has prepared this document as an updated Construction Environmental Management Plan (CEMP) for this phase of the works. This CEMP includes general guidance on the following topics:

- Environmental monitoring
- Timing of works
- Protection of fish and fish habitat
- Protection of birds and wildlife
- Tree protection and vegetation management
- Invasive plant management
- Erosion and sediment control
- Deleterious substance control and spill management
- Clean up and restoration

1.2 Purpose of the Construction Environmental Management Plan

This Construction Environmental Management Plan (CEMP) provides overarching guidance and sets out the requirements and measures that will be adopted to avoid, minimize, and mitigate the potential adverse environmental impacts of the Project. This plan is to be implemented by the Contractor throughout the duration of the Project and applies to the construction phase.

The CEMP is a living document and will be updated over the course of construction as planning and sequencing for work activities are adjusted and finalized, and as observations made by Environmental Monitors warrant changes in environmental management.

1.3 Roles and Responsibilities

The parties involved in the Project have the following roles and responsibilities with respect to environmental management:

1. The Owner's (LFN's) representative, shall:
    a. ensure that the appropriate resources are available to establish, implement, maintain, and improve environmentally responsible construction practices;
    b. liaise with the EM about potential impacts to environmental components during construction;
    c. contract Qualified Professionals[1] (QPs) with specific expertise required for the Project liaise with all QPs as needed; and
    d. provide resources required for environmental awareness and protection training, environmental documents specific to the Project, and financial resources.
2. The Project Sponsors, Ministry of Environment and Climate Change Strategy (ENV) and Indigenous Services Canada, shall:
    a. provide project funding; and
    b. provide general guidance and oversight of works.
3. The Environmental Monitor (EM), KWL, shall:
    a. advise the Contractor of environmental protection and monitor environmental protection measures;
    b. identify deficiencies of the Contractor and communicate with the Contractor on how to address deficiencies;
    c. have written authority to halt or modify any construction activity if it is deemed necessary in order to protect fish and wildlife populations or their habitats; and
    d. report to the Consultant.
4. The Contract Administrator, KWL, shall:
    a. ensure that the appropriate resources are available to establish, implement, maintain, and improve environmentally responsible construction practices;
    b. liaise with the EM about potential impacts to environmental components during construction;
    c. liaise with all QPs involved with the Project as needed; and
    d. provide the resources required for environmental awareness and protection training, contract QPs with specific expertise as needed, environmental documents specific to the Project, and financial resources.
5. The Engineer of Record, NHC, shall:
    a. have specific expertise or knowledge needed to advise and/or support the EM and the Contractor where specific engineering input is required related to environmental concerns;
    b. liaise with the EM about potential impacts to environmental components during construction; and

[1] QPs will have the expertise or knowledge needed to advise and/or support the Consultant, the EM, the Contractor, and KWL with respect to environmental or other engineering concerns.

c. liaise with any other QPs involved with the project as needed.

6. The Contractor (to be determined) includes any company and its field staff retained by LFN to construct a component of the Project. The Contractor shall:
   a. plan and conduct activities in compliance with the CEMP and all applicable legislation, approvals, and best management practices;
   b. report directly to the Consultant regarding all site activities;
   c. ensure that there is no release of deleterious substances into Deroche Creek or any other nearby watercourses or waterbodies;
   d. ensure all staff, including subcontractors, are familiar with the CEMP and know their responsibilities in meeting the outcomes of the plan;
   e. communicate changes in construction plans or activities that could impact the implementation of the CEMP to the Consultant, the EM, and KWL as quickly as possible; and
   f. keep a copy of the CEMP on-site at all times.

1.4 Guiding Documents

The following guidance documents were used to develop the CEMP:

- *Requirements and Best Management Practices for Making Changes In and About a Stream in British Columbia*. Version 2022.01. Government of British Columbia, 2022.
- *Measures to Protect Fish and Fish Habitat*, Fisheries and Oceans Canada, 2019.
- *A Field Guide to Fuel Handling, Transportation and Storage*, Ministry of Water, Land and Air Protection, 3rd Edition, 2002.
- *B.C. Approved Water Quality Guidelines*, Ministry of Environment and Climate Change Strategy Updated 2018
- *Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia*, Ministry of Water, Land and Air Protection, 2004.
- *Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia*, Ministry of Environment and Climate Change Strategy, 2014.
- *Land Development Guidelines for the Protection of Aquatic Habitat, Fisheries and Oceans, 2nd Edition, 1993.*
- *New Migratory Birds Regulations,* Environment and Climate Change Canada, 2022.

2. Project Location and Scope of Work

2.1 Project Location and Physical Setting

Deroche Creek flows through Lakahahmen IR 11 where it enters Nicomen Slough, a historical side channel of the Fraser River that has had its inflow from the river regulated by diking and the "Bell Dam" since the 1930s. Lakahahmen IR 11 is located on and adjacent to the Deroche Creek alluvial fan, approximately 22 km east of the City of Mission, BC. The project location is the mainstem of Deroche Creek, starting to the west of the intersection of North Deroche Road and Cooper Road, running southeast to Taylor Road, and ending at the downstream edge of the alluvial fan within Nicomen Slough.

Emergency sediment removal was conducted in November 2022 to remove sediments introduced by the 2021 Atmospheric River Event (ARE) and repair the highest risk bank erosion sites. The following Project now aims to provide a long-term solution to the sediment accumulation in Deroche Creek to mitigate future impacts on infrastructure and salmon habitat. Continued sediment deposition on the alluvial fan poses potential threats such as channel avulsion, bank erosion, and negative impacts to fish passage. Initial emergency sediment removal works have been completed, but further long-term solutions are required to mitigate future risks.

The proposed Deroche Creek Recovery Solution Project includes the following works:

- Construction of a sediment basin with a low-flow channel in Reach 2 to increase area available for sediment deposition and reduce infilling of the lower channel and fan, which has the potential to impede the migration of fish during low flows and smother spawning habitat downstream.
- Installation of bed armouring at Ministry of Transportation & Infrastructure's Taylor Road Bridge in Reach 2, downstream of the proposed sediment basin, to prevent degradation due the reduction in sediment supply.
- Construction of two timber pile deflectors on the Deroche Creek alluvial fan perpendicular to the Taylor Road to prevent high flows from eroding the embankment of Taylor Road.
- Construction of rearing habitat channels in the Deroche Creek alluvial fan.
- Installation of a large woody debris reef along the Highway 7 embankment to improve habitat complexity and stabilize the bank.
- Enhancement of riparian habitat of Deroche Creek through invasive species removal and native planting.

More details about construction are provided in subsequent sections of the CEMP.

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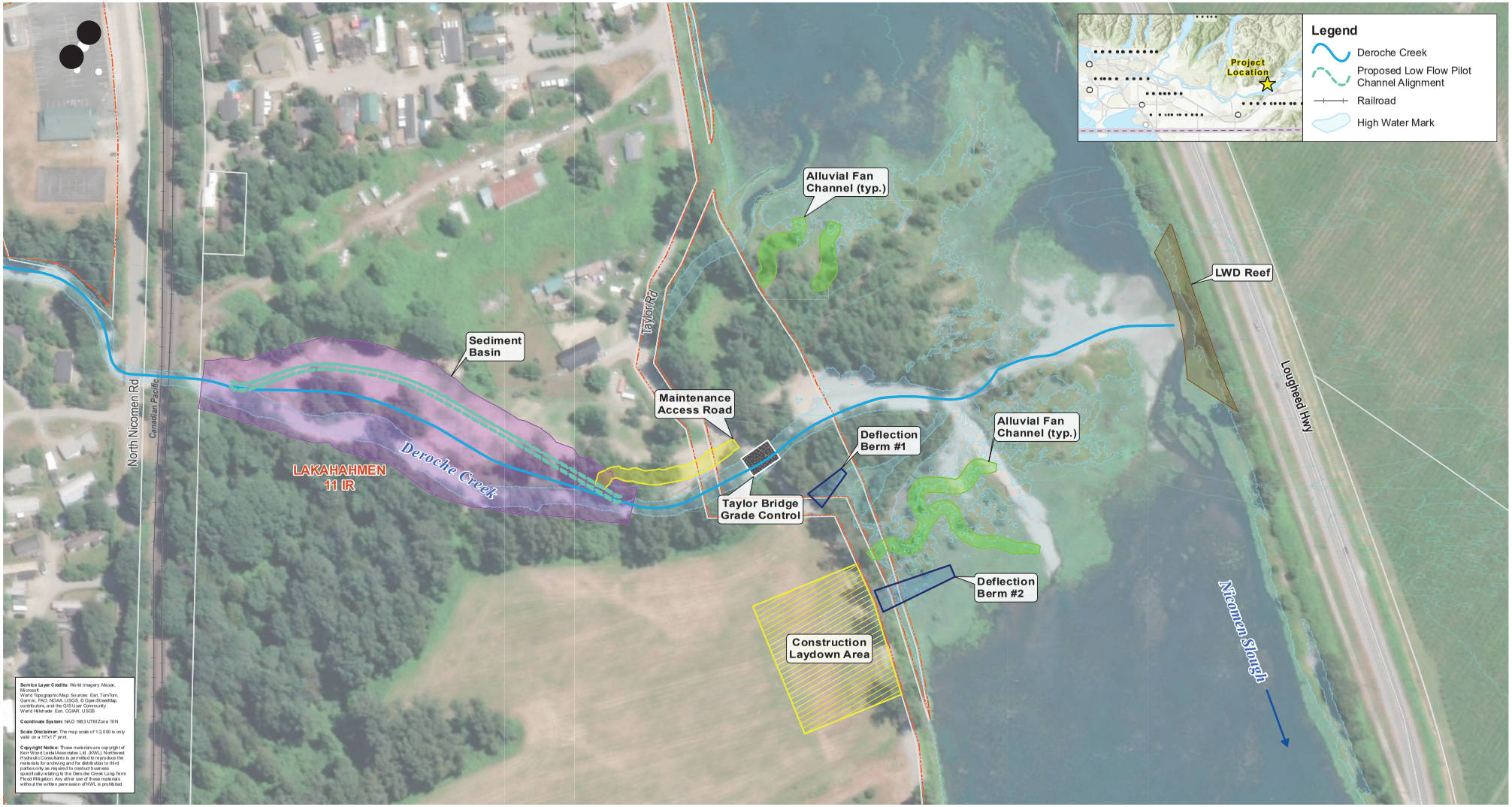
Northwest Hydraulic Consultants
Deroche Creek Long-Term Flood Mitigation

KERR WOOD LEIDAL consulting engineers



Project No. 2838.003
Date May 2025
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Proposed Works

Figure 2-1

2.2 Scope of Proposed Works

The construction stage, activity, and description of activity for construction works are described in the tables below.

Table 2-1: Proposed Construction Methods for Sediment Basin

Stage	Activity	Description of Activity
Site Preparation	Clearing and Grubbing	Remove vegetation for access path from Taylor Road to the downstream extent of the sediment basin. Remove vegetation on east bank of Deroche Creek within the basin footprint.
	Site Isolation	The work site will be isolated from flow and dewatered so that work can be conducted in the dry. Flow will be pumped around the site or through a bypass channel. Exclusion fencing of construction area to prevent fish access; salvage of all fish, amphibians, and mammals from enclosed site.
Construction	Basin Construction	Excavation and grading of sediment basin. The west bank of Deroche Creek will act as the west wall of the sediment basin. A low flow channel will be established along the left bank to convey base surface flows once they return to the creek. All construction below the normal high-water mark will occur in the dry and/or fully isolated from creek flows.
	Hauling and Disposal	Excavated material will be hauled by truck and either used on-site for construction of other project components, disposed of on Lot 8-3-3, or disposed of off-reserve at a location(s) determined by the Contractor. Machine access will occur from Taylor Road.
	Instream Complexing	Large woody debris (sourced from clearing) and habitat boulders will be placed in the low flow channel to add habitat complexity for salmonids.
	Bank Stabilization	Banks of the sediment basin will be stabilized using a mix of rock and appropriate growing substrate for vegetation above the normal high-water mark.
	Surface Restoration	Refinish roads and seed exposed soils disturbed from the works.
Site Restoration	Site Restoration and Enhancement	The banks of the sediment basin will be planted with native riparian plant species and live stakes.

Table 2-2: Proposed Construction Methods for Taylor Bridge Grade Control

Stage	Activity	Description of Activity
Site Preparation	Site Isolation	The work site will be isolated from flow and dewatered so that work can be conducted in the dry. Flow will be pumped around the site if necessary.
	Clearing and Grubbing	Remove riparian vegetation along the machine access path from Taylor Road.
Construction	Excavation	Excavate sediment to subgrade, place boulders in a checkerboard pattern, and fill voids between boulders using excavated sediment and add coarse rock to the side slopes.
	Hauling and Disposal	Excavated material will be hauled by truck and either used on-site for construction of other Project Elements or disposed of on Lot 8-3-3.
	Surface Restoration	Refinish roads and seed and exposed soils disturbed from the works.
Site Restoration	Site Restoration and Enhancement	Replant cleared area with native riparian plant species.

Table 2-3: Proposed Construction Methods for Timber Deflectors

Stage	Activity	Description of Activity
Site Preparation	Clearing and Grubbing	Remove vegetation along access path and within the berm footprints from Taylor Road.
Construction	Installation of wood piles	Drive timber piles (sourced from sediment basin clearing) into the Deroche Creek fan approximately 5 m below grade.
	Installation of woody debris	Woody debris from cleared trees will be placed between the timber piles to form the timber deflectors.
	Surface Restoration	Refinish roads, driveways, and other surfaces disturbed due to the works.
Site Restoration	Site Restoration and Enhancement	Disturbed areas will be replanted with native shrubs and trees.

2.3 Construction Timeline

A portion of pre-construction tree and shrub clearing was completed in February and March 2024, prior to the start of general migratory bird nesting window for the area. Additional tree clearing was conducted in February and March 2025. Construction will begin in June 2025, starting with partial excavation of the sediment basin, construction of the offsetting channel, and installation of the timber deflectors. These works will be done in the dry. Instream works occurring during the reduced-risk work window for fish and wildlife for Deroche Creek (August 1 to September 15). This includes Taylor Bridge grade control, LWD reef, and completion of the sediment basin. Planting and staking will occur in fall 2025.

3. Environmental Setting

Deroche Creek provides important spawning and rearing habitat for several species of salmon, however, the frequent movement and deposition of sediment, channel instability, and intermittent flows currently impair its value. The creek supports runs of coho (*Oncorhynchus kisutch*) and chum salmon (*Oncorhynchus keta*). Records of cutthroat trout (*Oncorhynchus clarkii*) are also known from the creek. No new fish sampling was conducted by KWL as part of the environmental assessment.

The riparian vegetation within the assessed area of Deroche Creek consists disturbed young deciduous forest and mixed forest. Riparian vegetation on the alluvial fan consists of small black cottonwoods (*Populus tricocarpa*) and red alders (*Alnus rubra*) with an understory consisting predominantly of invasive reed canary grass (*Phalaris arundinacea*). Upstream of Taylor Road, the riparian community transitions into a mixed forest with larger cottonwood and western redcedar (*Thuja plicata*) with a sparse understory.

Invasive species observed through this reach include Himalayan blackberry (*Rubus armeniacus*), English ivy (*Hedera helix*), Japanese knotweed (*Fallopia japonica*), and Scotch broom (*Cytisus scoparius*).

The assessed area does not contain critical habitat for any aquatic or terrestrial species or birds protected under Schedule 1 of Canada's *Species at Risk Act*.

4. Regulatory Reviews, Permits, and Approvals

The following regulatory reviews, permits, and approvals have been identified as being required for the project:

- Fisheries and Oceans Canada – *Fisheries Act* Authorization.
- Fisheries and Oceans Canada – Scientific Licence for fish salvage activities for federally-regulated fish species.
- BC Ministry of Water, Land and Resource Stewardship – *Water Sustainability Act* Change Approval for Works In and About a Stream.
- BC Ministry of Water, Land and Resource Stewardship – Scientific Fish Collection Permit for fish salvage activities for provincially-regulated fish species.
- BC Ministry of Water, Land and Resource Stewardship – General Wildlife Permit for potential salvage of amphibians during construction.
- BC Ministry of Forests – Heritage Inspection/Investigation Permit.
- Leq'a:mel First Nation – Approval under Nation's Environmental Assessment Law (2018).
- Leq'a:mel First Nation – Permit under Nation's Soil Transport, Deposit, and Removal Law (2020).
- Leq'a:mel First Nation – Archaeological Permit for site investigation and, if required, alteration.

As institutional projects are generally not subject to the Riparian Areas Protection Regulation (RAPR), a provincial RAPR assessment is not required for this project.

A federal *Species at Risk Act* Permit is not required as no critical habitat for any listed aquatic or terrestrial species at risk has been designated within the site.

5. Construction Environmental Management Plan

The following measures will be used to avoid, minimize, and mitigate potential environmental impacts of the Project and to ensure compliance with all environmental legislation, permits, and approvals.

5.1 Environmental Monitoring

Environmental monitoring will be conducted to ensure appropriate measures are being taken to protect the environment. The Environmental Monitor (EM) must be an appropriate Qualified Environmental Professional (QEP). The EM will regularly inspect the work site for compliance with the environmental requirements of the Project. Observations will be recorded and reported to the Owner's Representative and the Contractor. The EM must be familiar with the regulatory requirements of the Project and has the responsibility to report all non-compliance events and stop work if necessary. The EM will be on-site at the project start-up and during any sensitive activity. A copy of this document will be kept on-site for the duration of the Project. Responsibilities of the EM will include, but are not limited to, the following:

- Review all permits, best management practices, and the CEMP.
- Be on site for Project start-up and critical instream works and works adjacent to sensitive areas.
- Meet with the Contractor before construction to explain all mitigation and environmental protection measures.
- Monitor project compliance with the CEMP, address changes with the Contractor and Consultant to ensure CEMP is continuously updated, as needed.
- Inspect all mitigation and erosion and sediment control (ESC) measures to ensure they are appropriate and working properly and recommend modifications and repairs when necessary.
- Have written authority to halt any construction activity if it is deemed necessary to protect fish, wildlife, and their habitat.
- Identify, monitor, and promptly report any situations of ongoing or potential damage to the environment.
- Report to the Engineer of Record and relevant regulatory agencies on environmental issues encountered during construction.
- Prepare and submit a monitoring summary report after the Project's completion to the Engineer of Record and any regulatory agencies, as required.

5.2 Timing of Works

- Project activities will be scheduled for dry weather conditions whenever possible.
- All instream works will be completed during the reduced risk work window for fish species documented in Deroche Creek (August 1 – September 15).
- Unless absolutely necessary to proceed with project works, tree removal and vegetation clearing is to take place outside the regional bird nesting period (March 1 to August 30) to avoid impacts to migratory birds. In certain areas with low habitat complexity (e.g., unvegetated, sparsely vegetated, isolated trees), bird nest searches may be considered at the discretion of a QEP. In the event that a bird nest search is conducted, the following will apply:
    - if an active nest is identified, a no-work zone buffer will be established and maintained around the active nest to minimize access and sensory disturbance;
    - the buffer distance will vary depending on the species of bird. Therefore, the buffer distance will be determined based on best management practices and the professional judgement of the QEP;
    - nests will be monitored to assess nest activity and effectiveness of the buffer. Clearing (disturbance) can continue once the EM has determined that the nest is no longer active;
    - if no active nests are found in surveyed areas, vegetation clearing (disturbance) can commence, but must be complete within 36 hours of the pre-disturbance nest survey being conducted; and
    - nests of birds in Schedule 1 of the Migratory Birds Regulations (2022) will be reported as required by the regulations and will be protected for the duration of time required by the regulations (e.g., 36 months for pileated woodpecker).

5.3 Protection of Fish and Fish Habitat

- Where instream works are isolated using a flow bypass or other similar means (if necessary), fish salvage will be undertaken before and during dewatering of the isolated area. To prevent the dewatering of areas outside of the work site, an appropriate bypass discharge location will be selected.
- During reinstatement of flows to the work area, measures will be taken to ensure the area downstream of the work site does not dewater (i.e., some flows should still be bypassed downstream).
- All pump intakes will be equipped with fish screens (mesh width < 2.54 mm) to prevent entrainment and impingement of fish, in accordance with the DFO Interim Code of Practice for End-of-pipe fish protection screens (DFO, 2020).
- Slow commencement of in-water activities is recommended to encourage mobile aquatic species to leave the construction area.
- The duration of in-water work and activity will be minimized so that it does not diminish the ability of fish to carry out one or more of their life processes.
- Minimal disturbance will occur to natural materials (e.g., embedded logs) and vegetation that contributes to habitat or stream channel stability.
- Minimal disturbance will occur to existing vegetation on and adjacent to the stream banks.

5.4 Tree Protection and Vegetation Management

- Professional arborists and biologists will be consulted throughout the site clearing and construction phases to minimize impacts to vegetation communities.
- Clearing will be limited to areas necessary for the works. Existing roads, trails, and other access points will be used where possible.
- A tree or other structure containing a nest of eagles, peregrine falcons, gyrfalcons, ospreys, and herons must not be felled, even outside of the breeding season for these species. This is in accordance with Section 34(b) of the *Wildlife Act*.
- Wildlife trees will be retained if possible. They provide essential habitat to birds and other wildlife.
- Where topping or removing dead limbs of dangerous trees will remove the hazard, this option is preferred over removing the entire tree.
- Cleared areas will be revegetated with native trees and shrubs when work is complete.

5.5 Invasive Plant Management

- All machinery will be inspected by the QEP before entering or leaving the construction site to remove any invasive plant propagules.
- All invasive vegetation removed will be disposed of off site at an appropriate facility.
- All material used on site (e.g., straw, hydroseeding, etc.) must be certified weed-free.
- Upon Project completion, native shrubs and trees will be planted in disturbed areas within the footprint to maintain soil stability and to minimize the potential for invasive species colonization.
- If patches of knotweed or hogweed are encountered during site clearing or other works in the Project area, they will be flagged off and reported to the QEP immediately. Knotweed must be managed carefully as it is able to reproduce from rhizomes and stem fragments. The following procedures will be adhered to:
    - all plant and soil material must be removed from site in a way as to minimize transfer of plant parts to other areas;
    - all plant parts must be removed, potentially by hand with appropriate personal protective equipment, sealed in plastic bags, and disposed of appropriately off site; and
    - topsoil within 10 m of the extent of the knotweed patch may not be used as backfill. The soil should be disposed off site at an appropriate waste management facility experiences in dealing with knotweed-contaminated soils.

5.6 Soil Testing and Handling

Materials excavated from the Project site may require sampling for contaminants before being removed from the site. If additional sampling is required, the contractor will coordinate with the EM to allow access for soil sampling when required. Any signs of soil contamination (staining, odor, sheen on water in excavation site) should be reported immediately to the EM.

If soil contamination is suspected, excavated materials will need to be stored on site until analytical results have been received. The material should be stored in a manner where potential contaminants will not runoff into adjacent waterbodies. The location should be coordinated with the EM.

If soil is deemed to be contaminated, special handling and disposal by the contractor may be required. The contractor will need to work under the direction of a qualified contaminated sites professional who will provide direction on appropriate soil excavation, handling, and disposal procedures to ensure all regulatory requirements for contaminated sites management are met.

5.7 Erosion and Sediment Control Plan

The purpose of erosion and sediment control (ESC) is to prevent the introduction of sediment (e.g., silt, clay, or sand) into watercourses. An ESC Plan will be prepared for the project which prescribes methods to prevent the erosion and mobilization of sediment of exposed areas by rainfall or water flow through the work site, to intercept and manage sediment-laden runoff from works before leaving the work site and entering the watercourse, and/or manage the risk of a sediment discharge.

The ESC measures can be adapted or added to before, during, and after construction as required based on the recommendations of the EM. ESC measures will be set up before starting work. Measures will be monitored regularly and maintained until all disturbed ground has been stabilized.

ESC measures included in the ESC Plan will incorporate the following measures at a minimum:

- Undertake works during dry weather where possible.
- Deposit all spoil materials above the high-water mark, ensuring sediment re-entry into watercourses or waterbodies is prevented.
- Cover all disturbed areas and spoil piles with poly sheeting or a reasonable alternative under the direction of the Consultant and/or if inclement weather is expected.
- Minimize vegetation disturbance on banks to the furthest extent possible.
- Deploy perimeter ESC measures such as silt fences, berms, and check dams as necessary.
- All ESC measures will be monitored regularly by both the Contractor and the EM and maintained until all disturbed ground has been stabilized.
- Any other measures needed to prevent erosion of a watercourse and work site, or sediment from entering any watercourse, as determined by the QEP, EM or Engineer.

5.8 Deleterious Substance Control and Spill Management

- Instream works will be carried out in accordance with the *Requirements and Best Management Practices for Making Changes In and About a Stream in British Columbia*. (Government of British Columbia, 2022) and *Best Management Practices for Site Restoration or Maintenance* (Government of BC 2022).
- Construction activities will follow Fisheries and Oceans Canada's *Land Development Guidelines* (DFO, 1993) to maintain the quantity and quality of fish habitat at the productive level present before development activities occurred.
- Machinery and equipment shall not be operated below the high-water mark of Deroche Creek or the Nicomen Slough unless it has been converted to use biodegradable hydraulic fluid and grease.
- All fueling of vehicles and equipment will be done off-site or onsite in a designated fueling area over a spill containment tray at least 30 m from Deroche Creek and Nicomen Slough.
- All equipment washing must be done off-site or onsite in a designated area at least 30 m from any watercourse or in a manner that will prevent wash from reaching any waterway.
- Generators, pumps, and other stationary equipment will be placed on spill trays or equipped with other secondary containment. Where possible, generators will be located at least 30 m from Deroche Creek or Nicomen Slough. Noise from generators will be suppressed using a suitable method (e.g., enclosing generators in plywood).
- All machinery will be clean, in good working condition and free of excess oil and grease. Equipment will be inspected daily and documented.
- Containers will be labelled according to the *Transportation of Dangerous Good Act* and *Workplace Hazardous Materials Information Systems* (WHMIS) regulations.
- Oil waste, filters, absorbent pads, and cartridges will be collected and disposed of off-site at an appropriate facility in accordance with federal, provincial, and municipal regulatory requirements.
- To prevent the release of substances toxic to fish, there will be no use of treated wood products within a watercourse.
- A spill response plan and spill kit will be on site and suitable for all substances on-site, and staff trained in its use.

Spill Response

- The contractor will prepare a spill management plan which includes notification procedures, contact telephone numbers and spill report forms.
- A spill kit will remain on site during construction. The kit will be stocked with appropriate supplies for the site size and conditions (e.g., absorbent pads, booms, granular absorbent). Staff will be trained in the proper use of the kit.
- Any spill of a toxic or deleterious substance over the reportable limits as outlined in the Ministry of Environment and Climate Change Strategy Spill Reporting Factsheet (MOE, 2021)[2] will be reported immediately to the BC Provincial Emergency Program 24–hour phone line at 1-800-663-3456.
- If a spill of toxic or deleterious substances occurs within a watercourse or waterbody both FOR and DFO will be notified immediately. All spills will be reported to the EM immediately.

5.9 Clean up and Restoration

- All construction materials, recyclables and garbage will be removed from site and responsibly disposed of after the Project is complete.
- Erosion and sediment control devices and measures will be removed following the stabilization of all disturbed areas.
- The contractor will be responsible for leaving the site in compliance with all Permits, Approvals, and Authorizations.

[2] https://www2.gov.bc.ca/assets/gov/environment/air-land-water/spills-and-environmental-emergencies/docs/materials/fact_sheet_spill_reporting.pdf

Report Submission

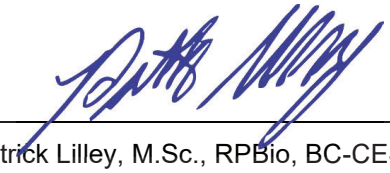
Prepared by:

KERR WOOD LEIDAL ASSOCIATES LTD.



Janice Kwo, M.Sc., RPBio
Project Biologist

Reviewed by:



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Senior Biologist

Statement of Limitations

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Revision History

Revision #	Date	Status	Revision	Author
2	June 3, 2025	Final	Update Project footprint	JVK
1	November 20, 2024	Final	Updated based on schedule change to 2025 construction	JVK
0	May 30, 2024	Final	Issued for Tender	JVK

References

Fisheries and Oceans Canada (DFO). 1993. *Land Development Guidelines for the Protection of Aquatic Habitat.* URL http://www.sxd.sala.ubc.ca/9_resources/fed_%20files/fed%20land%20development%20guidelines.pdf

Fisheries and Oceans Canada (DFO). 2019. *Measures to Protect Fish and Fish Habitat*. URL https://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures-eng.html

Fisheries and Oceans Canada (DFO). 2020. *DFO Interim Code of Practice for End-of-pipe fish protection screens for small water intakes in freshwater.* URL https://www.dfo-mpo.gc.ca/pnw-ppe/codes/screen-ecran-eng.html.

Government of British Columbia. 2022. *Requirements and Best Management Practices for Making Changes In and About a Stream in British Columbia*. Version 2022.01. URL https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/wsa-cias-requirements-bmps.pdf

Ministry of Environment (MOE). 2006. *Guidelines for Reduced Risk Instream Work Windows*. URL: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/work_windows_low_main.pdf

Ministry of Environment (MOE). 2014. *Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia.* URL https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/best-management-practices/develop-with-care

Ministry of Environment and Climate Change Strategy (MOE). 2021. B.C. Approved Water Quality Guidelines: Aquatic Life, Wildlife, and Agriculture. URL https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/wqg_summary_aquaticlife_wildlife_agri.pdf

Ministry of Water, Land, and Air Protection (WLAP). 2002. *A Field Guide to Fuel Handling, Transportation and Storage*. URL https://www2.gov.bc.ca/assets/gov/environment/waste-management/industrial-waste/industrial-waste/oilandgas/fuel_handle_guide.pdf

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Technical Memorandum

DATE: April 15, 2026

TO: Brenda Rotinsky, Watershed Operations Regulatory Manager
Via email

FROM: Janice Kwo, MSc, RPBio

RE: **Deroche Creek Sediment Long-Term Solution Project (23-HPAC-01232)**
Environmental Completion Report
Our File 2838.003-300

1. Introduction

This technical memorandum summarizes construction and environmental monitoring activities conducted for the Deroche Creek Sediment Long-Term Solution Project (the Project), which is located in Deroche, British Columbia. The purpose of the Project was to address the sedimentation impacts from the November 2021 atmospheric storms and subsequent flooding events. The Project involved construction of infrastructure to address sedimentation impacts and habitat offsetting measures.

Deroche Creek flows through Lakahahmen IR 11 where it enters Nicomen Slough, a historical side channel of the Fraser River that has had its inflow from the river regulated by diking and the "Bell Dam" since the 1930s. Lakahahmen IR 11 is located on and adjacent to the Deroche Creek alluvial fan, approximately 22 km east of the City of Mission, BC.

Ministry of Environment and Climate Change Strategy (ENV) and Leq'a:mel FN have collaborated to assess and address the impacts of sedimentation in Deroche Creek. Kerr Wood Leidal Associates Ltd. (KWL) has been retained as a subconsultant to the Engineer-of-Record, Northwest Hydraulic Consultants (NHC). KWL acted as the Qualified Environmental Professional (QEP) and LFN acted as the Environmental Monitor (EM) for the Project.

2. Permitting and Approvals

The project works were undertaken in compliance with best management practices, and in accordance with the terms of the following regulatory permits and approvals. All permits listed below can be found in Enclosure A. The following permits were acquired:

- **Fisheries and Oceans Canada –** *Fisheries Act* Authorization (23-HPAC-01232), originally issued July 25, 2024, amended and issued January 15, 2025.
- **Fisheries and Oceans Canada –** Scientific Licence for fish salvage activities for federally-regulated fish species (XHAB 128 2025), issued April 4, 2025.
- **BC Ministry of Water, Land and Resource Stewardship –** *Water Sustainability Act* Change Approval for Works In and About a Stream (File 2011239), dated November 13, 2024.
- **BC Ministry of Water, Land and Resource Stewardship –** Scientific Fish Collection Permit for fish salvage activities for provincially-regulated fish species (Permit No. SU25-942716) issued April 24, 2025.
- **BC Ministry of Water, Land and Resource Stewardship –** General Wildlife Permit for potential salvage of amphibians during construction (Permit No. SU25-942717), issued April 28, 2025.

3. Summary of Works Undertaken

The Project included the following works:

1. Construction of a sediment basin with a low-flow channel to increase area available for sediment deposition and reduce infilling of the lower channel and fan, which has the potential to impede the migration of fish during low flows and smother spawning habitat downstream. Void filled rip rap along the banks was staked.
2. Installation of bed armouring at Ministry of Transportation & Infrastructure's Taylor Road Bridge in Reach 2, downstream of the proposed sediment basin, to prevent degradation due the reduction in sediment supply.
3. Construction of two timber pile deflectors on the Deroche Creek alluvial fan perpendicular to the Taylor Road to prevent high flows from eroding the embankment of Taylor Road. Douglas fir piles were driven into the substrate and woody debris and logs were woven between the piles.

3.1 Offsetting Measures

In addition to the work listed above, the following offsetting measures were implemented as part of the Project:

1. Construction of rearing habitat channels in the Deroche Creek alluvial fan (1,812 m^2). The original design had four separate rearing channels, but due to access issues and water levels, two channels with two branches each were constructed. Some gravel was removed from Deroche Creek to achieve the correct grade at the connection point of the habitat channels. Western redcedar rootwads were placed in the fan channels to provide instream cover.
2. Installation of a large woody debris reef along the Highway 7 embankment to improve habitat complexity and stabilize the bank (983 m^2). The reef was constructed using untreated Douglas Fir posts and filled with woody debris from trees cleared on site. Bracing logs were placed on the fill and braced into place using steel cables to keep them in place during high flows. The bypass channel constructed during isolation was left in place as an additional channel for fish passage.
3. Large woody debris (western redcedar root wads) and boulders were placed in the low-flow channel as habitat complexing features (714 m^2).
4. Enhancement of riparian habitat of Deroche Creek through invasive species removal and native planting. A total of 1,143 trees, 10,423 shrubs, and 12,000 live stakes were planted on site. The total planted area for the Project was approximately 8,236 m^2 due to the configuration of the channels being changed in the field in consultation with the QEP. The creation of branched channels instead of individual channels reduced the amount of available planting area.

Fixed photo points for monitoring for the offsetting components have been established and are shown in Figure 1. A habitat balance comparing actual and planned HADD and offsetting measures outlined in Condition 4.1 of the *Fisheries Act* Authorization is provided in Table 1.

Table 1. Habitat Balance for Aquatic and Riparian Habitat

Project Component	Type	FAA Authorized Area (m^2)	As-Built Area (m^2)	Difference (m^2)
Aquatic				
Sediment Basin & Armouring	Impact Area	3810	3973	-163
Rearing Habitat Channels	Offsetting	1325	1358	33
LWD Reef		1200	983	-217
Habitat Complexing (LWD in Low-Flow Channel)		700	714	14
			Difference	**-333**
Riparian				
Sediment Basin	Impact Area	7400	5582	1818
Planting	Offsetting	9800	8236	-1564
			Difference	**254**

A summary of Project impacts and offsetting are shown in Figure 2 and Figure 3.

The planting area was smaller than intended due to the rearing channel reconfiguration. However, the same number of plants were installed at a higher density through the site. Additionally, the actual riparian impact of the Project was 5,582 m^2, which is 1,818 m^2 less than the projected impact area. Therefore, the Project resulted in a net gain of 254 m^2 of riparian habitat.

No additional offsetting measures are recommended to meet the conditions of the Authorization. Additionally, gravel removal was completed along the west branch of Deroche Creek through the alluvial fan to improve fish passage. This additional work was not included in the original offsetting plan.

As-built drawings are available in Enclosure B.

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Northwest Hydraulic Consultants
Deroche Creek Long-Term Flood Mitigation

KERR WOOD LEIDAL consulting engineers



Project No. 2838.003
Date April 2026
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Photo Monitoring Locations

Figure 1

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Deroche Creek Long-Term Flood Mitigation

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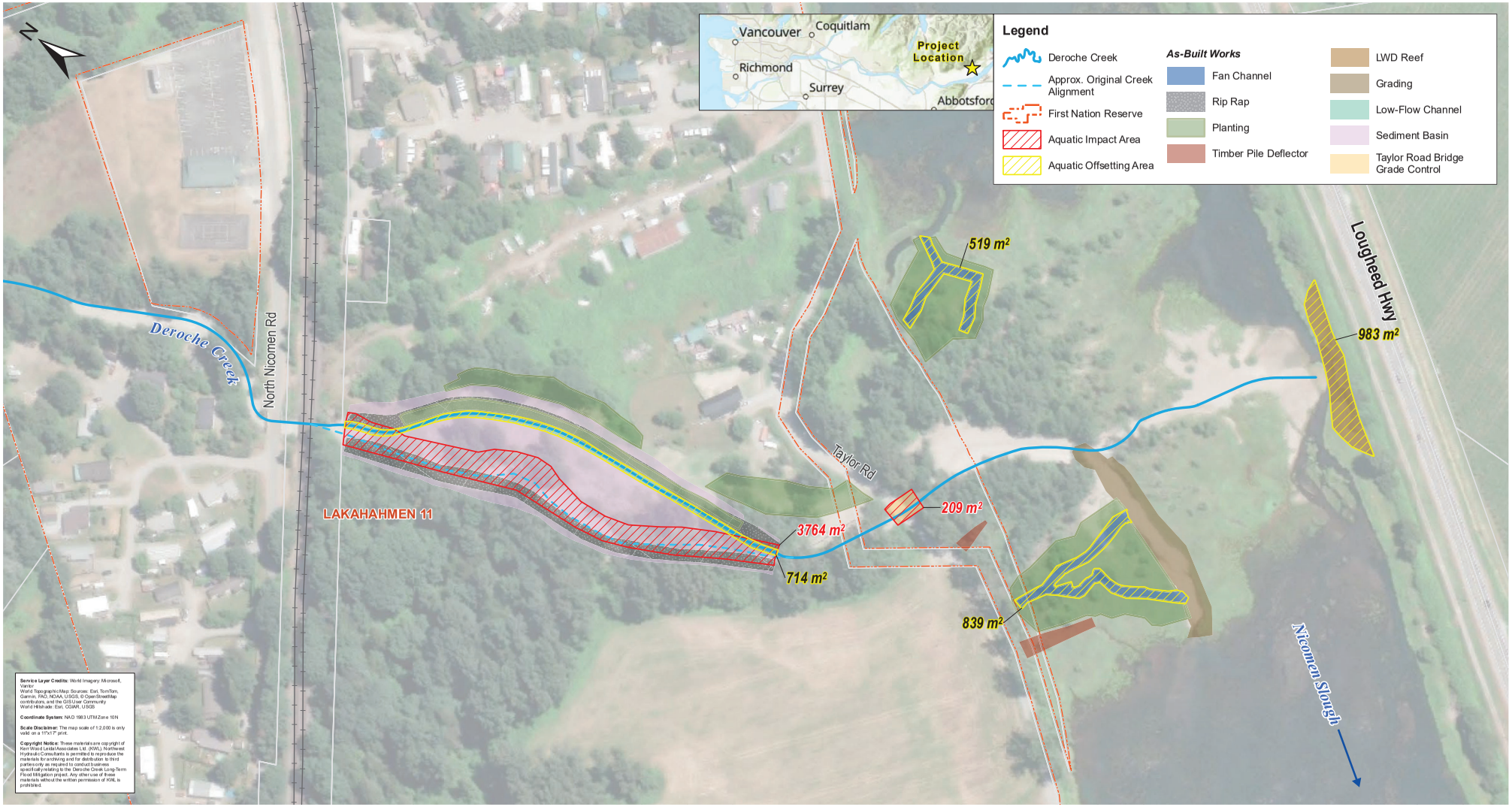

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Aquatic Impact Areas

Figure 2

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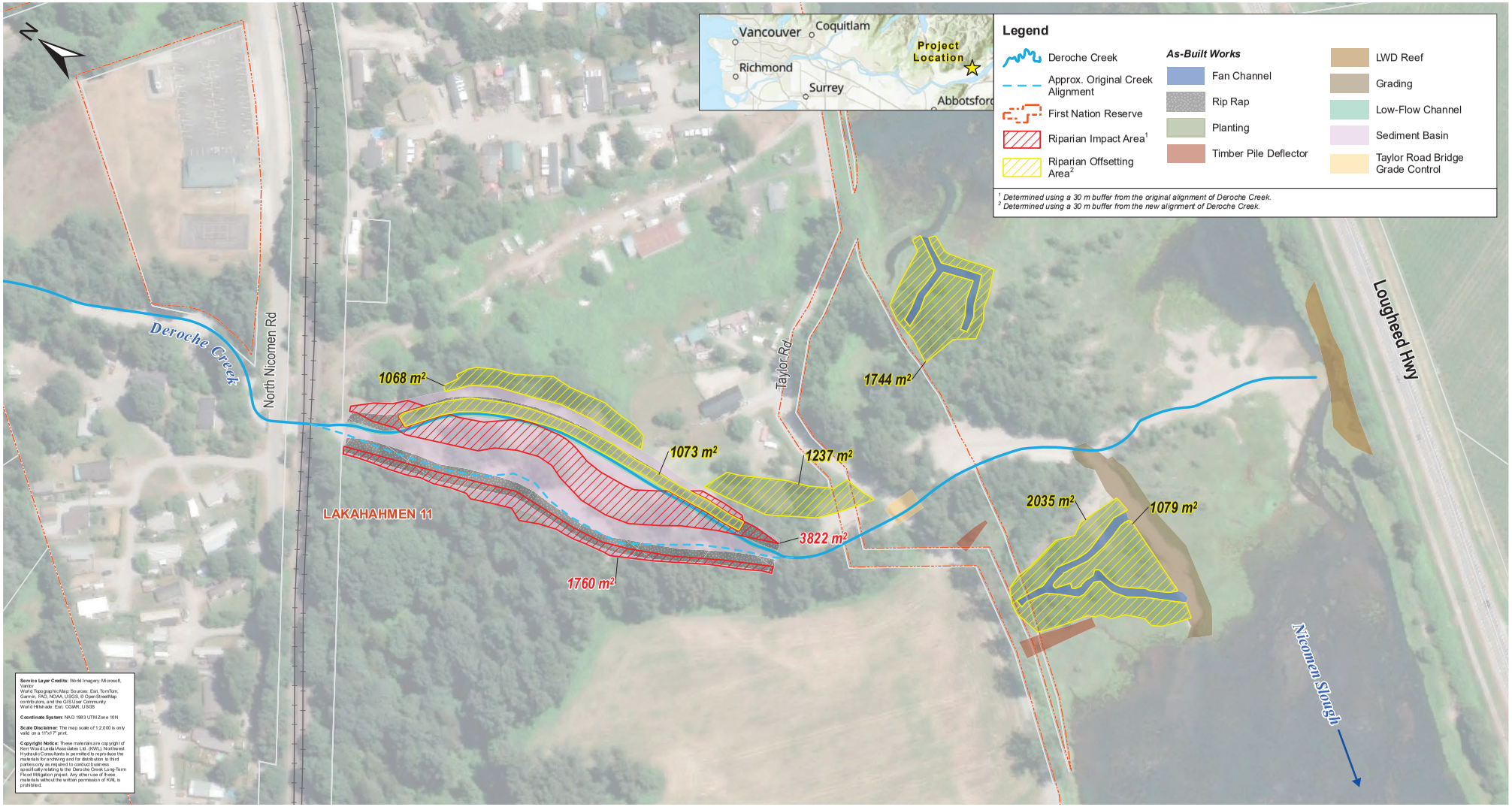

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Riparian Impact Areas

Figure 3

4. Project Timing

The Project construction timeline is outlined below:

- **March 6 & 7, 2024** – Tree clearing was conducted within the sediment basin footprint. Bird nesting surveys were completed prior to clearing. No clearing was done within 10 m of Deroche Creek, as per instruction from DFO.
- **June 9 to July 31, 2025** – Start of construction. The QEP allowed Timbro to work below the high-water mark of Deroche Creek since no flows were observed and it was historically dry during the summer. During this time the sediment basin and armouring of Taylor Road Bridge were completed. The fan channels were also constructed at this time since water levels in Nicomen Slough were lower than the elevation of the channels.
- **August 1 to September 15, 2025** – The LWD reef was constructed in the Nicomen Slough during the least-risk window for the area. This involved construction of a bypass channel through the alluvial fan, isolation of the work site, construction of the reef, and rewatering of the work site. The bypass channel was not decommissioned.
- **September to December, 2025** – The restoration areas were planted, and the banks of the sediment basin were staked. Works were completed by December 31, 2025.

5. Site Inspections and Monitoring

A LFN Environmental Monitor (EM) conducted full-time on-site environmental monitoring during in-stream works. Part-time monitoring occurred during low-risk activities, once in-stream work was complete. All EMs were supported and under the direction of a KWL Qualified Environmental Professional (QEP). The QEP was on site during high-risk activities (i.e., isolation, dewatering, fish salvage, rewatering). Site inspections were completed to ensure that the project works were compliant with the conditions included in all applicable environmental legislation, permits, and approvals, and BMPs.

All works below the top of bank were monitored by an EM. Turbidity was monitored during installation and removal of site isolation in Nicomen Slough. During inspections, the EM documented the following items related to compliance with the environmental permits and implementation of BMPs:

- location(s) of maintenance activities;
- weather conditions;
- environmental protection measures and materials on site;
- condition of site equipment and their set up;
- storage and handling of fuel and hazardous/waste products;
- discussions with construction supervisors and staff; and
- any environmental deficiencies, incidents, concerns, recommendations, and/or required actions.

Site photographs (Enclosure C) were also taken during each site visit.

6. Site Isolation and Fish Salvage

No fish salvage or isolation measures were required for works in Deroche Creek or the alluvial fan since these areas were not wetted at the time of construction.

Bypass and isolation measures were installed in the Nicomen Slough prior to the construction of the LWD reef. A bypass channel was constructed through the alluvial fan to the west of the existing channel. A culvert was installed in this channel to allow for machinery access to the work site. This was completed in the dry and then connected to the Nicomen Slough on August 6, 2025, during the least-risk fish window under supervision of the QEP. Turbidity was monitored approximately 20 m downstream of the bypass channel during the connection of the upstream and downstream sections. Measurements are summarized in Table 2.

Once the bypass channel was functioning, isolation measures were installed around the LWD reef work site. Bulk bags on top of poly sheeting were initially used to isolate the area on the upstream and downstream ends. A fish salvage using minnow traps and seining netting was conducted on August 6 and 7 by KWL biologists Janice Kwo, RPBio, and Bridget MacGillivray, BIT. Fish salvage results are summarized in Table 3. However, due to the difference in the depth of the water between the Nicomen Slough and the work site during dewatering, the upstream isolation failed. A fill berm was constructed next to the upstream bulk bags within the work area, under supervision of the QEP. The contractor used slow start procedures to allow fish to leave the area. A 3” pump with a fish screen was used to control local turbidity. Water was pumped to a vegetated area south of the site.

Once isolation was reestablished, 3” pumps were used to lower the water levels. Based on the porous nature of the substrate, the contractor was unable to completely dewater the site. A second fish salvage was conducted on August 12 by KWL biologists Matt Sanders, RPBio, and Oskar Von Wahl, RPBio. The salvage was conducted by seine netting. The majority of species caught were invasive. A summary of the salvage results is provided in Table 4.

Once the LWD reef was completed, the QEP and Engineer-on-Record decided the bypass channel could remain in place and only the culvert would be removed. Bulk bags on poly sheeting were placed upstream and downstream of the culvert to isolate the area before removal. The area was salvaged on September 10, 2025, using an Electrofisher by KWL Biologist Janice Kwo, RPBio and LFN Guardian Erik Still. A summary of the fish salvage results is provided in Table 5. Isolation measures around the LWD reef were removed on September 10, 2025, under supervision of the QEP. Turbidity monitoring was conducted downstream of the area, and a summary is provided in Table 6.

All native species of fish captured during the salvage were released back into Nicomen Slough downstream of the work site in a slow-moving area with cover. Non-native fish species captured were humanely euthanized as per the conditions of the fish collection permits.

There were no wildlife salvages conducted and no incidental wildlife observations.

Table 2: Turbidity Measurements During Connection of Bypass Channel, ~20 m Downstream of Site, August 6, 2025

Time	Turbidity (NTU)	Comments
9:00	3.44	Prior to works
9:30 – 9:40	45 – 85	During connection of downstream section
9:40	300	Large turbidity plume for ~ 20 seconds during excavation
9:41	90	Excavation complete
9:45	25	Turbidity decreasing
10:30	5.15	Prior to connection of upstream section
10:38	20	Start of upstream connection
10:41	53	During upstream connection
10:43	70	
10:45 – 11:00	28 - 78	Minor drop in turbidity while contractor was changing buckets
11:00	70	Connection complete
11:15	10	Visible turbidity has cleared from area

Table 3: Fish Salvage Results for Nicomen Slough, August 6 and 7, 2025

Common Name	Scientific Name	Method of Capture	Status	Quantity
Bass	*Micropterus sp.*	Seine netting	Invasive	30
Brown Catfish	*Ameiurus nebulosus*	Seine netting	Invasive	3
Carp	*Cyprinus carpio*	Seine netting	Invasive	2
Pumpkinseed	*Lepomis gibbosus*	Seine netting	Invasive	43
Signal Crayfish	*Pacifastacus leniusculus*	Seine netting/Dipnetting	Native	32
Largescale Sucker	*Catostomus macrocheilus*	Seine netting	Native	9
Pacific Lamprey	*Entosphenus tridentatus*	Seine netting/Dipnetting	Native	3
Northern Pikeminnow	*Ptychocheilus oregonensis*	Seine netting	Native	12
Sculpin	*Cottus sp.*	Seine netting	Native	15

Table 4: Fish Salvage Results for Nicomen Slough, August 9, 2025

Common Name	Scientific Name	Method of Capture	Status	Quantity
Bass	*Micropterus sp.*	Seine netting	Invasive	73
Brown Catfish	*Ameiurus nebulosus*	Seine netting	Invasive	108
Carp	*Cyprinus carpio*	Seine netting	Invasive	22
Pumpkinseed	*Lepomis gibbosus*	Seine netting	Invasive	78
Signal Crayfish	*Pacifastacus leniusculus*	Seine netting/Dipnetting	Native	293
Largescale Sucker	*Catostomus macrocheilus*	Seine netting	Native	2
Pacific Lamprey	*Entosphenus tridentatus*	Seine netting/Dipnetting	Native	15
Northern Pikeminnow	*Ptychocheilus oregonensis*	Seine netting	Native	5
Sculpin	*Cottus sp.*	Seine netting	Native	16

Table 5: Fish Salvage Results for Nicomen Slough, September 10, 2025

Common Name	Scientific Name	Method of Capture	Status	Quantity
Bass	*Micropterus nigricans*	Seine netting	Invasive	15
Pumpkinseed	*Lepomis gibbosus*	Seine netting	Invasive	12
Pacific Lamprey	*Entosphenus tridentatus*	Seine netting	Native	1
Sculpin	*Cottus sp.*	Seine netting	Native	1

Table 6: Turbidity Measurements During Removal of Site Isolation in Nicomen Slough, September 10, 2025

Time	Turbidity (NTU)	Comments
9:25	2.61	Prior to works
13:44	66	~10 m downstream
	13	~20 m downstream
14:00	135	~20 m downstream
15:25	55	~20 m downstream

7. Mitigation Measures

All construction activities were conducted following B.C. Ministry of Environment's *Standards and Best Practices for Instream Works* (B.C. Ministry of Water, Land and Air Protection, 2004). Environmental mitigation measures for the construction activities were provided as follows:

- Works below the high water mark were monitored fulltime by an EM under the supervision of a QEP.
- All works below the high water mark were conducted in the dry.
- Isolation, dewatering, and fish salvage were conducted where required under direct supervision of the QEP. Pumps used for dewatering were screened according to DFO's interim Code of Practice for End-of-pipe Fish Protection Screens for Small Water Intakes (DFO, 2020).
- Disturbed riparian areas were restored to stable condition after works were completed.
- Spill kits were present on site.
- Discussions were held with the contractor to discuss and address any environmental deficiencies.

Please see the Construction Environmental Management Plan (CEMP) for a detailed list of mitigation measures (Enclosure D).

8. Compliance and Environmental Incidents

The following non-compliance events arose throughout the Project:

- **Turbidity exceedances** – Exceedances up to 296 NTU above background conditions occurred during the connection and the decommissioning of the bypass channel in Nicomen Slough. Mitigation measures were implemented, such as:
  - temporarily stopping works until turbidity decreased; and
  - using a 3” pump to remove turbid water.

  These exceedances were permitted by the EM since BMPs were implemented properly, no other feasible options were available, and work could be completed in a reasonable timeframe.
- **Disturbance of Japanese knotweed –** Along the access route to the fan channels 1 and 2 on the north side of the alluvial fan, Japanese knotweed was disturbed. On July 23, the QEP was on site and observed that a patch of knotweed had been run over by machinery. This area was flagged off to prevent access, and a new access route was identified with the contractor.
- **Spill/Use of machinery below the high-water mark without biodegradable hydraulic fluid** – On August 28, 2025, machinery from the pile driving subcontractor leaked approximately 1 L of hydraulic fluid on the swamp pads. Absorbent padding was placed on the swamp pads and there was no release into water. The EM noted that the machinery was not using biodegradable hydraulic fluid. The machine was immediately removed and the contractor was notified. Once the machine was switched to biodegradable hydraulic fluid, works resumed.
- **Spill** – On September 8, 2025, an excavator leaked approximately < 1L biodegradable hydraulic fluid onto the alluvial fan channel, which was dry at the time. Some was contained in the spill tray and some leaked onto the ground. The contaminated soil was excavated and removed from below the high-water mark and disposed of.

Aside from the non-compliance events above, no environmental incidents occurred during the project works.

9. Closure

We trust this submission meets your requirements for documenting the construction activities for the Deroche Creek Sediment Long-Term Solution Project.

KERR WOOD LEIDAL ASSOCIATES LTD.

Prepared by:

Janice Kwo, MSc, RPBio (BC)
Project Biologist

Reviewed by:

Christy Juteau, MA, RPBio (BC)
Technical Reviewer

JVK/tgv

Encl.: Enclosure A – Permit and Approval Documents
Enclosure B – As-Built Drawings
Enclosure C – Site Photographs
Enclosure D – Construction Environmental Management Plan

Statement of Limitations

This document has been prepared by Kerr Wood Leidal Associates Ltd. (KWL) for the exclusive use and benefit of the intended recipient. No other party is entitled to rely on any of the conclusions, data, opinions, or any other information contained in this document.

This document represents KWL's best professional judgement based on the information available at the time of its completion and as appropriate for the project scope of work. Services performed in developing the content of this document have been conducted in a manner consistent with that level and skill ordinarily exercised by members of the engineering profession currently practising under similar conditions. No warranty, express or implied, is made.

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Revision History

Revision #	Date	Status	Revision Description	Author
0	April 15, 2026	Final	Issued as Final	JVK

Innovation. Integrity.
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Enclosure A

Permit and Approval Documents

November 13, 2024 File Number: 2011239

Amy Vallarino
BC Ministry of Environment and Climate Change Strategy
PO BOX 9360 Stn Prov Govt
Victoria , BC V8W 9M2
Sent via email: Amy.Vallarino@gov.bc.ca

Dear Amy Vallarino,

Re: Application for approval to make changes in Deroche Creek and Nicomen Slough That Part of SW1/4 Lying West of District Lot 475, Group 1, and East of Nicomen Slough, Section 5, Township 24, East of the Coast Meridian, 29TR1A_IR, in the Vicinity of Lakahahmen IR 11 New Westminster Regional District. Unsurveyed Crown foreshore or Land Covered by Water being part of the Bed of the Deroche Creek and lands held under Permit # 29854 authorizing the Occupation of Crown Land.

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

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

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

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

The holder of this Approval must advise Water Authorizations at SouthCoastWSAReporting@gov.bc.ca with the Approval number in the subject line, five (5)

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

working days prior to commencement and five (5) working days following completion of the authorized work to facilitate the timing of auditing.

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

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.

When choosing compensation/restoration locations, it is encouraged to avoid areas that are isolated or are discontinuous from existing habitat, to avoid creating habitat sinks, and enable wildlife access.

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

The holder of this Approval must 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.

You are reminded of requirement to comply with Permit # 2024-02415 issued by the Ministry of Transportation "Permit to Construct, Use and Maintain Works within the Right of Way of a Provincial Public Highway" Under the Transportation Act and/or the industrial roads Act and/or the Motor Vehicle Act and/r as defined in the Nisga'a final agreement and the Nisga'a final Agreement Act dated May 7, 2024.

It is the Ministry's understanding that Leq'a:mel First Nation will be maintaining the sediment basin following completion of works. Future maintenance of the basin (e.g. additional sediment removal) is not authorized under this Change Approval and will require appropriate authorization. If regular maintenance is expected to be required, the holder of this Approval is encouraged to apply for a Water Licence as soon as possible.

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: Janice Kwo, KWL, Email: jkwo@kwl.ca
Pradeep Poudel, Ministry of Water, Land and Resource Stewardship, Email: Pradeep.1.Poudel@gov.bc.ca
Leq'a:mel First Nation (LFN)
Peters First Nation
Snuneymuxw First Nation
S’ólh Téméxw Stewardship Alliance Strategic Engagement Agreement
People of the River Referral Office (PRRO)

November 13, 2024 File Number: 2011239

APPROVAL

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

Ministry of Environment and Climate Change Strategy and Leq'a:mel First Nation
are hereby authorized to make changes in and about a stream as follows:

(a) The names of the streams are Deroche Creek and Nicomen Slough, herein referred to as the stream(s).

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

1. Deflection Berms/Reach 1:

   i. Clearing of vegetation and trees along the access path and within the berm footprints from Taylor Road over an approximate footprint of 2400 square metres.
   ii. Placement and compaction of subgrade and fill for the berm(s).
   iii. Installation of riprap at the head of the berm.
   iv. Install high-performance turf reinforcement (HPTRM) along the trunks of both berms, with soil amendments and revegetation augmentation.
   v. Restoration of the site with native riparian plant species and willow staking on the installed riprap at the end of the berm and placement of cleared trees between the berms in order to provide fish cover during high water conditions, all over an area of approximately 6667 square metres.

2. Sediment basin

   i. Clearing of vegetation and trees along the access path from Taylor Road to the downstream extent of the sediment basin and on the

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

east bank of Deroche Creek within the basin footprint over an area of approximately 6200 square metres.
ii. Site isolation and dewatering, including us of pumps as required.
iii. Install exclusion fencing to prevent fish access.
iv. Excavation and grading of the sediment basin.
v. Installation of riprap back-filled with an appropriate growing substrate for vegetation above the normal high-water mark.
vi. Establish a low-flow channel through the basin to convey base surface flows once they return to the creek.
vii. Restoration of the site with native riparian plant species and willow staking on the installed riprap at the end of the berm and placement of cleared trees between the berms in order to provide fish cover during high water conditions, all over an area of approximately 6328 square metres.

3. Taylor Bridge:

i. Clearing of vegetation and trees along the access path from Taylor Road.
ii. Site isolation and dewatering, including use of pumps as required.
iii. Excavation of sediment to subgrade, placement of boulders in a checkerboard pattern and filling voids using excavated sediment.
iv. Restoration of the site with native riparian planting over approximately 414 square metres.

4. Offset Measures

i. Construction of four habitat channels within the northeast and southeast portions of the Deroche Creek alluvial fan over approximately 1325 square metres.
ii. Installation of a large woody debris reef along the Highway 7 embankment to improve habitat complexity, limit erosion, and encourage natural channel migration away from the south bank of Nicomen slough, all over an area of approximately 1200 square metres.
iii. Installation of habitat complexing features, including installation of large woody debris in the sediment basin low flow channel over an area of approximately 700 square metres.
iv. Enhancement of the existing riparian habitat along Deroche Creek via planting of native shrubs and trees and removal of invasive species, all over an area of approximately 9800 square metres.

That Part of SW1/4 Lying West of District Lot 475, Group 1, and East of Nicomen Slough, Section 5, Township 24, East of the Coast Meridian, 29TR1A_IR, in the Vicinity of Lakahahmen IR 11 New Westminster Regional District. Unsurveyed Crown foreshore or Land Covered by Water

being part of the Bed of the Deroche Creek and lands held under Permit # 29854 authorizing the Occupation of Crown Land.

(c) The location of the works is at the following coordinates, as provided by the applicant are:
    1. Offset locations: 49.1825390, -122.0708980 and 49.1841060, -122.0717250.
    2. Sediment basin: 49.1851240, -122.0750980.
    3. Taylor Road Bridge location: 49.1837530.
    4. Deflection berms: 49.1828910, -122.0735630.

(d) The works authorized in this Approval must be completed on or before. December 31, 2025.

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

(f) All works associated with the Effectiveness Monitoring Plan, as outlined in clause (x) below, must be completed by December 1, 2035, ten years after the works are completed.

(g) As much as is practicable, the construction area(s) and access routes must be marked on-site prior to starting groundwork. Any vegetation removal must be minimized and limited only to the areas required for active construction, with consideration for the timing and scheduling of work.

(h) Work in the stream and stream channel must occur during the reduced risk instream work window of August 1 to September 15, so that the fisheries interests are protected:

(i) All works must be completed within the designed project footprint and in accordance with the following:

    1. “Deroche Creek Sediment Long-term Solution Project: Environmental Assessment” prepared by Kerr Wood Leidal Associates Ltd. for the BC Ministry of Environment and Climate Change Strategy dated September 15, 2023.
    2. “Deroche Creek Sediment Long-Term Solution Project: Environmental Assessment and Offsetting Plan” prepared by Kerr Wood Leidal Associates Ltd. For the BC Ministry of Environment and Climate change Strategy dated May 29, 2024.
    3. Deroche Creek Sediment Long-Term Solution Project “Construction Environmental Management Plan” prepared by Kerr Wood Leidal Associates Ltd. For the BC Ministry of Environment and Climate

Change Strategy dated September 29, 2023, and updated on December 18, 2023.

4. " Deroche Creek Recovery Solution Project: Final Hydrotechnical Design Report Rev.0" prepared by Northwest Hydraulic Consultant (NHC) for Ministry of Environment and Climate Change Strategy dated May 27, 2024.
5. "Leq'a:mel First Nation Permit Report: Archaeological Assessment Deroche Creek, Phase 1" prepared by Summit Earthworks Inc. for Leq'a:mel First Nation Lands Department dated October 31, 2023.
6. Sealed Engineering drawings IFT for Deroche Creek Recovery Solutions prepared by NHC for Ministry of Environment and Climate Change Strategy and Leq'a:mel First Nation dated 30 April 2024, including:
   v. 001 Title Sheet and Project Location
   vi. 002 Site Plan
   vii. 003 Reach 1 Works Plan and Profile Views
   viii. 004 Reach 2 Works- Plan and Profile Views
   ix. 005 Reach 1 Typical Sections and Profiles
   x. 006 Reach 2 Typical Sections and Profiles
   xi. 007 Sediment Basin- Standard Sections
   xii. 008 Lot 8-3-3 Grading Plan
   xiii. 009 Off-Setting Works
   xiv. 010 Off-Setting Works- Typical Sections and Profiles
   xv. 011 Planting Plan

(j) 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 must:

1. Ensure all best management practices and mitigation measures are in place to avoid and minimize environmental impact on the land and on fish and fish habitat of the stream.
2. Where applicable, assist in the isolation of the stream prior to the commencement of works.
3. Implement and ensure erosion and sediment control measures are constructed, installed, and maintained appropriately for the full duration of instream works.
4. Supervise all instream works authorized under this Approval.
5. When the works involve temporary diversions to isolate the work site,
   i) Monitor all diversion works daily to ensure pumps & flow bypasses are in proper working condition;
   ii) Ensure diversion works that include pump intakes be screened for fish and aquatic species in accordance with the "Interim

code of practice: End-of-pipe fish protection screens for small water intakes in freshwater" (Fisheries and Oceans Canada, 2020); and

iii) Ensure fish are prevented from entering the works.

6. When the works involve dewatering or isolation of flow and the stream is known or suspected to contain fish and/or amphibians,
   i) Attend the site prior to conducting any instream works to complete fish and wildlife search and salvage(s);
   ii) Obtain any permits needed prior to undertaking the salvage(s); and
   iii) Inspect the extraction area for fish stranding at least once after water levels have declined.
   iv) Protect the species at risk and salvage under the direction of a Qualified Environmental Professional in the event of discovery of species at risk. The works must not result in harm to species at risk.
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. 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 must 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.

(k) All work must be carried out in accordance with the Provincial "Requirements and Best Management Practices for Making Changes In and About A Stream in British Columbia" (2022). The Provincial guidance document can be found at the following link: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/wsa-cias-requirements-bmps.pdf .

(l) 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.

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

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

(o) All equipment and machinery used in or near the stream channel:

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 refueled a minimum of 30 meters 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 must be exercised during all phases of the work to prevent the release of silt, sediment, sediment-laden water, raw concrete, concrete leachate, or any deleterious substances. All control measures must meet or surpass the Requirements and Best Management Practices for Making Changes in and About a Stream in British Columbia (2022) and the "Land Development Guidelines for the Protection of Aquatic Habitat" (Fisheries and Oceans Canada and the British Columbia, 1993).

(q) Discharge and runoff water from the site into any watercourse(s) must comply with the BC Approved Water Quality Guidelines for the Protection of Aquatic Life (https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines/approved-water-quality-guidelines) and/or the applicable Local Government Bylaw(s) .

Water quality monitoring must be conducted by an appropriately Qualified Professional or a designate (in writing) Environmental Monitor on every day in which instream works are being conducted. Measurements must be taken upstream of any works taking place and within the extent of the sedimentation downstream of where instream work is actively occurring. Measurements are to be taken immediately prior to works beginning, and then at regular intervals until the works are completed and may require additional frequency during wet weather conditions. Wet weather conditions will be defined as being equal to or greater than 25 millimetres of rainfall within a 24-hour period. All excavated material and debris must be removed from the site or placed in a stable area above the high water mark of the stream. Mitigative measures must

be applied to protect the excavated material and debris from erosion and reintroduction into the watercourse. These measures may include covering the material with erosion blankets, seeding and planting with native vegetation, or as otherwise directed by a Qualified Professional.

(r) All excavated material and debris must be removed from the site or placed in a stable area above the high-water mark of the stream. Mitigative measures must be applied to protect the excavated material and debris from erosion and reintroduction into the watercourse.

(s) The holder of this Approval must ensure that instream works are designed and installed so as not to restrict fish passage and/or lead to fish stranding. The works must not result in depressions that have the ability to trap fish and other aquatic life.

(t) All temporary works (including a ford, stream crossing, flow bypass, and erosion and sediment control measures) must be removed on completion of the project, and the stream channel restored to its natural condition.

(u) All disturbed areas of the banks of the stream must be restored using native vegetation suitable for the site conditions.

(v) All rock used in the works must be clean and free of sediment producing material, durable, non-acid generating and suitably graded. Any other engineering material required for the construction of the works must be clean of any substances deleterious to aquatic life.

(w) 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 must cease if the Drought Level Classification is at Level 5. The proponent must contact WLRS and DFO 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 WLRS and DFO.

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 must 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 must be inspected regularly and maintained throughout the project.

(x) The holder of this Approval must retain an appropriately Qualified Professional to develop and implement a Five-Year effectiveness monitoring for aquatic habitat and channel function and Ten-Year Effectiveness Monitoring Plan for riparian habitat 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. Invasive species management; and
4. Monitoring water flow and function with proposed adaptive management strategies to address shortfalls.
5. Monitoring of Fish habitat (Water Quality, Water Quantity/Flow, Habitat Quantity/quality), Fish community (fish diversity, relative abundance), Riparian habitat (vegetation cover, density and survival, riparian stability)
6. Monitoring of sediment basin for its performance, functionality and stability, the monitoring parameters could be photo documentation, sediment volume, elevation of riverbed, scouring or undercut banks etc.

Annual reports must be submitted by December 1 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.

(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 must 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 pre-construction and post-construction surveys if undertaken;
5. The quantity of gravel removed;
6. Representative site photographs;
7. Whether or not they observed or were otherwise aware of any non-compliance with the terms and conditions of this Approval; and

8. A description of any environmental incidents, non-compliance or other difficulties, and how these were addressed and reported.

Sincerely,



Michael Currie
Assistant Water Manager

Province of British Columbia
Water Sustainability Act

PERMIT 29854 AUTHORIZING THE OCCUPATION OF CROWN LAND

The holders of this permit, BC Ministry of Environment and Climate Change Strategy and Leq'a:mel First Nation (29854), whose Change Approval authorizes changes in and about a stream (Deroche Creek and Nicomen Slough), are hereby authorized to occupy Crown Land by constructing, maintaining and operating the works as authorized in the Change Approval (2011239).

(a) The Crown land which is authorized to be occupied under this permit is Unsurveyed Crown foreshore or Land Covered by Water being part of the Bed of the Deroche Creek, the location of which is shown approximately on the plan listed in said Change Approval.

(b) The approximate area of the Crown Land authorized to be occupied under this permit is 0.754 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

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

January 2025 Amendment[1]

Authorization issued to
BC Ministry of Environment and Climate Change Strategy *(hereafter referred to as the "Proponent"*)

Attention to: Amy Vallarino
PO Box 9337 Stn Prov Gov't
Victoria, BC V8W 9M1

Location of Proposed Project

Municipality: Deroche
Province: British Columbia
Name of watercourse: Deroche Creek and Nicomen Slough
Longitude and latitude: 49.186157, -122.075846 (upstream) to 49.182694, -122.074070 (downstream)

Valid Authorization Period

This Authorization remains in force from the **Date of Issuance** until **December 31, 2037[2].**

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 works, undertakings or activities authorized is a part of involves:

- Flood protection works to address sediment accumulation and erosion concerns in Deroche Creek and Nicomen Slough to mitigate risks to Leq'á:mel First Nation and Deroche communities. The works are part of BC Ministry of Environment and Climate Change Strategy's response to the 2021 Atmospheric River Event.

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[1] January 2025 Amendment: This is the first amendment to *Fisheries Act* Authorization 23-HPAC-01232, originally issued on July 25, 2024. Amendments to this Authorization will be highlighted in footnotes. All previous Authorizations related to the Project are rescinded and no longer valid.
[2] January 2025 Amendment: The valid authorization period has been extended from December 31, 2036 to December 31, 2037.

The project is described in the following documents (*hereafter referred to as the "Project Plan"*):

- *Application Form for the Issuance of an Authorization under Paragraphs 34.4(2) (b) and 35(2)(b) of the Fisheries Act (Non-Emergency Situations)* prepared by Kerr Wood Leidal Associates Ltd., dated December 18, 2024;
- *Deroche Creek Sediment Long-Term Solution Project Environmental Assessment and Offsetting Plan* prepared by Kerr Wood Leidal Associates Ltd., dated May 29, 2024;
- *Deroche Creek Sediment Long-Term Solution Project Construction Environmental Management Plan* prepared by Kerr Wood Leidal Associates Ltd., dated December 18, 2023; and
- *Application Form for Authorization Holders to Request an Amendment to an Authorization* signed by Janice Kwo of Kerr Wood Leidal Associates Ltd., dated November 14, 2024.[3]

Description of Authorized works, undertakings or activities likely to result in the harmful alteration, disruption or destruction of fish habitat:

- Clearing and grubbing of riparian vegetation within the project footprint;
- Establishment of access routes and machine laydown areas;
- Excavation of sediment from and realignment of the lower kilometre of Deroche Creek, upstream of Nicomen Slough;
- Placement of rock armouring below Taylor Road bridge to establish grade control; and
- Construction of timber deflectors on the Deroche Creek fan, below the high-water mark of Nicomen Slough, to deflect flows away from the Taylor Road embankment.

The authorized works, undertakings or activities are likely to result in the following impacts to fish and fish habitat:

- Harmful alteration, disruption, or destruction of not more than 3,810 m^2 of aquatic habitat and not more than 7,400 m^2 of riparian habitat in Deroche Creek and Nicomen Slough.

The works, undertakings, or activities associated with the proposed project described above, are not expected to result in the death of fish provided that avoidance and mitigation measures described in the Project Plan and outlined in the Conditions of Authorization below are effectively implemented. Any death of fish resulting from this project should be demonstrated to have been unavoidable or accidental. DFO should be notified immediately in such circumstances via an email 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.

Conditions of Authorization

The above described works, undertakings or activities must be carried on in accordance with the following conditions.

[3] January 2025 Amendment: Project Plan document added.

1. Conditions that relate to the period during which the works, undertakings or activities can be carried on

The works, undertakings or activities that are authorized to be carried on during the following period:

From **Date of Issuance** To **September 15, 2025[4].**

If the Proponent cannot complete the works, undertakings or activities 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 The Proponent shall adhere to all designs and avoidance and mitigation measures outlined in the Project Plan for the protection of fish and fish habitat. In the event of a conflict between those measures and the conditions of this Authorization, the more precautionary condition shall prevail, so long as conditions of this Authorization are not contravened. The specific measures and standards to avoid and mitigate impacts to fish and fish habitat are outlined in the Project Plan.

2.2 Environmental Monitoring: The Proponent shall retain an appropriately Qualified Environmental Professional (QEP) to oversee measures and standards to avoid and mitigate impacts to fish and fish habitat. The QEP (or Environmental Monitors working under the direction of the QEP) shall monitor the implementation of the conditions of this Authorization and shall be onsite at all times during all works, undertakings or activities below the high water mark. The QEP shall ensure the measures and standards to avoid and mitigate impacts to fish and fish habitat are effective, and that no additional harm to fish and fish habitat occurs other than what is authorized herein.

2.3 Erosion and sediment control (ESC) measures: ESC measures must be in place and shall be monitored and maintained, such that release of sediment to fish and fish habitat is minimized or avoided at the location of the authorized works, undertakings or activities.

2.3.1 The QEP shall carry out routine quantitative (e.g., turbidity or total suspended solids) monitoring to detect increased suspended sediment in fish habitats both within and in areas adjacent to the project footprint. Monitoring shall occur during works below the high water mark (e.g., sediment excavation), and/or at any time suspended sediment from the project site and/or authorized works, undertakings or activities may exceed aquatic guidelines. The QEP shall provide direction on appropriate corrective actions as needed (e.g., suspend works, maintain or improve erosion and sediment control measures, etc.).

[4] January 2025 Amendment: The date to which the works, undertakings or activities are authorized to be carried on has been extended from September 15, 2024 to September 15, 2025.

2.3.2 All riparian areas that have been disturbed during works shall be restored to a stable condition and protected against erosion as soon as works are completed with native species suitable for the site.

2.4 Works below the high water mark: Works within Deroche Creek and Nicomen Slough River shall be conducted under dry conditions. If the work area is not naturally dry at the start of construction, instream works, undertakings or activities shall be conducted in accordance with applicable measures and standards from DFO's interim standard for in-water site isolation. 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.

2.4.1 Maintain hydrological conditions (e.g., depth and flow) downstream of the work area during all phases of the project.

2.5 Avoid deposit of deleterious substances: All equipment and machinery working on site shall be in good working order and maintained free of fluid leaks. Hydraulic machinery will use non-toxic, readily biodegradable hydraulic fluids where mechanically feasible. 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 water. Develop and implement a spill prevention and emergency response plan to avoid a spill of deleterious substances into a watercourse.

2.6 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 or activities. Instream works shall cease if the Drought Level Classification is at Level 5. The proponent shall contact DFO 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 DFO.

2.6.1 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 habitat 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).

2.7 Contingency measures: Additional measures shall be put in place if the 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.

2.8 Dates by which these measures and standards shall be implemented: The measures and standards to avoid and mitigate impacts to fish and fish habitat in Section 2 of this Authorization shall be implemented prior to, and where appropriate, during, and after the works, undertakings, and 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 retain an appropriate QEP to monitor the implementation of avoidance and mitigation measures referred to in section 2 of this Authorization and report to DFO within 90 days following completion of the work. The report

shall indicate whether the measures and standards to avoid and mitigate impacts to fish were conducted according to the conditions of this Authorization. This shall be done, by:

3.1.1 Demonstration of effective implementation and functioning:

3.1.1.1 A description of the completed works, undertakings, or activities, including dimensions (e.g., sediment basin area, low flow channel dimensions, etc.);

3.1.1.2 A comparison of the completed works, undertakings or activities with the design dimensions or design drawings provided in the Project Plan;

3.1.1.3 Dated photographs and inspection reports to demonstrate implementation and results of effectiveness monitoring of mitigation measures and standards referred to above, to limit the impacts to fish and fish habitat to what is authorized herein. Provide a figure illustrating the locations of mitigation measures and monitoring locations (e.g., ESC measures, total suspended solids, monitoring points); and

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

3.1.2 Contingency measures: Provide 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; and

3.1.3 As-builts: Provide georeferenced 'as-built' drawings and geospatial polygons that accurately represent the completed HADD (i.e., low-flow channel, riparian clearing) footprints. Geospatial polygon data should be collected using WGS 1984 to four (4) decimal places (e.g., 28.5234°N, 80.6830°W). Geospatial polygon data must be supplied in Shape File (.shp, .shx, .dbf) format and .xml or .kmz format.

In addition, the following data must also be supplied in an Excel file (i.e., metadata):
- HADD area per habitat type (based on the high water mark of Deroche Creek);
- Dates when HADD of fish habitat was completed;
- Brand name and model of the GPS unit, the coordinate system used, and guaranteed accuracy of the GPS unit.

3.2 Report Submission: All required reports and geospatial polygons (.shp files) are to be submitted to ReferralsPacific@dfo-mpo.gc.ca, with reference to DFO File Number: 23-HPAC-01232.

4. **Conditions that relate to the offsetting plan**

4.1 Scale and description of offsetting measures: The offsetting measures shall be carried out in accordance with the measures set out in the Proponent's offsetting plan, as described in the Project Plan. The offsetting measures include:

- Creation of not less than 1,325 m^2 of rearing habitat through the construction of not less than four (4) channels within the northeast and southeast portions of the Deroche Creek alluvial fan;

- Creation of not less than 1,200 m^2 of cover/rearing habitat through the installation of a large woody debris reef along the left downstream bank of Nicomen Slough;
- Installation of not less than 700 m^2 of habitat complexing features (e.g., large woody debris, boulders) throughout the realigned lower kilometre of Deroche Creek; and
- Removal of invasive species and planting of native trees and shrubs throughout not less than 9,800 m^2 of riparian habitat. The planting sites are as follows:
    - **Site 1:** Willow staking and planting riprap along the east wall of the low flow channel in the sediment basin to provide shade.
    - **Site 2:** English ivy removal and planting of native shrubs along the west bank of the sediment basin.
    - **Site 3:** Himalayan blackberry removal and planting of native trees and shrubs east of the new sediment basin.
    - **Site 4:** Himalayan blackberry removal and planting of native trees and shrubs on the northeast side of Taylor Road bridge.
    - **Site 5:** Planting of native trees and shrubs along the created rearing habitat channels on the Deroche Creek alluvial fan.

4.2 Implementation of offsetting measures: Construction of all offsetting measures shall be completed by **December 31, 2025**[5]. The proponent shall retain a QEP to monitor the implementation and effectiveness of the offsetting measures. Effectiveness monitoring shall be conducted for a period of ten (10) years post-completion of the offsetting measures described herein. The final monitoring report is due by **December 31, 2036**[6], at the end of the ten (10) year monitoring period.

4.3 Offsetting criteria to assess the implementation and effectiveness of the offsetting plan: The Proponent will be considered to have met the requirements of this Authorization as it pertains to fish habitat offsetting measures once they are able to demonstrate fulfilment of the criteria described **in Section 7** of the Proponent's offsetting plan and summarized in the following table:

Component	Monitoring Metric	Performance Measures
Fish Habitat	Water Quality	Water quality will be consistent with BC Water Quality Guidelines for the Protection of Aquatic Life and within typical ranges of water temperatures suitable for target fish species and life stages.
	Water Quantity/Flow	Habitat continuously wetted with average target water depths and velocities as described in the Proponent's offsetting plan.
	Habitat Quantity/Quality	Habitat areas consistent with as-builts. Large woody debris structures are to be in sufficient condition; normal wear and tear with limited localized damage.
Fish Community	Diversity	Assemblage composed of some or all of the predicted fish species (i.e., Chum/Coho salmon) and life stages (e.g., juvenile/adult).

[5] January 2025 Amendment: The date by which the construction of all offsetting measures shall be completed by has been extended from December 31, 2024 to December 31, 2025.
[6] January 2025 Amendment: The date by which the final monitoring report is due has been extended from December 31, 2035 to December 31, 2036.

	Relative Abundance	Catch per unit effort of juvenile salmonids is consistent with, or greater, than the reference sites identified in the Proponent's offsetting plan.
Riparian Habitat	Vegetation Cover	80% cover, stable to increasing native plant composition and cover, and less than 5% invasive species plant coverage.
	Density and Survival	100% survival of planted trees and at least 80% survival of planted shrubs.
	Riparian Stability	Stable site conditions, improved vegetation success, and continued succession.

4.4 Contingency measures: If the results of monitoring as required in Section 5 indicate that the offsetting measures are not completed by the date specified and/or are not functioning according to the above criteria in Section 4.3, the Proponent shall give written notice to DFO and retain a QEP to implement contingency measures and associated monitoring measures to ensure the offsetting is completed and/or functioning as required by this Authorization.

4.4.1 Scale and description of contingency measures: If the results of the monitoring determine that offsetting measures are not functioning appropriately, the QEP will determine the cause(s) for failure, develop a contingency plan to address the failure, and implement corrective actions within one calendar year. The contingency offsetting measures shall be approved by DFO, in an amendment to this Authorization, prior to implementation. Final determination of the suitability and sufficiency of the contingency measures to offset for the harmful alteration, disruption or destruction of fish habitat, account for time lag, and development of criteria to assess the effectiveness of contingency offsetting, is at the discretion of DFO.

4.4.2 Monitoring measures to ensure offsetting contingency is completed and/or functioning as required: Contingency measures shall be monitored per the requirements described in the DFO approved Contingency Offsetting Plan.

4.5 The Proponent shall not carry on any works, undertakings or activities that will adversely impact the offsetting measures.

5. **Conditions that relate to monitoring and reporting of implementation of the offsetting plan (described in section 4):**

5.1 Schedule(s) and criteria: The Proponent shall retain a QEP to monitor the implementation and effectiveness of offsetting measures according to the timeline and criteria below:

5.1.1 Effectiveness monitoring shall commence in 2026[7], the year after offsetting measures have been constructed, and shall be carried out over a period of 10 years, with monitoring occurring in years 1, 2, 3, 5, 7, and 10, at a time during each monitoring year that allows for the criteria described in Condition 4.3 of this Authorization to be assessed.

[7] January 2025 Amendment: The year by which effectiveness monitoring shall commence has been extended from 2025 to 2026.

5.1.2 In the event of the implementation of contingency measures, monitoring of contingency measures shall occur according to a frequency described in the DFO approved Contingency Offsetting Plan.

5.2 Reporting of the offsetting measures: The QEP shall report to DFO on whether the offsetting measures were implemented and functioning according to the conditions of this Authorization by providing the following:

5.2.1 Offsetting Construction: Within 90 days of the completion of offsetting construction, provide a written assessment to DFO on whether the offsetting measures were constructed in accordance with the conditions of this Authorization. The report shall include, at a minimum, the following:

5.2.1.1 Geo-referenced 'as-built' drawing(s) of the completed offsetting measures, including areal footprints;

5.2.1.2 A description of the completed offsetting measures, including dimensions (e.g., area, elevation, slope, etc.) and materials used;

5.2.1.3 A comparison of the completed offsetting measures with the proposed offsetting measures described in the Proponent's offsetting plan and in Condition 4.1 of this Authorization;

5.2.1.4 Dated photographs of the offsetting measures post-offset construction;

5.2.1.5 Establishment of fixed photo points that will be used to document changes of the offsetting measures over time;

5.2.1.6 A summary of the effectiveness of mitigation measures and standards implemented during construction of the offsetting measures; and

5.2.1.7 Recommendations as to whether additional offsetting measures are required to meet the requirements of the Authorization.

5.2.2 Offsetting Effectiveness: The QEP, on behalf of the Proponent, shall report on the effectiveness of the offsetting measures in accordance with the conditions of this Authorization. Monitoring reports are required for each year of monitoring following construction of offsetting measures. The reports are to be submitted to DFO by December 31 of each monitoring year. The reports shall include, at a minimum, the following:

5.2.2.1 A description of the methods used to assess the offsetting measures.

5.2.2.2 Updates to the geo-referenced 'as-built' drawing(s) delineating the area of the offsetting measures, including areal footprints, if there have been any changes to the offsetting habitats;

5.2.2.3 An assessment of the success of the offsetting measures (to date) in accordance with the criteria listed in the Proponent's offsetting plan and in Condition 4.3 of this Authorization;

5.2.2.4 An assessment of the stability of the offsetting measures, identifying any signs of potential erosion, accretion, failure, movement or other physical alteration that may affect the stability and long-term success of the offsetting measures;

5.2.2.5 Geo-referenced and dated photographs or video documenting the offsetting measures for the respective monitoring period (including at fixed photo points to document changes over time);

5.2.2.6 Identification of any function concerns related to the offsetting measures and a description of any remedial measures taken; and

5.2.2.7 The final Offsetting Effectiveness Monitoring Report (Year 10), shall include an evaluation of whether the offsetting measures undertaken counterbalanced the authorized impacts to fish and fish habitat resulting from the authorized works, undertakings or activities.

5.2.3 Geospatial Polygons and Data: The Proponent shall provide a geospatial polygon that accurately represents the completed offset footprint(s). Geospatial polygon data should be collected using WGS 1984 to four (4) decimal places (e.g., 28.5234°N, 80.6830°W). Geospatial polygon data must be supplied in Shape File (.shp, .shx, .dbf) format and .xml or .kmz format.

In addition to the geospatial polygon, the following data must also be supplied in an Excel file (i.e. metadata):

- Area of the offset per habitat type (based on high water mark);
- Target species of offset habitat;
- Dates offsetting completed, date of maintenance, and date monitored;
- Brand name and model of GPS unit, the coordinate system used, and guaranteed accuracy of GPS unit.

5.3 Report Submission: All required reports and geospatial polygons (Shape files) are to be submitted to ReferralsPacific@dfo-mpo.gc.ca, with reference to DFO File Number: 23-HPAC-01232**.**

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 works, undertakings or activities that are likely to result in impacts to fish and fish habitat as described herein.

This authorization does not purport to release the Proponent from any obligation to obtain permission from any private landowner 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.

At the date of issuance of this authorization, no individuals of aquatic species listed under the *Species at Risk Act* (SARA) were identified in the vicinity of the authorized works, undertakings or activities.

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 (http://www.dfo-mpo.gc.ca/pnw-ppe/CONTACT-eng.html) or to the DFO-Pacific Observe, Record and 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.

A copy of this authorization will 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 works, undertakings or activities 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 works, undertakings or activities, the Proponent named in this authorization shall advise DFO in advance.

Date of Issuance: January 15, 2025

Approved by: Rotinsky, Brenda Digitally signed by Rotinsky, Brenda Date: 2025.01.15 09:41:43-08'00'

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

Fisheries and Oceans Canada | Pêches et Océans Canada

Licence Number: XHAB 128 2025
Valid From: 01-Jun-2025
Expiry Date: 31-May-2026

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 associated with a construction project to provide a long-term solution to sediment accumulation in Deroche Creek, British Columbia to mitigate future impacts on infrastructure and salmon habitat.

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 shall be retained under the authority of this licence.

Licence Holder:
FIN: 130455

300 - 4185 STILL CREEK DRIVE
BURNABY BC V5C 6G9

KERR WOOD LEIDAL ASSOCIATES LTD.

Contact Number: 604-293-2088
Fax Number: 604-294-2090

Contact Party:
FIN: 138800 LILLEY, PATRICK

Contact Number: 604-812-2578
Fax Number: 604-294-2080

Individuals or groups assisting with the authorized activity:

All employees of Kerr Wood Leidal Associates Ltd. are authorized to fish under this licence.

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

Species:	CHINOOK SALMON (Oncorhynchus tshawytscha); CHUM SALMON (Oncorhynchus keta); PINK SALMON (Oncorhynchus gorbuscha); SOCKEYE SALMON (Oncorhynchus nerka); COHO SALMON (Oncorhynchus kisutch);
Life Stage:	Juvenile
Gear:	Dip Net Trap, Gee/Minnow (Set Duration Max: 24 Hours) Seine Net Electroshocker
Licence Area:	Deroche Creek within and immediately downstream of Lakahahmen (Leq'a:mel) IR 11, near confluence with Nicomen Slough. UTM Coordinates: 10U 567551 E, 5448285 N
To be Retained:	0

Reporting Requirements:

XHAB 128 2025 **Due Date** 31-Jul-2026

The Appendix 1 must be completed within 60 days of completion of the fishing activities outlined in this licence and submitted to the mailbox: DFO.FIALicense-LicenseSFI.MPO@dfo-mpo.gc.ca

Additional Information:

Activities authorized in this licence may be subject to orders issued by DFO. Notices of orders can be found online at: https://notices.dfo-mpo.gc.ca/fns-sap/index-eng.cfm?pg=fishery_search&ID=all.

The use of ALL of these licence(s) is subject to any conditions which are issued by DFO. The licence holder must ensure that they have received the licence conditions, and may NOT conduct any fishing activity with any of these licence(s) unless in receipt of the licence.

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 individuals or groups assisting the Licence Holder (herein referred to as Operator) 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.

Document(s) to be carried while fishing: 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 and release of the species identified in the Species, Quantity of Fish, Area(s) and Gear section of this licence.

This licence does not authorize fishing for non-anadromous (freshwater) species or Steelhead trout 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: Nothing in this license must be construed as authority to cause the death of fish by means other than fishing or the harmful alteration, disruption or destruction of fish habitat which are prohibited under subsections 34.4(1) and 35(1) of the *Fisheries Act*.

To avoid and mitigate the potential for prohibited effects to fish and fish habitat and to determine if a request for review is required, we recommend you visit the Department's Project Near Water website at: https://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html.

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

Notification 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 licenced activities taking place and include the details and locations of fishing. Notification shall occur by telephone during normal business hours. If you are unable to notify the local office on evenings or weekends, advise the DFO Radio Room at 1-800-465-4336 prior to fishing under this licence.

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 or the name and phone number of the person who owns the gear.

Fishing gear shall not be set or used in such a manner or in such a place that they or any equipment that is attached to any of them interferes with the public right of navigation. Fishing gear that interferes with safe navigation can be removed under the *Canadian Navigable Waters Act*.

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: The Licence Holder is only permitted to fish using only the fishing gear specified in the Species, Quantity of fish, Area(s) and Gear part of this licence.

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 take care when working in potential salmonid spawning habitat to avoid or minimize streambed disturbance.

If non-tended gear is permitted (i.e. minnow traps) under this licence, the Licence Holder/Operator must ensure that when setting non-tended gear that it will 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.

When fishing with a seine net, if permitted under this licence, the Licence Holder/Operator must record the water temperature, length, position, and duration of each seine netting event. Net loads of fish should not contain excessive numbers of fish. No more than 1/3 of the net volume should contain fish.

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

If electrofishing is permitted under this licence and 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. If salmonid spawning behaviour is noted at any time, the Licence Holder/Operator is required to cease all electrofishing activities.

(c) Electrofishing may only be used after extensive use of other gear during sampling activity indicates no presence of juvenile salmonids. 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 captured. 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 animal domestic movements: If you are considering moving dead fish or parts of fish collected under this licence from within British Columbia to outside of British Columbia, you are required to apply and receive a permit from the Canadian Food Inspection Agency (CFIA) prior to proceeding. For more information regarding a CFIA domestic movement control permit, visit: https://inspection.canada.ca/about-the-cfia/find-a-form/form-cfia-acia-5743/eng/1410362945783/1410362946643.

Disposition of fish: Any fish captured and collected for sampling, or incidental mortalities associated with non-lethal fishing and sampling methods permitted under the authority of this licence are not permitted to be sold and are prohibited from being utilized for human consumption or personal use purposes unless authorized by Fisheries & Oceans Canada.

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.

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.

Additional precautionary measures that shall be taken to avoid the introduction and/or transportation of aquatic invasive species (AIS) into other waters:

1. Inspect and clean plants, animals, mud, and sediment from all equipment used below the high watermark.
2. Drain all water from equipment used below the high watermark.
3. Dry all parts of equipment completely before leaving the site.
4. All organic matter and wash water generated during cleaning must be disposed of on land.

For further information, please visit:

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

Reporting requirements for fishing activities: The Licence Holder/Operator must complete the Section 52 Licence Report Form (Appendix 1 of licence), by project, in the format provided by Fisheries and Oceans Canada. The completed Section 52 Licence Report Form must be submitted to Fisheries and Oceans Canada electronically via email to: DFO.FIALicense-LicenseSFI.MPO@dfo-mpo.gc.ca within 60 days of completion of the fishing activities as outlined in this licence.

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. A breach of licence conditions is a *Fisheries Act* offence.

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.

130455

FIN	Licence Holder - Print Name	Signature	Date

Licence Issued: 04 April 2025

Licence Printed: 04 April 2025
Licence Issued By: JEFFREY READER, Fisheries and Oceans Canada

FISH COLLECTION PERMIT
FISH SALVAGE

File: 34770-20

Permit No.: **SU25-942716**

Permit Holder: **Ministry of Environment & Climate Change Strategy** – Amy Vallarino
PO Box 9339 Stn Prov Govt
Victoria, BC V8W 9M1

Authorized Persons: Gadwyn Gan, Janice Kwo, Matt Sanders, Jaime Dimillo, Andrew Baylis, Sherri Jonkman, Justin Southam, Erica Harvey, Sonya Oetterich, Dan Brown, Heather Kingcott, Oskar Von Wahl, Forrest Bjornson, Christy Juteau, Enrico Barbon, Patrick Lilley

Leq'a:mel First Nation Guardians: Erik Still, Megan Friesen, Emilia Hale, Melissa Friesen, Dimitri John, Samantha Mitchell, Darian McKamey, Anna Osetska, Ryan Cameron, Tina Pederson.

Pursuant to section 18 of the Angling and Scientific Collection Regulation, B.C. Reg. 125/90, the above-named persons are authorized to collect fish for scientific purposes (from non-tidal waters) subject to the terms set forth in this Permit:

Permitted Sampling Period: June 1, 2025 – December 31, 2025
Permitted Waterbodies: Deroche Creek (100-070200), Nicomen Slough (100)
Permitted Sampling Techniques: AG, DN, EF, MT, SN (subject to permit terms)
Potential Species: BCB, RSC, PMB, CP, LMB, RB, CAS, LNC, CCT, BNH, NSC, LDC, CRA, TSB (subject to permit terms)
Provincial Terms: (Permit holder and authorized persons must be aware of all terms):
See Appendix A.
Region Specific Terms:
See Appendix A.

Authorized by:

Elizabeth Shebib, Wildlife Biologist
A person authorized by the Regional Manager
Recreational Fisheries & Wildlife Programs
South Coast Region

Date: April 24, 2025

Permit Fee: $25.00

APPENDIX A
FISH COLLECTION PERMIT TERMS

Any Variation of the following terms will require explicit authorization by the appropriate regional Fish & Wildlife Section Head.

PROVINCIAL TERMS

1. This collecting permit is **only** valid for species listed as threatened, endangered, or extirpated under the *Species at Risk Act* (SARA) **in conjunction with a permit issued under Section 73 of SARA from Fisheries and Oceans Canada.**

   NOTE: Contact the Department of Fisheries and Oceans for fish collecting permits for salmon or eulachon https://www.pac.dfo-mpo.gc.ca/fm-gp/licence-permis/forms/licence-sci-permis-eng.pdf or for SARA listed species https://www.dfo-mpo.gc.ca/species-especes/sara-lep/permits-permis/index-eng.html#apply.

2. Any specimen's surplus to scientific requirements and any species not authorized for collection in this permit must be immediately and carefully released at the point of capture.

3. Fish collected under authority of this permit must not be used for food or any purpose other than the objectives set out in this permit. Dead fish must be disposed of in a manner that will not constitute a health hazard, nuisance, or a threat to wildlife.

4. No fish collected under authority of this permit must be transplanted unless separately authorized by the Federal/Provincial Introductions and Transfers Committee.

5. The permit holder must, within 90 days (120 days for the Kootenay/Boundary region and Peace region) of the expiry of this permit, submit a report of fish collection activities. Interim reports may also be required and must be submitted as required by the permit issuer. All submissions must be filed electronically to: https://www2.gov.bc.ca/fish-data-submission-process.

   Reporting specifications, information and templates are available from this website and outline the mandatory information requirements. Prior notification of submission or questions regarding data report standards can be made to: fishdatasub@gov.bc.ca

6. The permit holder must comply with all Workers' Compensation Board requirements and other regulatory requirements. The permit holder is responsible for ensuring authorized persons listed on the permit are properly certified for specific sampling methods or activities (e.g., electroshocking).

7. Any workers not listed on the permit must be supervised by the permit holder or one of the authorized persons named on the permit.

8. All sampling equipment that has been previously used outside of B.C. must be cleaned of mud and dirt and disinfected with 100mg/L chlorine bleach before using in any water course to prevent the spread of fish pathogens (e.g., whirling disease) and/or invasive plant species. Any washed off dirt or mud must be disposed of in a manner such that it cannot enter a watercourse untreated.

9. No electrofishing is to take place in waters having a temperature less than five degrees C.

10. No sampling of fish in waters having a temperature greater than twenty degrees C.

11. 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.

12. When work requires de-watering or isolation of the worksite in the stream, a permit for the salvage of fish and wildlife (Scientific Fish Collection permit) must be obtained prior to commencing work. All required salvage permits must be obtained from FrontCounter BC: https://portal.nrs.gov.bc.ca/web/client/home.

PROVINCIAL TERMS CONTINUED

13. Any fish or wildlife salvage must be carried out by a qualified environmental professional registered with a professional association (such as an RPBio). The qualified professional conducting salvage work must adhere to the conditions below in addition to those required in the Scientific Fish Collection permit.

- Salvage activities must be conducted to the Provincial Resource Information Standards Committee (RISC) standards for capture, data collection, handling, and release:

STREAM ISOLATION

- The QP must follow the standards and practices outlined in the Work Area Isolation Appendix found in the Standards and Best Practices for Instream Works. http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf
- A QP must ensure that the worksite has be substantively isolated to prevent any fishes from entering the work area and efforts must be made to exclude fish from entrapment during installation of isolation works. (See section 14.2 of the Standards and Best Practices for Instream Works (MWLAP 2004).
- Dewatering must not result in HADD to fish habitat or the death of fish unless authorized by Fisheries and Oceans Canada.
- While dewatering the work site and dewatering during fish capture, all pump intakes are required to meet the federal COP for fish intake screening guidelines https://www.dfo-mpo.gc.ca/pnw-ppe/codes/screen-ecran-eng.html.

FISH CAPTURE

- Qualified professionals must determine appropriate sampling methods from the RISC standards based on water body type and habitat conditions https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/nr-laws-policy/risc/fishml04.pdf.
- Qualified professionals must use a risk hierarchy of passive to active and low risk to higher risk in collection methods (e.g., minnow traps, fyke nets, beach pole seines, electroshocking, angling).
- Qualified professional must conduct a **minimum of three** non-lethal collection methods in all fish salvages.
- For active collection methods a minimum of two consecutive passes of each method that produces a zero catch must be completed as per total population removal methodology (at a minimum 95% fish removal must be achieved). (https://www.wildsalmoncenter.org/resources/field-protocols-best-monitoring-practices/).
- Where work site isolation cannot be fully achieved (e.g., fast flowing streams, imperfect seal due to substrate) additional efforts are needed to prevent harm to fish. At the end of each workday, a passive form of fish capture (e.g., baited minnow traps) are to be placed in the isolation site. If fish are captured overnight, you must restart isolation procedures at the start of the workday.
- If species at risk are captured, work must stop until proper permits are obtained.

DATA COLLECTION

- Sampling/data collection is a requirement of the Scientific Collection Permit. Sample size requirements are listed in the table below.
- Scientific Fish Collection Permits require a Fish Data Submission Template to be completed. Step 4 (Stream Site Data) of the Fish Data Submission Template must be filled out for the location where fish are salvaged from. https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/fish/fish-and-fish-habitat-data-information/fish-data-submission/submit-fish-data.

FISH RELEASE

- Fish must be released following RISC standards.
- All species are to be released in the same watercourse downstream of the work areas or a sufficient distance upstream (5 channel widths to a maximum of 100 meters) into waters of equivalent baseline quality and habitat type (pool, riffle, run).

Minimum Standards During Salvage for Fish Collection Sampling Effort*

Fish Species	Age Class	Size range	Minimum Sampling Size for lengths	Sample column required (from Individual Fish Data form)	Notes
Salmonids, including RB, CT(CCT), DV, BT, GR, LT, KO	fry	20 to 80 mm	up to 30 after 30 count	J (if possible), K	
	juvenile	81 mm-250 mm	Measure all fish caught	J, K, L	
	adult	greater than 250 mm	Measure all fish caught	J, K, L, M, N	
Coarse Fish (cyprinids, stickleback, dace, shiner, carp, pikeminnow)		under 200 mm	up to 30 after 30 count	J, K	
	Adult	over 200 mm	All	J, K, L, M	
Sport other (bass, perch, sunfish, walleye, northern pike)		all	up to 30 after 30 count	J, K, L	
Sculpin sp.		0-150mm (total length)	up to 30 after 30 count	J, K	
		Over 150mm	All	J, K, L	
Burbot, Lamprey		0-150 mm (total length)	All	J, K, L, N	
Listed Species (salish sucker, sturgeon, etc.)		All	All		Refer to SAR permit for conditions
All fishes not listed above		All	minimum 10 of each then count only	J, K, L	

Abbreviations for salmonids

- **RB-Rainbow**
- **CT(CCT)-Cutthroat**
- **DV-Dolly Varden**
- **BT- Bull Trout**
- **GR- Arctic Grayling**
- **LT- Lake Trout**
- **KO- Kokanee**

BRITISH COLUMBIA

REGION SPECIFIC TERMS

South Coast Region

1. All streams sampled, for which a watershed code does not presently exist, will require a map showing the location of the stream and sampling location with the map scale identified at time of reporting.
2. Electrofishing and minnow trapping can harm or kill non-target species of management concern such as the endangered Coastal Giant Salamander (within the Chilliwack River drainage system), Oregon Spotted Frog, and Pacific Water Shrew (within the lower Fraser River Valley). Any incidental captures (alive or dead) of any red-listed or blue-listed wildlife species must be reported to the Ministry of Water, Land, and Resource Stewardship, South Coast Region. For further information on these species or to report incidental captures, please contact the Fish and Wildlife Branch by e-mail at SCFishandAquaticWildlife@gov.bc.ca.
3. All non-native fish species captured under this permit are to be humanely euthanized and disposed of appropriately. Within 48 hours of capture, a record of the species, capture location, date, waterbody, number, size range (mm) and digital imagery must be submitted to the Fish and Wildlife Branch by email at SCFishandAquaticWildlife@gov.bc.ca. Non-native fish species include but are not limited to: American Shad; Black Catfish; Black Crappie; Brown Catfish; Carp; Goldfish; Largemouth or Smallmouth Bass; Pumpkinseed Sunfish; and Weather-fish.
4. Please refer to the following website for the least risk in-stream work windows: https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-licensing-rights/working-around-water/regional-terms-conditions-timing-windows. Where possible, collection should be conducted during the least risk word windows identified. The exception is seasonal or ephemeral streams where sampling may not be possible during the prescribed window due to flow conditions.
5. The permit holder must refer to the following when sampling Salish Sucker, Nooksack Dace, and Stickleback species.

   Salish sucker sampling guidelines - https://portal.nrs.gov.bc.ca/documents/10184/0/SalishSuckerCollectionGuidelines2015.pdf/5893755c-1c3f-b85b-419c-a4ce50ffac71

   Nooksack dace sampling guidelines – https://portal.nrs.gov.bc.ca/documents/10184/0/NooksackDaceCollectionGuidelines2015.pdf/339d65e0-23b5-10bb-b33f-a7dbf74d5d39

   Stickleback species pairs sampling guidelines - http://www.dfo-mpo.gc.ca/species-especes/publications/sara-lep/stickleback-epinoches/index-eng.html

BRITISH COLUMBIA

APPENDIX B
ADVISORY

GENERAL

- It is the permit holder's responsibility to be aware of all applicable laws and the limits of this permit.
  For example,
  - This permit **does not** authorize the collection of fish in national or provincial parks.
  - This permit does not authorize the collection of fish in tidal waters.
  - This permit does not authorize the collection of eulachon or for salmon, other than kokanee.
  - This permit is NOT authority to angle for fish without a valid angling licence.

  It is the responsibility of the permit holder to obtain proper authorization.
- The Province is not liable for any illness contracted through fish handling. It is the responsibility of the permit holder to inform themselves of possible health hazards, and to ensure that all reasonably necessary safety measures are undertaken.
- If applicable, the permit holder is responsible for renewing this permit. The issuer is not obliged to send a reminder notice.

LEGISLATION

Below is a non-exhaustive list of provisions under the *Wildlife Act* and regulations that are relevant to this permit. It is the permit holder's responsibility to be aware of any provisions under the *Wildlife Act* or regulations that may apply to this permit.

Wildlife Act

Suspension and cancellation of permits

25 (1) A regional manager, for any cause he or she considers sufficient, and after providing an opportunity for the person to be heard, may suspend or cancel a permit held by a person, may order that the person is ineligible to obtain or renew a permit for a period and, if he or she does make an order, must inform the person of the period of ineligibility.

(2) An officer may, without the necessity of holding a hearing, exercise the powers of a regional manager under this section to suspend a permit and, if a permit is suspended by an officer, the matter must be referred to the regional manager, who may confirm, reduce, extend or terminate the suspension.

Documents not transferable

81 Except as authorized by regulation or as otherwise provided under this Act, a licence, permit or limited entry hunting authorization is not transferable, and a person commits an offence if the person

(a) allows his or her licence, permit or limited entry hunting authorization to be used by another person, or

(b) uses another person's licence, permit or limited entry hunting authorization.

Failure to pay fine

85 (1) This section applies if a person

(a) fails to pay, within the time required by law, a fine imposed as a result of the person's conviction for an offence under this Act or the *Firearm Act*, and

(b) has been served with notice of this section.

(2) In the circumstances referred to in subsection (1),

(a) the person's right to apply for or obtain a licence, permit or limited entry hunting authorization under this Act is suspended immediately and automatically on the failure to pay the fine,

(b) all licences, permits and limited entry hunting authorizations issued to that person under this Act are cancelled immediately and automatically on the failure to pay the fine,

(b.1) the person must not apply for employment as an assistant guide,

(b.2) the person must not guide as an assistant guide, and

(c) the person commits an offence if, before that fine is paid, the person

(i) applies for, or in any way obtains, a licence, permit or limited entry hunting authorization under this Act,

(ii) does anything for which a licence, permit or limited entry hunting authorization under this Act is required,

(iii) applies for employment as an assistant guide, or

(iv) guides as an assistant guide.

Proof of identity and authorization

97 (1) In this section, **"authorization"** means a licence, permit or limited entry hunting authorization issued under this Act.

(2) Subject to subsection (5), a person who is required to hold an authorization must, on the request of an officer,

(a) state the person's name and address,

(b) produce prescribed photo identification, and

(c) demonstrate in accordance with subsection (3) that the person holds the authorization.

(3) A person may demonstrate that the person holds an authorization by

(a) producing the authorization, or

(b) unless the regulations require that the original authorization be produced,

(i) producing a legible copy of the authorization, or

(ii) if authorized by the regulations, stating a number assigned to the person by the director as an identification number for the person.

(4) Subject to subsection (5), a person who would be required to hold a licence or permit issued under this Act were the person not exempt under section 11 (9) or 12 (b) must, on the request of an officer,

(a) state the person's name and address, and

(b) produce prescribed photo identification.

(5) Subsections (2) (b) and (4) (b) do not apply to a person in a prescribed class of persons.

(6) A person who contravenes subsection (2) or (4) commits an offence.

Wildlife Act General Regulation

Proof of identity

21.01 (1) For the purposes of section 97 (2)(b) and (4)(b) of the Act, the following photo identification is prescribed:

(a) valid photo identification issued to a person by any of the following:

(i) the government of Canada;

(ii) the government of a province or territory, or an agent of the government of a province or territory, in which the person has a current address;

(iii) the Nisga'a Nation, if the person is a Nisga'a citizen;

(iv) a treaty first nation, if the person is a treaty first nation member of the treaty first nation;

(b) in the case of a person who is a non-resident alien,

(i) valid photo identification in the form of

(A) a passport, or

(B) a driver's licence issued to the person by a foreign jurisdiction in which the person has a current address, or

(ii) a copy of a photo identification referred to in subparagraph (i) that has been certified as a true copy by

(A) a lawyer, or

(B) a notary who is a member in good standing under the *Notaries Act*

(c) in any case, a valid NEXUS card.

(2) For the purposes of section 97 (5) of the Act, persons under 16 years of age are prescribed as exempt from the requirement to produce photo identification.

Freshwater Fish Regulation

Offences

2 A person commits an offence where the person

(a) has in possession,

(b) transports, or

(c) traffics in

live fish unless authorized by a permit or a licence.

Ministry of Water, Land and Resource Stewardship

PERMIT

78470-25

WILDLIFE ACT

PERMIT SU25-942717

PERMIT HOLDER	**MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY** PO BOX 9339 STN PROV GOVT VICTORIA BC V8W 9M1 ATTENTION: AMY VALLARINO PHONE: (778) 943 -6904

IS AUTHORIZED UNDER s. 2(c)(i), 2(j), 2(k)(i), 2(m), and 2(o) of the Permit Regulation, B.C. Reg. 253/2000,

TO	**Live capture, temporarily possess, transport and release to a nearby suitable habitat , and dispose of dead invasive species.** American Bullfrog (*Lithobates catesbeianus*) Green Frog (*Lithobates clamitans*) Northern Pacific Tree Frog (*Pseudacris regilla*) Northern Red-legged Frog (*Rana aurora*) Northwestern Salamander (*Ambystoma gracile*) Coastal Tailed Frog (*Ascaphus truei*) Western Painted Turtle (*Chrysemys picta bellii*) Northern Alligator Lizard (*Elgaria coerulea*) Common Gartersnake (*Thamnophis sirtalis*) Northwestern Gartersnake (*Thamnophis ordinoides*) Terrestrial Gartersnake (*Thamnophis elegans*) House Mouse (*Mus musculus*) Brown Rat (*Rattus norvegicus*) Roof Rat (*Rattus rattus*) Common Muskrat (*Ondatra zibethicus*) Coast Mole (*Scapanus orarius*) Townsend's Mole (*Scapanus townsendii)* Cinereus Shrew (*Sorex cinereus*) Dusky Shrew (*Sorex obscurus*) Trowbridge's Shrew (*Sorex trowbridgii*) Vagrant Shrew (*Sorex vagrans*) Western Jumping Mouse (*Zapus princeps*) Pacific Jumping Mouse (*Zapus trinotatus)* **In specific areas:** Deroche Creek - 10U 567420 m E 5448467 m N Nicomen Slough - 10U 567694 m E 5448163 m N

SUBJECT TO THE FOLLOWING:

TERMS OF PERMIT	The permit holder must follow the attached British Columbia **Interim Hygiene Protocols for Amphibian field staff and researchers**. The permit holder must comply with the terms in Appendix A.

COMPLIANCE ADVISORY	Failure to comply with any term of this permit is an offence under the *Wildlife Act*, and may result in any or all of prosecution, suspension of the permit, cancellation of the permit, ineligibility for future permits, and denial of future permit requests.
PERIOD OF PERMIT	This permit is only valid from June 1, 2025 to May 31, 2026.
DATE OF ISSUE	April 28, 2025

 **SIGNATURE OF ISSUER**	**Elizabeth Shebib, Wildlife Biologist** A person authorized by the Regional Manager Recreational Fisheries & Wildlife Programs South Coast Region	**PERMIT FEE** Exempt **HCTF SURCHARGE** Exempt

BRITISH COLUMBIA

APPENDIX A
TERMS OF PERMIT

PERMIT SU25-942717

REPORTING REQUIREMENTS:

1. The permit holder must maintain an accurate up to date record of the wildlife hunted, trapped or killed under the permit that includes the following information:

    a) common name of the wildlife;
    b) location* where the wildlife was taken,
    c) the date the wildlife was hunted, trapped or killed;
    d) the sex and age class of the wildlife taken;
    e) the bands or tags on the wildlife; and
    f) a description of all nests, dams or other structures destroyed or removed.

    *includes a UTM grid location in NAD83 to + or – 100m accuracy (zone 2 digits, easting 6 digits, northing 7 digits)

    NOTE: A blank reporting form (Appendix D) is attached to the end of this permit for your convenience

2. The permit holder must submit the original copy of this record to FrontCounter BC, Ministry of Water, Land and Resource Stewardship **within 21 days** of the permit's expiry.

3. The permit holder must produce a copy of the record referred to in paragraph 1 on the demand of an officer.

4. If a species at risk (red or blue) is captured – the above information needs to be submitted within **7 days** of the capture and notification must be submitted without delay to Ministry of Water, Land and Resource Stewardship (FrontCounterBC.Surrey@gov.bc.ca). Please include a description of the wildlife, the above information and a photo documenting identifying characteristics.

ADDITIONAL REPORTING REQUIREMENTS:

1. The permit holder must within 90 days of the expiry of this permit submit data and a written report of activities related to this permit. The data and written report must be submitted on-line to https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/wildlife/wildlife-data-information/submit-wildlife-data-information.

    This website contains the data templates, report specifications and describes which data is mandatory to submit. Interim reports may also be required and must be submitted as required by Regional Biologists.

GENERAL CONDITIONS:

1. The permit holder must comply with all laws applicable to the activities carried out under this permit.

2. This permit extends to the permit holder's employees or contractors only when they are engaged in the direct performance of their duties on behalf of the permit holder.

3. All work is to be undertaken by trained professionals with experience in capturing and handling Amphibians, Reptiles, Pacific Water Shrew and Small Mammals.

4. Regardless of period of permit dates, salvage of amphibians shall not occur once the amphibians enter their overwintering phase between: October 31 – March 1.

5. Regardless of period of permit dates, salvage of reptiles (including turtles) shall not occur once the reptiles enter their overwintering phase between: October 31 – March 15.

6. The permit holder must take all reasonably necessary steps to ensure that public safety is not jeopardized, and fish or wildlife habitat is not damaged by any action taken under authority of this permit.

7. Capture and handling of specimens to be in accordance with the Standards for Live Animal Capture and Handling Guidelines established by the Ministry of Environment.

   https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/inventory-standards/terrestrial-ecosystems-biodiversity

   Further guidelines can be obtained on the Canadian Council on Animal Care website at https://www.ccac.ca/en/standards/guidelines/types-of-animals.html

8. The permit holder must ensure that the wildlife are treated in a humane manner and are not subjected to any unnecessary harm or suffering.

9. No intentional mortality of red or blue listed species is to occur. All reasonable steps must be taken to ensure accidental mortality does not occur.

10. Lizards must not be relocated further than 60m distance from capture sites, unless there are no suitable areas within 60m. Lizards must be moved to a location containing natural habitat features that may provide refuge (i.e. talus, rock outcrop, etc.) and away from any roads and trails.

11. Snakes must not be relocated further than 500m from any capture site, unless there are no suitable areas within 500m that support the microhabitat characteristics preferred by each species. All release sites must contain similar microhabitat characteristics as the capture location, such as refuge features (i.e. rocks/talus, shrubs, coarse woody debris, small mammal burrows, etc.) and thermal characteristics (i.e. aspect) and should be located a minimum of 100m from any road or trail.

12. In the case of needing to salvage and translocate reptiles from a den site, the permit holder must contact FrontCounter BC, Ministry of Water, Land and Resource Stewardship upon discovery of the den site. Post-salvage monitoring plans must be developed in conjunction with Regional Biologists and species experts. The permit holder must ensure implementation of the monitoring plan.

13. Works carried out in and around Western Painted Turtle habitat must only be carried out when ambient air temperature is at or above 8 degrees Celsius. At temperatures lower than 8 degrees Celsius, turtles are slow-moving and often seek refuge in emergent vegetation and/or waterbody substrate. This behaviour limits their ability to evade harm and reduces visual detectability by monitors resulting in increased risk or turtle mortality.

14. Contact: Briar.hunter@gov.bc.ca and SCFishandAquaticWildlife@gov.bc.ca upon capture of any turtle species (including eggs) so that it can be identified and marked, if necessary. Do not release or euthanize any turtles until they have been identified by a member of the Western Painted Turtle Recovery Team.

15. All other small mammals and other organisms incidentally captured must be released unharmed; except wildlife species listed under *Wildlife Act Designation and Exemption Regulation (BC Reg 168/90),* Schedule "C" which must be humanely euthanized.

16. If working in potential Pacific Water Shrew habitat, works must be consistent with the most current Draft Best Management Practices for Pacific Water Shrew in Urban and Rural Areas,

September 2010, by Craig, Vennesland and Kym Welstead. It is the responsibility of the contractor/permit holder to obtain the most current version.

17. In addition to reporting condition requirements in this permit (i.e. reporting all captured wildlife within 21 days of permit expiry date), the permit holder must provide upon conclusion of this year's project, a copy of the final project report to Front Counter BC, Ministry of Water, Land and Resource Stewardship. The final project report must include an inventory of all wildlife species listed under *Wildlife Act Designation and Exemption Regulation (BC Reg 168/90),* Schedule "C" that were captured and euthanized.

18. All activities completed under this permit will follow methods described in the most recent Application and Animal Care Application (ACA) and associated documents. Salvage and handling of amphibians shall follow the methodology outlined in Best Management Practices for Amphibian and Reptile Salvages in British Columbia, 2016, by British Columbia Ministry of Forests Lands and Natural Resource Operations**, noting different salvage methodology in lotic and lentic habitat.** Inventory/survey methods shall be consistent with methodology outlined in Inventory Methods for Tailed Frog and Pacific Giant Salamander, 2000, by the Resource Inventory Committee.

BRITISH COLUMBIA

APPENDIX B
ADVISORY

PERMIT SU25-942717

GENERAL

- It is the permit holder's responsibility to be aware of all applicable laws and the limits of this permit. For example, this permit does not give the permit holder authority to access or travel though any private land without permission from the landowner.
- The Province is not liable for any illness contracted through wildlife handling. It is the responsibility of the permit holder to inform themselves of possible health hazards, and to ensure that all reasonably necessary safety measures are undertaken.
- If applicable, the permit holder is responsible for renewing this permit. The issuer is not obliged to send a reminder notice.

LEGISLATION

Below is a non-exhaustive list of provisions under the *Wildlife Act* and regulations that are relevant to this permit. It is the permit holder's responsibility to be aware of any provisions under the *Wildlife Act* or regulations that may apply to this permit.

Wildlife Act

Property in Wildlife

2 (1) Ownership in all wildlife in British Columbia is vested in the government.

(4) If a person by accident or for the protection of life or property kills wildlife, that wildlife, despite subsection (3), remains the property of the government.

(5) Despite anything in this Act, no right of action lies, and no right of compensation exists, against the government for death, personal injury or property damage caused by

(a) wildlife, or

(b) an animal that escapes or is released from captivity or is abandoned

in British Columbia

Trafficking in wildlife

22 A person who traffics live wildlife or wildlife meat, except as authorized by regulation or a permit, commits an offence.

Documents not transferable

81 Except as authorized by regulation or as otherwise provided under this Act, a licence, permit or limited entry hunting authorization is not transferable, and a person commits an offence if the person

(a) allows his or her licence, permit or limited entry hunting authorization to be used by another person, or

(b) uses another person's licence, permit or limited entry hunting authorization.

Failure to pay fine

85 (1) This section applies if a person

(a) fails to pay, within the time required by law, a fine imposed as a result of the person's conviction for an offence under this Act or the *Firearm Act*, and

(b) has been served with notice of this section.

(2) In the circumstances referred to in subsection (1),

(a) the person's right to apply for or obtain a licence, permit or limited entry hunting authorization under this Act is suspended immediately and automatically on the failure to pay the fine,

(b) all licences, permits and limited entry hunting authorizations issued to that person under this Act are cancelled immediately and automatically on the failure to pay the fine,

(b.1) the person must not apply for employment as an assistant guide,

(b.2) the person must not guide as an assistant guide, and

(c) the person commits an offence if, before that fine is paid, the person

(i) applies for, or in any way obtains, a licence, permit or limited entry hunting authorization under this Act,

(ii) does anything for which a licence, permit or limited entry hunting authorization under this Act is required,

(iii) applies for employment as an assistant guide, or

(iv) guides as an assistant guide.

Proof of identity and authorization

97 (1) In this section, **"authorization"** means a licence, permit or limited entry hunting authorization issued under this Act.

(2) Subject to subsection (5), a person who is required to hold an authorization must, on the request of an officer,

(a) state the person's name and address,

(b) produce prescribed photo identification, and

(c) demonstrate in accordance with subsection (3) that the person holds the authorization.

(3) A person may demonstrate that the person holds an authorization by

(a) producing the authorization, or

(b) unless the regulations require that the original authorization be produced,

(i) producing a legible copy of the authorization, or

(ii) if authorized by the regulations, stating a number assigned to the person by the director as an identification number for the person.

(4) Subject to subsection (5), a person who would be required to hold a licence or permit issued under this Act were the person not exempt under section 11 (9) or 12 (b) must, on the request of an officer,

(a) state the person's name and address, and

(b) produce prescribed photo identification.

(5) Subsections (2) (b) and (4) (b) do not apply to a person in a prescribed class of persons.

(6) A person who contravenes subsection (2) or (4) commits an offence.

Permit Regulation

General offence – failure to comply with permit

8 A person who holds a permit under the Act or this regulation commits an offence if the person fails to comply with a term of the permit.

Wildlife Act General Regulation

Proof of identity

21.01 (1) For the purposes of section 97 (2)(b) and (4)(b) of the Act, the following photo identification is prescribed:

(a) valid photo identification issued to a person by any of the following:

(i) the government of Canada;

(ii) the government of a province or territory, or an agent of the government of a province or territory, in which the person has a current address;

(iii) the Nisga'a Nation, if the person is a Nisga'a citizen;

(iv) a treaty first nation, if the person is a treaty first nation member of the treaty first nation;

(b) in the case of a person who is a non-resident alien,

(i) valid photo identification in the form of

(A) a passport, or

(B) a driver's licence issued to the person by a foreign jurisdiction in which the person has a current address, or

(ii) a copy of a photo identification referred to in subparagraph (i) that has been certified as a true copy by

(A) a lawyer, or

(B) a notary who is a member in good standing under the *Notaries Act;*

(c) in any case, a valid NEXUS card.

(2) For the purposes of section 97 (5) of the Act, persons under 16 years of age are prescribed as exempt from the requirement to produce photo identification.

BRITISH COLUMBIA

APPENDIX C
PERMIT SU25-942717

STANDARD OPERATING PROCEDURES:
HYGIENE PROTOCOLS FOR AMPHIBIAN FIELDWORK - 2008

ECOSYSTEMS BRANCH, MINISTRY OF ENVIRONMENT, BRITISH COLUMBIA

Interim Hygiene Protocols for Amphibian field staff and researchers

PURPOSE

To describe hygiene protocols to be used by amphibian field staff and researchers to reduce risk of disease transmission among sites and among animals within a site.

DESCRIPTION

Over the past few decades emerging infectious diseases such as the amphibian chytrid fungus (*Batrachochytrium dendrobatidis*) and ranavirus have been implicated in the decline of amphibian populations from many sites around the world. It is thought that field staff could act as potential vectors of transmission introducing these diseases into new sites and to naïve species. The risk of this mode of transmission is not fully understood compared to other modes of transmission, for example by vectors such as waterfowl and other wildlife. However, to reduce the risk, it is essential that all field workers incorporate the hygiene protocol into their research plans as Standard Operating Procedure (SOP).

To encourage compliance, the SOP below aims to strike a balance between reducing risk of disease transmission and increasing ease of protocol implementation under field conditions.

The protocols below address two levels of disease transmission: 1) the risk of disease transmission between sites; and 2) the risk of disease transmission among individuals within a site.

RESPONSIBILITY

This protocol applies to all field staff working in aquatic habitats sampling amphibians in freshwater lentic and lotic wetlands.

MATERIALS

- Plastic tote or box to store field equipment.
- Buckets and totes for mixing bleach solution and soaking equipment
- Spray bottle for bleach solution
- Scraper, brushes, hand-brushes
- Rubber dishwashing gloves, rubber apron
- Clean plastic containers and bags for temporarily holding animals
- Household bleach (contains active ingredient 5-6.5% sodium hypochlorite solution)
- Vinyl or nitrile gloves for handling amphibians
- Sterilizing solutions (ethanol) and alcohol burner/lighter for disinfecting instruments if toe-clipping or marking animals.
- Container for waste disposal

STANDARD OPERATING PROCEDURES (SOP)

I. SOP when moving between sites

Definition of site

At geographic scales of tens of kilometres, watersheds and major geographical barriers should be used to designate separate sites.

Each tributary of a river should be considered a separate site. Wetlands, ponds and lakes separated by dry land should be considered separate sites.

Site designation is particularly difficult at smaller geographic scales and with small isolated water bodies. At scales less than 500 m, if the water bodies remain separate under high water/flood conditions then they should be considered separate sites. Within a stream (at distances less than 500 m) sampling should occur in a downstream direction where possible. Each stream and each upstream location should be considered separate sites.

Equipment treatment

Equipment such as wetsuits, waders, footwear, nets, buckets, and traps may act as vectors of disease spread. In this SOP we recommend household bleach for disinfection because it is widely available, and it is easy to dispose under field conditions if the precautions below are followed. However, there are a number of other disinfectants that have been tested (Table 1) that offer a variety of other advantages. The SOP can be used with these chemical disinfectants instead of bleach, but manufacturer's recommendations and Material Safety Data Sheet requirements for use and disposal must be followed. It is important to ensure that disinfectants do not leave a residue on equipment, as the residue can be harmful to amphibians.

1. Before leaving a site, field workers must scrub using a hand brush and rinse using the pond/stream water to remove mud, algae, plants, snails and other invertebrates from all equipment. Disinfection procedures work best on cleaned equipment, free of debris.
2. A bleach solution with 0.2 % sodium hypochlorite and exposure time of 10 minutes has been shown to be effective against *Bd* (Johnson et al 2003). Commercial household bleach sold in North America often contains 6.15% sodium hypochlorite, but concentrations can vary. To prepare the disinfectant solution, add 32 ml of household bleach to 1 litre of water. This translates to approximately 3.5 cups (0.85 litre) of bleach to one tall bucket or tote (~ 25 litres) of water. In the absence of municipal/well water supply, water from the pond or stream can be used.
3. All equipment must be soaked in the bleach solution for a minimum of 15 minutes. Small items such as dipnets, and sample containers can be immersed in the bleach solution in a bucket or plastic tote. Larger items such as chest waders, paddles, boats, canoes, meter sticks and other survey equipment should be thoroughly soaked with the bleach solution using a spray bottle.
4. The bleach solution can be rinsed off after 15 minutes with clean water from a well or municipal supply. However, if clean treated water is not available, the items can be hung out to dry, preferably in sunlight, so that the bleach evaporates completely from the equipment.
5. The bleach solution can damage exposed skin and clothing. Dishwashing gloves and rubber aprons should be worn to protect clothing and skin from exposure to the bleach solution.
6. The SOP is most easily carried out back at the laboratory or field station. All equipment should be stored in a waterproof box or tote during transportation to prevent contaminating the vehicle and preventing the vehicles from acting as secondary sources of cross contamination.
7. If the equipment needs to be used immediately at another site prior to returning to the laboratory or field station, the SOP should be carried out on a road or other impermeable surface away from the waterbody, so that no bleach contaminated water enters surface water bodies. If time permits, all equipment should be dried completely between sites. This is facilitated by having two sets of gear, one of which is drying while the other is in use. If the equipment needs to be used immediately at another site, residual bleach from nets and other equipment should be rinsed off using water from the second site, again working away from the waterbody. Even trace amounts of residual bleach can adversely affect amphibians on contact.
8. In the field, the bleach solution is best disposed far from the waterbody by pouring over an asphalt, hard roadbed or concrete surface where it breaks down in sunlight and evaporates. Ensure no bleach water enters surface waters directly.
9. Washing road vehicles at a carwash between watersheds is desirable. All off-road vehicles, boats, canoes, and other floatation devices should be subject to the same SOP as sampling equipment. Large equipment, such as boats and seine nets, are most easily handled by spraying with or soaking in the bleach solution and then rinsing off at a carwash using high pressure hot water rinses.

Special Sites

The above SOP should be sufficient to reduce the risk of disease transmission under most circumstances. However, at sites where there have been known disease outbreaks or sites with highly endangered amphibian populations extra precautions are necessary. The simplest solution would be to have dedicated field gear that is used only at that site.

II. SOP under Special Circumstances

The above SOP should be implemented under all normal operating conditions. However, if for unforeseen and unplanned reasons it is not possible to adhere strictly to the above SOP the following precautions can be taken to reduce the risk of disease transmission.

1. At a minimum, all equipment should be scrubbed and rinsed thoroughly to remove debris, algae, invertebrates and mud.
2. Complete drying between sites can reduce the risk of transmission of chytrid fungus (*Bd*) but is not effective against ranavirus.
3. If it is possible to heat water, equipment should be soaked in water > 60°C for 30 minutes. This method may be practical for small equipment such as dipnets that come in direct contact with the animals.

III. SOP for handling amphibians within a site

It is important to assume that not all animals from a site are infected and that handling multiple animals without adequate caution will significantly increase the risk of between animal disease transmissions. The following SOP should be followed to ensure that handling by field staff does not increase the risk of an animal being exposed to a pathogen.

1. All field staff must ensure that their hands are well cleaned and free of residual chemicals such as sunscreen and insecticides at the start of the survey.
2. All field staff must wear disposable gloves when capturing amphibians. Non- powdered vinyl and nitrile gloves are preferred, as latex has been shown to have toxicity towards frog embryos and tadpoles.
3. Gloves should be changed between animal captures. If under unforeseeable circumstances access to gloves is limited, it is better to capture animals with bare hands and wash hands thoroughly in water to which the animals are habitually exposed, rather than to use the same pair of gloves to handle multiple animals.
4. Captured animals must be housed in separate disinfected containers or disposable bags such as plastic Ziploc bags.
5. The duration of restraint should be as short as possible. The greatest stress and risk of disease transmission between animals is during restraint. Every effort should be made to process animals at the site of capture and avoid captivity.

Containers used to house individuals should not be reused unless the containers have been treated using 4% bleach solution as described in SOP #1 above.

6. Fresh disposable gloves must be worn when measuring, swabbing or marking the animal. Surgical instruments such as scissors used for toe clipping should be dipped in 70% ethanol and flamed briefly between uses. A *bic* lighter is useful and effective for flaming surgical instruments in the field. Wiping down with ethanol alone kills the pathogens but does not completely destroy the pathogen DNA. This may increase the number of false positives if the animals are being sampled for disease prevalence

7. Instruments used for inserting PIT tags and other tags should also be sterilized between animals. Fresh disposable syringes should be used for each animal.
8. The tuberculin syringes used for fluorescent elastomer paint injections present a special problem. The needles can neither be changed between animals nor is it practical to use a fresh syringe for each marked animal. At this time the recommendation is that the needles should be sterilized with appropriate viricide/bactericide (or dipped in 70% ethanol) and rinsed with distilled water between making animals. The efficacy of this method in preventing between animal disease transmission needs to be assessed.

FURTHER INFORMATION

When in doubt, field staff should use the precautionary principle and use the highest standards of cleanliness possible. An additional half hour spent following the most stringent SOP is well worth the effort. A number of other protocols, using a variety of disinfection agents are listed below.

RELEVANT LITERATURE

Daszak P, Cunningham AA, Hyatt AD. 2001. Draft guidelines for international translocation of amphibians with respect to infectious diseases. Attachment 6. *In*: Speare R and Steering Committee of Getting the Jump on Amphibian Disease.

Developing management strategies to control amphibian diseases: Decreasing the risks due to communicable diseases. School of Public Health and Tropical Medicine, James Cook University: Townsville. 2001: 150-156.

Department of Environment and Heritiage. 2006. Threat abatement plan for infection of amphibians with chytrid fungus resulting in chytridiomycosis. Department of Environment and Heritage, Commonwealth of Australia. http://www.deh.gov.au/biodiversity/threatened/publications/tap/chytrid/

Gutleb, A. C., M. Bronkhorst, J. H. J. van den berg, and A. J. Murk. 2001. Latex laboratory gloves: an unexpected pitfall in amphibian toxicity assays with tadpoles. Environmental Toxicology and Chemistry **10**:119-121.

Johnson M, Berger L, Philips L, Speare R**.** 2003. Fungicidal effects of chemical disinfectants, UV light, dessication and heat on the amphibian chytrid, *Batrachochytrium dendrobatidis.* Diseases of Aquatic Organisms 57:255-260.

Speare, R., L. Berger, L. F. Skerratt, R. A. Alford, D. Mendez, S. Cashins, N. Kenyon, K. Hauselberger, and J. J. L. Rowley. 2004. Hygiene protocol for handling amphibians in field studies. Amphibian Disease Group, James Cook University, Townsville 4811, Australia. http://www.jcu.edu.au/school/phtm/PHTM/frogs/field-hygiene.pdf

US Forest Service Intermountain Region. Technical Chemical Information for Disinfecting Aquatic Invasive Species (excellent resource for calculating disinfectant dilutions) http://www.fs.fed.us/r4/resources/aquatic/guidelines/chemical_tech_final.xls

Webb, R., D. Mendez, L. Berger, and R. Speare. 2007. Additional disinfectants effective against the amphibian chytrid fungus Batrachochytrium dendrobatidis. Diseases of Aquatic Organisms 74:13-16.

Wellington, R. and R. Haering. 2001. Hygiene protocol for the control of diseases in frogs. New South Wales National Parks and Wildlife Service Threatened Species Management Information Circular No 6, Hurstville, Australia. www.npws.gov.au/wildlife/licence/frog.html

Table 1

Summary of disinfectant concentrations and exposure times found to be effective against *Bd*. Table reproduced with modification from Speare et al (2004) with additional information from Johnson et al (2003) and Webb et al (2007).

DISINFECTANT	CONCENTRATION	TIME	REFERENCE
Disinfecting surgical equipment and scales			
Ethanol	70%	1 min	Speare et al 2004 Webb et al 2007
Virkon	1mg/ml	1 min	Speare et al 2004
Benzalkonium chloride	1 mg/ml	1 min	Speare et al 2004
Disinfecting collection equipment, containers, footwear, waders, boats, nets and other field gear			
Household bleach (sodium hypochlorite 4% to 6%)	4% to 1% (0.2 to 0.01% Sodium hypochlorite)	10 min to 30 sec	Speare et al 2004 Johnson et al 2003 Webb et al 2007
Didecyl dimethyl ammonium chloride	1 to 1000 dilution	30 sec	Speare et al 2004
Quaternary ammonium compound 128	Full strength to $1x10^{-3}$	5 mins to 30 sec	Johnson et al 2003
Virkon	1 mg/ml 2 g/litre	5 min, 20 sec 1 min	Johnson et al 2003 Webb et al 2007
F10 Super Concentrate Disinfectant	0.7 ml/litre	1 min	Webb et al 2007
TriGene Viricidal Surface Disinfectant Cleaner	0.2 ml/litre	1 min	Webb et al 2007
DDAC	2 ml/litre	1 min	Webb et al 2007
Sodium chloride	10%	5 min, 2 min	Johnson et al 2003
Potassium permanganate	2%	10 min, 5 min	Johnson et al 2003
Hot wash for cloth bags and clothing	60 °C or greater	15 mins	Speare et al 2004
Heat	60 °C	30 minutes	Speare et al 2004 Webb et al 2007
Complete drying (footwear only)	Effective against *Bd* but not ranavirus	3 hrs or greater	Speare et al 2004
Sterilising UV light ($1000\ mW\ m^{-2}$ wavelength 254 nm)	Effective against ranavirus but not *Bd*	1 min	Speare et al 2004 Johnson et al 2003

APPENDIX D
RECORD OF WILDLIFE HUNTED, TRAPPED OR KILLED
PERMIT SU25-942717

- The permit holder **MUST** maintain an accurate up-to-date record.
- The permit holder **MUST** submit the original copy of this record to FrontCounter BC, Ministry of Water, Land and Resource Stewardship **within 21 days** of the permit's expiry or annually as indicated in "Appendix A – Terms of Permit – Reporting Requirements" of this permit.
- The permit holder must produce a copy of this record on the demand of an officer

*If more room is required, please use a sheet of blank paper

Common name of wildlife	Location where wildlife was taken	Date wildlife was hunted, trapped or killed	Sex and age class of wildlife	Bands or tags on wildlife	Description of all nests, dams or other structures destroyed or removed

_____ _____

Signature of Permit Holder Date

FrontCounter BC
Ministry of Water, Land and Resource Stewardship
Locations: https://portal.nrs.gov.bc.ca/web/client/locations

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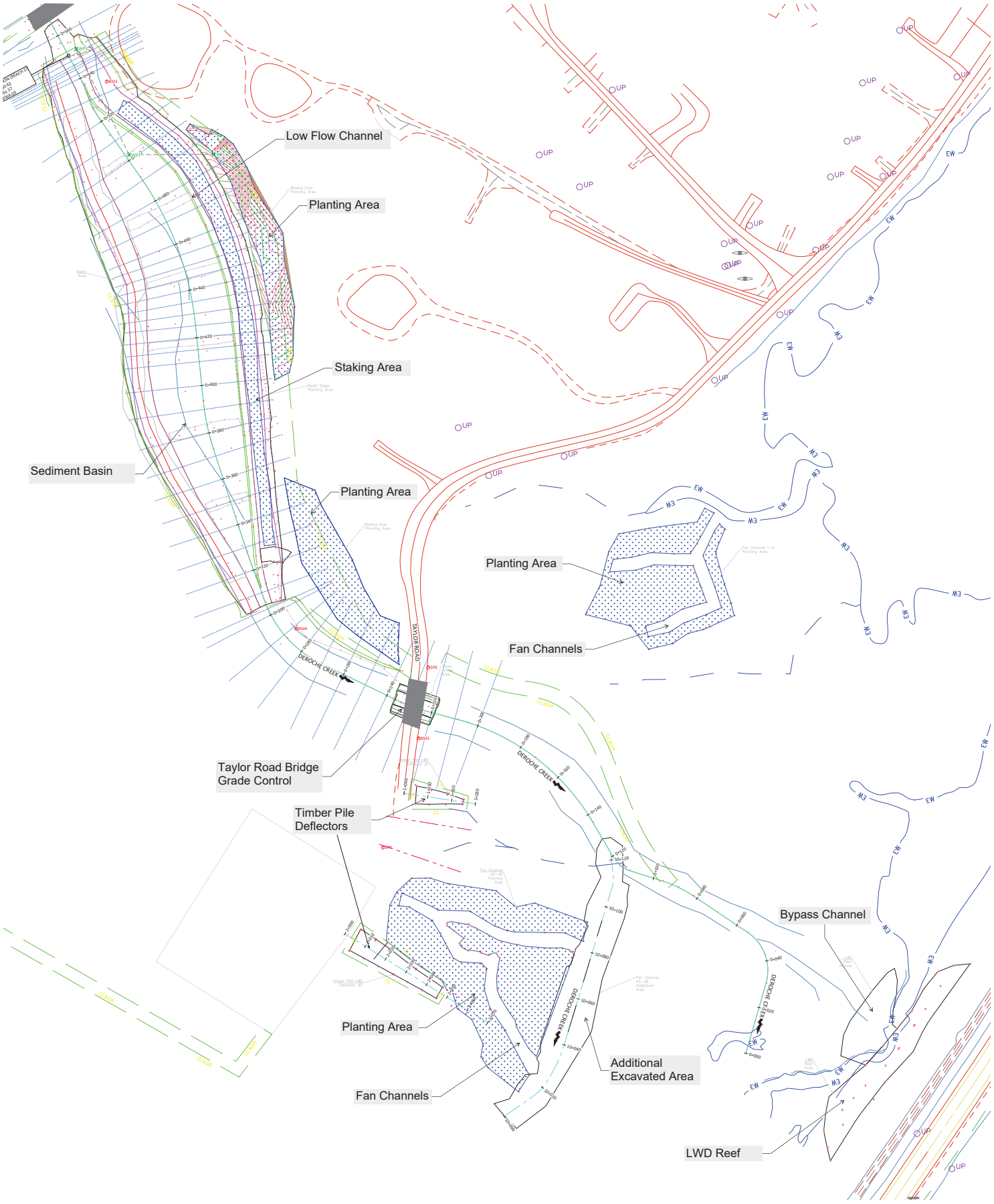
Enclosure B

As-Built Drawings

AS-BUILT DRAWING



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Enclosure C

Site Photographs

Enclosure C – Site Photographs

PHOTOGRAPHS



Photo 1: Japanese knotweed disturbed along fan channel access path.



Photo 2: Generator located on spill tray

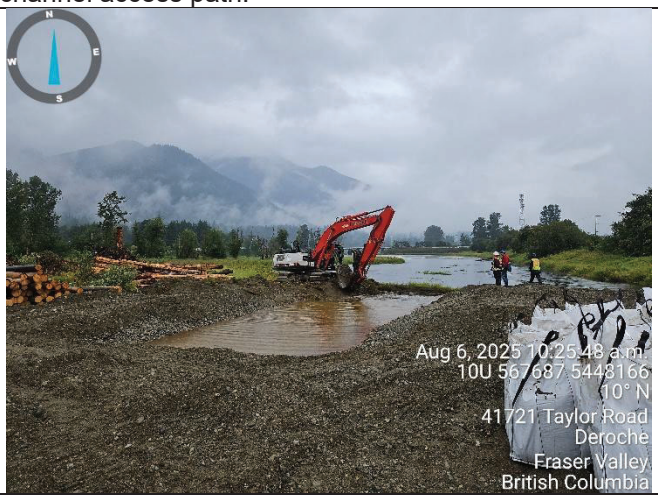

Photo 3: Connection of the upstream end of the bypass channel to the Nicomen Slough.



Photo 4: Isolation of the LWD Reef worksite using bulk bags and poly sheeting.



Photo 5: Construction of fill berm on the upstream side of the LWD reef site.



Photo 6: Spill of hydraulic fluid on swamp mats.

Enclosure C – Site Photographs

PHOTOGRAPHS



Photo 7: LWD Reef constructed in isolation



Photo 8: Pumping turbid water from the LWD reef worksite into adjacent grassy area prior to removal of isolation measures.



Photo 9: Removal of downstream isolation.



Photo 10: Isolated area after culvert removal in bypass channel. Turbid water is settling before release.



Photo 11: Constructed fan channel and riparian planting



Photo 12: Sediment basin and low flow channel

Enclosure C – Site Photographs

PHOTOGRAPHS



Photo 13: Planting area adjacent to sediment basin.



Photo 14: Timber pile deflector.



Photo 15: LWD reef in Nicomen Slough

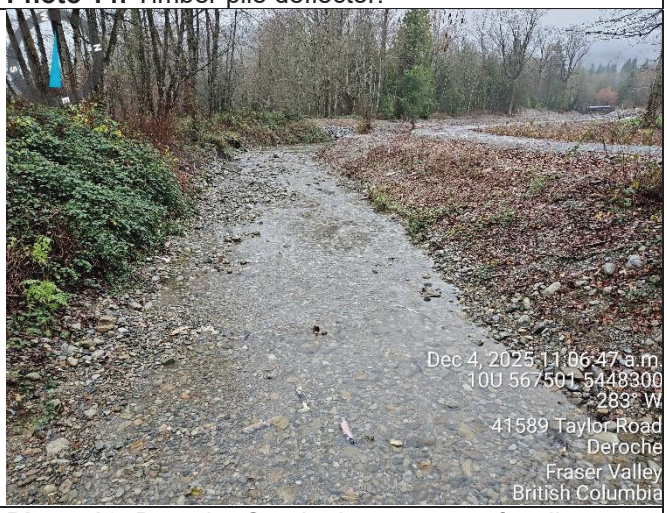

Photo 16: Deroche Creek, downstream of sediment basin.

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Enclosure D

Construction Environmental Management Plan

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Deroche Creek Recovery Solution Project

Construction Environmental Management Plan

Final Report – Revision 2
June 3, 2025
KWL Project No. 2838.003

Prepared for:
BC Ministry of Environment and Climate Change Strategy

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1. Introduction

1.1 Project Description

The Ministry of Environment and Climate Change Strategy (ENV) and Leq'a:mel First Nation (LFN) are working to address the impacts of sedimentation in Deroche Creek that resulted from significant precipitation and flooding during the November 2021 Atmospheric River Event (ARE). Kerr Wood Leidal Associates Ltd. (KWL) has been retained as a subconsultant to the Engineer-of-Record, Northwest Hydraulic Consultants (NHC), to provide environmental services during design, permitting support, contract administration, construction management, and construction environmental monitoring for the Project.

KWL has prepared this document as an updated Construction Environmental Management Plan (CEMP) for this phase of the works. This CEMP includes general guidance on the following topics:

- Environmental monitoring
- Timing of works
- Protection of fish and fish habitat
- Protection of birds and wildlife
- Tree protection and vegetation management
- Invasive plant management
- Erosion and sediment control
- Deleterious substance control and spill management
- Clean up and restoration

1.2 Purpose of the Construction Environmental Management Plan

This Construction Environmental Management Plan (CEMP) provides overarching guidance and sets out the requirements and measures that will be adopted to avoid, minimize, and mitigate the potential adverse environmental impacts of the Project. This plan is to be implemented by the Contractor throughout the duration of the Project and applies to the construction phase.

The CEMP is a living document and will be updated over the course of construction as planning and sequencing for work activities are adjusted and finalized, and as observations made by Environmental Monitors warrant changes in environmental management.

1.3 Roles and Responsibilities

The parties involved in the Project have the following roles and responsibilities with respect to environmental management:

1. The Owner's (LFN's) representative, shall:
    a. ensure that the appropriate resources are available to establish, implement, maintain, and improve environmentally responsible construction practices;
    b. liaise with the EM about potential impacts to environmental components during construction;
    c. contract Qualified Professionals[1] (QPs) with specific expertise required for the Project liaise with all QPs as needed; and
    d. provide resources required for environmental awareness and protection training, environmental documents specific to the Project, and financial resources.
2. The Project Sponsors, Ministry of Environment and Climate Change Strategy (ENV) and Indigenous Services Canada, shall:
    a. provide project funding; and
    b. provide general guidance and oversight of works.
3. The Environmental Monitor (EM), KWL, shall:
    a. advise the Contractor of environmental protection and monitor environmental protection measures;
    b. identify deficiencies of the Contractor and communicate with the Contractor on how to address deficiencies;
    c. have written authority to halt or modify any construction activity if it is deemed necessary in order to protect fish and wildlife populations or their habitats; and
    d. report to the Consultant.
4. The Contract Administrator, KWL, shall:
    a. ensure that the appropriate resources are available to establish, implement, maintain, and improve environmentally responsible construction practices;
    b. liaise with the EM about potential impacts to environmental components during construction;
    c. liaise with all QPs involved with the Project as needed; and
    d. provide the resources required for environmental awareness and protection training, contract QPs with specific expertise as needed, environmental documents specific to the Project, and financial resources.
5. The Engineer of Record, NHC, shall:
    a. have specific expertise or knowledge needed to advise and/or support the EM and the Contractor where specific engineering input is required related to environmental concerns;
    b. liaise with the EM about potential impacts to environmental components during construction; and

[1] QPs will have the expertise or knowledge needed to advise and/or support the Consultant, the EM, the Contractor, and KWL with respect to environmental or other engineering concerns.

c. liaise with any other QPs involved with the project as needed.

6. The Contractor (to be determined) includes any company and its field staff retained by LFN to construct a component of the Project. The Contractor shall:
   a. plan and conduct activities in compliance with the CEMP and all applicable legislation, approvals, and best management practices;
   b. report directly to the Consultant regarding all site activities;
   c. ensure that there is no release of deleterious substances into Deroche Creek or any other nearby watercourses or waterbodies;
   d. ensure all staff, including subcontractors, are familiar with the CEMP and know their responsibilities in meeting the outcomes of the plan;
   e. communicate changes in construction plans or activities that could impact the implementation of the CEMP to the Consultant, the EM, and KWL as quickly as possible; and
   f. keep a copy of the CEMP on-site at all times.

1.4 Guiding Documents

The following guidance documents were used to develop the CEMP:

- *Requirements and Best Management Practices for Making Changes In and About a Stream in British Columbia*. Version 2022.01. Government of British Columbia, 2022.
- *Measures to Protect Fish and Fish Habitat*, Fisheries and Oceans Canada, 2019.
- *A Field Guide to Fuel Handling, Transportation and Storage*, Ministry of Water, Land and Air Protection, 3rd Edition, 2002.
- *B.C. Approved Water Quality Guidelines*, Ministry of Environment and Climate Change Strategy Updated 2018
- *Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia*, Ministry of Water, Land and Air Protection, 2004.
- *Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia*, Ministry of Environment and Climate Change Strategy, 2014.
- *Land Development Guidelines for the Protection of Aquatic Habitat, Fisheries and Oceans, 2nd Edition, 1993.*
- *New Migratory Birds Regulations,* Environment and Climate Change Canada, 2022.

2. Project Location and Scope of Work

2.1 Project Location and Physical Setting

Deroche Creek flows through Lakahahmen IR 11 where it enters Nicomen Slough, a historical side channel of the Fraser River that has had its inflow from the river regulated by diking and the "Bell Dam" since the 1930s. Lakahahmen IR 11 is located on and adjacent to the Deroche Creek alluvial fan, approximately 22 km east of the City of Mission, BC. The project location is the mainstem of Deroche Creek, starting to the west of the intersection of North Deroche Road and Cooper Road, running southeast to Taylor Road, and ending at the downstream edge of the alluvial fan within Nicomen Slough.

Emergency sediment removal was conducted in November 2022 to remove sediments introduced by the 2021 Atmospheric River Event (ARE) and repair the highest risk bank erosion sites. The following Project now aims to provide a long-term solution to the sediment accumulation in Deroche Creek to mitigate future impacts on infrastructure and salmon habitat. Continued sediment deposition on the alluvial fan poses potential threats such as channel avulsion, bank erosion, and negative impacts to fish passage. Initial emergency sediment removal works have been completed, but further long-term solutions are required to mitigate future risks.

The proposed Deroche Creek Recovery Solution Project includes the following works:

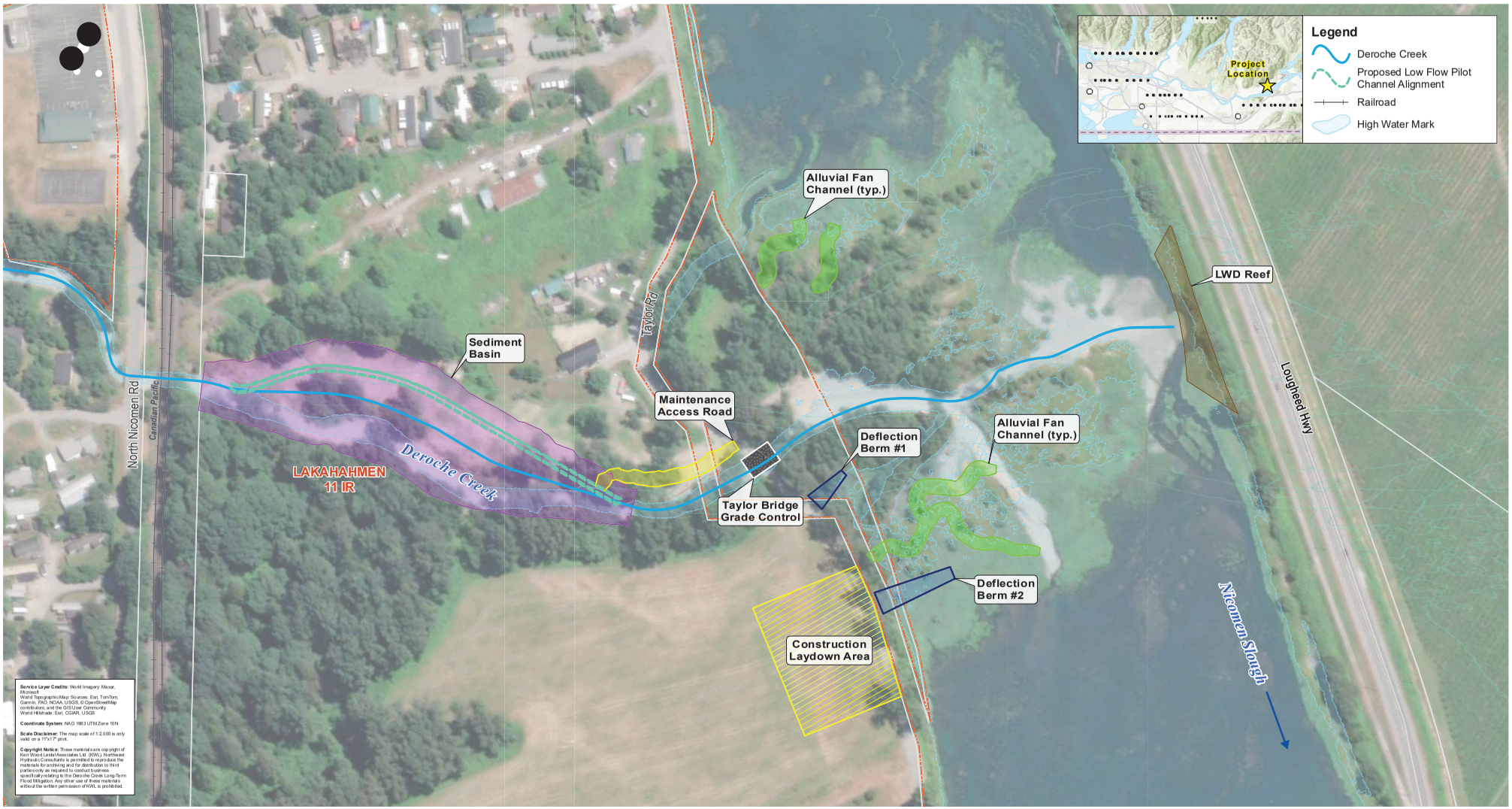
- Construction of a sediment basin with a low-flow channel in Reach 2 to increase area available for sediment deposition and reduce infilling of the lower channel and fan, which has the potential to impede the migration of fish during low flows and smother spawning habitat downstream.
- Installation of bed armouring at Ministry of Transportation & Infrastructure's Taylor Road Bridge in Reach 2, downstream of the proposed sediment basin, to prevent degradation due the reduction in sediment supply.
- Construction of two timber pile deflectors on the Deroche Creek alluvial fan perpendicular to the Taylor Road to prevent high flows from eroding the embankment of Taylor Road.
- Construction of rearing habitat channels in the Deroche Creek alluvial fan.
- Installation of a large woody debris reef along the Highway 7 embankment to improve habitat complexity and stabilize the bank.
- Enhancement of riparian habitat of Deroche Creek through invasive species removal and native planting.

More details about construction are provided in subsequent sections of the CEMP.

Path: P:\2800-2899\2838-003\430-GIS\Pro Projects\2838003_Figures\2838003_Figures.aprx\2838003_Fig2-1_ProposedWorks | Date Saved: 5/29/2025 10:38 PM | Author: JLau

Northwest Hydraulic Consultants
Deroche Creek Long-Term Flood Mitigation

KERR WOOD LEIDAL consulting engineers



Project No. 2838.003
Date May 2025
Scale 1:2,000
0 12.5 25 50 Metres

Proposed Works

Figure 2-1

2.2 Scope of Proposed Works

The construction stage, activity, and description of activity for construction works are described in the tables below.

Table 2-1: Proposed Construction Methods for Sediment Basin

Stage	Activity	Description of Activity
Site Preparation	Clearing and Grubbing	Remove vegetation for access path from Taylor Road to the downstream extent of the sediment basin. Remove vegetation on east bank of Deroche Creek within the basin footprint.
	Site Isolation	The work site will be isolated from flow and dewatered so that work can be conducted in the dry. Flow will be pumped around the site or through a bypass channel. Exclusion fencing of construction area to prevent fish access; salvage of all fish, amphibians, and mammals from enclosed site.
Construction	Basin Construction	Excavation and grading of sediment basin. The west bank of Deroche Creek will act as the west wall of the sediment basin. A low flow channel will be established along the left bank to convey base surface flows once they return to the creek. All construction below the normal high-water mark will occur in the dry and/or fully isolated from creek flows.
	Hauling and Disposal	Excavated material will be hauled by truck and either used on-site for construction of other project components, disposed of on Lot 8-3-3, or disposed of off-reserve at a location(s) determined by the Contractor. Machine access will occur from Taylor Road.
	Instream Complexing	Large woody debris (sourced from clearing) and habitat boulders will be placed in the low flow channel to add habitat complexity for salmonids.
	Bank Stabilization	Banks of the sediment basin will be stabilized using a mix of rock and appropriate growing substrate for vegetation above the normal high-water mark.
	Surface Restoration	Refinish roads and seed exposed soils disturbed from the works.
Site Restoration	Site Restoration and Enhancement	The banks of the sediment basin will be planted with native riparian plant species and live stakes.

Table 2-2: Proposed Construction Methods for Taylor Bridge Grade Control

Stage	Activity	Description of Activity
Site Preparation	Site Isolation	The work site will be isolated from flow and dewatered so that work can be conducted in the dry. Flow will be pumped around the site if necessary.
	Clearing and Grubbing	Remove riparian vegetation along the machine access path from Taylor Road.
Construction	Excavation	Excavate sediment to subgrade, place boulders in a checkerboard pattern, and fill voids between boulders using excavated sediment and add coarse rock to the side slopes.
	Hauling and Disposal	Excavated material will be hauled by truck and either used on-site for construction of other Project Elements or disposed of on Lot 8-3-3.
	Surface Restoration	Refinish roads and seed and exposed soils disturbed from the works.
Site Restoration	Site Restoration and Enhancement	Replant cleared area with native riparian plant species.

Table 2-3: Proposed Construction Methods for Timber Deflectors

Stage	Activity	Description of Activity
Site Preparation	Clearing and Grubbing	Remove vegetation along access path and within the berm footprints from Taylor Road.
Construction	Installation of wood piles	Drive timber piles (sourced from sediment basin clearing) into the Deroche Creek fan approximately 5 m below grade.
	Installation of woody debris	Woody debris from cleared trees will be placed between the timber piles to form the timber deflectors.
	Surface Restoration	Refinish roads, driveways, and other surfaces disturbed due to the works.
Site Restoration	Site Restoration and Enhancement	Disturbed areas will be replanted with native shrubs and trees.

2.3 Construction Timeline

A portion of pre-construction tree and shrub clearing was completed in February and March 2024, prior to the start of general migratory bird nesting window for the area. Additional tree clearing was conducted in February and March 2025. Construction will begin in June 2025, starting with partial excavation of the sediment basin, construction of the offsetting channel, and installation of the timber deflectors. These works will be done in the dry. Instream works occurring during the reduced-risk work window for fish and wildlife for Deroche Creek (August 1 to September 15). This includes Taylor Bridge grade control, LWD reef, and completion of the sediment basin. Planting and staking will occur in fall 2025.

3. Environmental Setting

Deroche Creek provides important spawning and rearing habitat for several species of salmon, however, the frequent movement and deposition of sediment, channel instability, and intermittent flows currently impair its value. The creek supports runs of coho (*Oncorhynchus kisutch*) and chum salmon (*Oncorhynchus keta*). Records of cutthroat trout (*Oncorhynchus clarkii*) are also known from the creek. No new fish sampling was conducted by KWL as part of the environmental assessment.

The riparian vegetation within the assessed area of Deroche Creek consists disturbed young deciduous forest and mixed forest. Riparian vegetation on the alluvial fan consists of small black cottonwoods (*Populus tricocarpa*) and red alders (*Alnus rubra*) with an understory consisting predominantly of invasive reed canary grass (*Phalaris arundinacea*). Upstream of Taylor Road, the riparian community transitions into a mixed forest with larger cottonwood and western redcedar (*Thuja plicata*) with a sparse understory.

Invasive species observed through this reach include Himalayan blackberry (*Rubus armeniacus*), English ivy (*Hedera helix*), Japanese knotweed (*Fallopia japonica*), and Scotch broom (*Cytisus scoparius*).

The assessed area does not contain critical habitat for any aquatic or terrestrial species or birds protected under Schedule 1 of Canada's *Species at Risk Act*.

4. Regulatory Reviews, Permits, and Approvals

The following regulatory reviews, permits, and approvals have been identified as being required for the project:

- Fisheries and Oceans Canada – *Fisheries Act* Authorization.
- Fisheries and Oceans Canada – Scientific Licence for fish salvage activities for federally-regulated fish species.
- BC Ministry of Water, Land and Resource Stewardship – *Water Sustainability Act* Change Approval for Works In and About a Stream.
- BC Ministry of Water, Land and Resource Stewardship – Scientific Fish Collection Permit for fish salvage activities for provincially-regulated fish species.
- BC Ministry of Water, Land and Resource Stewardship – General Wildlife Permit for potential salvage of amphibians during construction.
- BC Ministry of Forests – Heritage Inspection/Investigation Permit.
- Leq'a:mel First Nation – Approval under Nation's Environmental Assessment Law (2018).
- Leq'a:mel First Nation – Permit under Nation's Soil Transport, Deposit, and Removal Law (2020).
- Leq'a:mel First Nation – Archaeological Permit for site investigation and, if required, alteration.

As institutional projects are generally not subject to the Riparian Areas Protection Regulation (RAPR), a provincial RAPR assessment is not required for this project.

A federal *Species at Risk Act* Permit is not required as no critical habitat for any listed aquatic or terrestrial species at risk has been designated within the site.

5. Construction Environmental Management Plan

The following measures will be used to avoid, minimize, and mitigate potential environmental impacts of the Project and to ensure compliance with all environmental legislation, permits, and approvals.

5.1 Environmental Monitoring

Environmental monitoring will be conducted to ensure appropriate measures are being taken to protect the environment. The Environmental Monitor (EM) must be an appropriate Qualified Environmental Professional (QEP). The EM will regularly inspect the work site for compliance with the environmental requirements of the Project. Observations will be recorded and reported to the Owner's Representative and the Contractor. The EM must be familiar with the regulatory requirements of the Project and has the responsibility to report all non-compliance events and stop work if necessary. The EM will be on-site at the project start-up and during any sensitive activity. A copy of this document will be kept on-site for the duration of the Project. Responsibilities of the EM will include, but are not limited to, the following:

- Review all permits, best management practices, and the CEMP.
- Be on site for Project start-up and critical instream works and works adjacent to sensitive areas.
- Meet with the Contractor before construction to explain all mitigation and environmental protection measures.
- Monitor project compliance with the CEMP, address changes with the Contractor and Consultant to ensure CEMP is continuously updated, as needed.
- Inspect all mitigation and erosion and sediment control (ESC) measures to ensure they are appropriate and working properly and recommend modifications and repairs when necessary.
- Have written authority to halt any construction activity if it is deemed necessary to protect fish, wildlife, and their habitat.
- Identify, monitor, and promptly report any situations of ongoing or potential damage to the environment.
- Report to the Engineer of Record and relevant regulatory agencies on environmental issues encountered during construction.
- Prepare and submit a monitoring summary report after the Project's completion to the Engineer of Record and any regulatory agencies, as required.

5.2 Timing of Works

- Project activities will be scheduled for dry weather conditions whenever possible.
- All instream works will be completed during the reduced risk work window for fish species documented in Deroche Creek (August 1 – September 15).
- Unless absolutely necessary to proceed with project works, tree removal and vegetation clearing is to take place outside the regional bird nesting period (March 1 to August 30) to avoid impacts to migratory birds. In certain areas with low habitat complexity (e.g., unvegetated, sparsely vegetated, isolated trees), bird nest searches may be considered at the discretion of a QEP. In the event that a bird nest search is conducted, the following will apply:
    - if an active nest is identified, a no-work zone buffer will be established and maintained around the active nest to minimize access and sensory disturbance;
    - the buffer distance will vary depending on the species of bird. Therefore, the buffer distance will be determined based on best management practices and the professional judgement of the QEP;
    - nests will be monitored to assess nest activity and effectiveness of the buffer. Clearing (disturbance) can continue once the EM has determined that the nest is no longer active;
    - if no active nests are found in surveyed areas, vegetation clearing (disturbance) can commence, but must be complete within 36 hours of the pre-disturbance nest survey being conducted; and
    - nests of birds in Schedule 1 of the Migratory Birds Regulations (2022) will be reported as required by the regulations and will be protected for the duration of time required by the regulations (e.g., 36 months for pileated woodpecker).

5.3 Protection of Fish and Fish Habitat

- Where instream works are isolated using a flow bypass or other similar means (if necessary), fish salvage will be undertaken before and during dewatering of the isolated area. To prevent the dewatering of areas outside of the work site, an appropriate bypass discharge location will be selected.
- During reinstatement of flows to the work area, measures will be taken to ensure the area downstream of the work site does not dewater (i.e., some flows should still be bypassed downstream).
- All pump intakes will be equipped with fish screens (mesh width < 2.54 mm) to prevent entrainment and impingement of fish, in accordance with the DFO Interim Code of Practice for End-of-pipe fish protection screens (DFO, 2020).
- Slow commencement of in-water activities is recommended to encourage mobile aquatic species to leave the construction area.
- The duration of in-water work and activity will be minimized so that it does not diminish the ability of fish to carry out one or more of their life processes.
- Minimal disturbance will occur to natural materials (e.g., embedded logs) and vegetation that contributes to habitat or stream channel stability.
- Minimal disturbance will occur to existing vegetation on and adjacent to the stream banks.

5.4 Tree Protection and Vegetation Management

- Professional arborists and biologists will be consulted throughout the site clearing and construction phases to minimize impacts to vegetation communities.
- Clearing will be limited to areas necessary for the works. Existing roads, trails, and other access points will be used where possible.
- A tree or other structure containing a nest of eagles, peregrine falcons, gyrfalcons, ospreys, and herons must not be felled, even outside of the breeding season for these species. This is in accordance with Section 34(b) of the *Wildlife Act*.
- Wildlife trees will be retained if possible. They provide essential habitat to birds and other wildlife.
- Where topping or removing dead limbs of dangerous trees will remove the hazard, this option is preferred over removing the entire tree.
- Cleared areas will be revegetated with native trees and shrubs when work is complete.

5.5 Invasive Plant Management

- All machinery will be inspected by the QEP before entering or leaving the construction site to remove any invasive plant propagules.
- All invasive vegetation removed will be disposed of off site at an appropriate facility.
- All material used on site (e.g., straw, hydroseeding, etc.) must be certified weed-free.
- Upon Project completion, native shrubs and trees will be planted in disturbed areas within the footprint to maintain soil stability and to minimize the potential for invasive species colonization.
- If patches of knotweed or hogweed are encountered during site clearing or other works in the Project area, they will be flagged off and reported to the QEP immediately. Knotweed must be managed carefully as it is able to reproduce from rhizomes and stem fragments. The following procedures will be adhered to:
    - all plant and soil material must be removed from site in a way as to minimize transfer of plant parts to other areas;
    - all plant parts must be removed, potentially by hand with appropriate personal protective equipment, sealed in plastic bags, and disposed of appropriately off site; and
    - topsoil within 10 m of the extent of the knotweed patch may not be used as backfill. The soil should be disposed off site at an appropriate waste management facility experiences in dealing with knotweed-contaminated soils.

5.6 Soil Testing and Handling

Materials excavated from the Project site may require sampling for contaminants before being removed from the site. If additional sampling is required, the contractor will coordinate with the EM to allow access for soil sampling when required. Any signs of soil contamination (staining, odor, sheen on water in excavation site) should be reported immediately to the EM.

If soil contamination is suspected, excavated materials will need to be stored on site until analytical results have been received. The material should be stored in a manner where potential contaminants will not runoff into adjacent waterbodies. The location should be coordinated with the EM.

If soil is deemed to be contaminated, special handling and disposal by the contractor may be required. The contractor will need to work under the direction of a qualified contaminated sites professional who will provide direction on appropriate soil excavation, handling, and disposal procedures to ensure all regulatory requirements for contaminated sites management are met.

5.7 Erosion and Sediment Control Plan

The purpose of erosion and sediment control (ESC) is to prevent the introduction of sediment (e.g., silt, clay, or sand) into watercourses. An ESC Plan will be prepared for the project which prescribes methods to prevent the erosion and mobilization of sediment of exposed areas by rainfall or water flow through the work site, to intercept and manage sediment-laden runoff from works before leaving the work site and entering the watercourse, and/or manage the risk of a sediment discharge.

The ESC measures can be adapted or added to before, during, and after construction as required based on the recommendations of the EM. ESC measures will be set up before starting work. Measures will be monitored regularly and maintained until all disturbed ground has been stabilized.

ESC measures included in the ESC Plan will incorporate the following measures at a minimum:

- Undertake works during dry weather where possible.
- Deposit all spoil materials above the high-water mark, ensuring sediment re-entry into watercourses or waterbodies is prevented.
- Cover all disturbed areas and spoil piles with poly sheeting or a reasonable alternative under the direction of the Consultant and/or if inclement weather is expected.
- Minimize vegetation disturbance on banks to the furthest extent possible.
- Deploy perimeter ESC measures such as silt fences, berms, and check dams as necessary.
- All ESC measures will be monitored regularly by both the Contractor and the EM and maintained until all disturbed ground has been stabilized.
- Any other measures needed to prevent erosion of a watercourse and work site, or sediment from entering any watercourse, as determined by the QEP, EM or Engineer.

5.8 Deleterious Substance Control and Spill Management

- Instream works will be carried out in accordance with the *Requirements and Best Management Practices for Making Changes In and About a Stream in British Columbia*. (Government of British Columbia, 2022) and *Best Management Practices for Site Restoration or Maintenance* (Government of BC 2022).
- Construction activities will follow Fisheries and Oceans Canada's *Land Development Guidelines* (DFO, 1993) to maintain the quantity and quality of fish habitat at the productive level present before development activities occurred.
- Machinery and equipment shall not be operated below the high-water mark of Deroche Creek or the Nicomen Slough unless it has been converted to use biodegradable hydraulic fluid and grease.
- All fueling of vehicles and equipment will be done off-site or onsite in a designated fueling area over a spill containment tray at least 30 m from Deroche Creek and Nicomen Slough.
- All equipment washing must be done off-site or onsite in a designated area at least 30 m from any watercourse or in a manner that will prevent wash from reaching any waterway.
- Generators, pumps, and other stationary equipment will be placed on spill trays or equipped with other secondary containment. Where possible, generators will be located at least 30 m from Deroche Creek or Nicomen Slough. Noise from generators will be suppressed using a suitable method (e.g., enclosing generators in plywood).
- All machinery will be clean, in good working condition and free of excess oil and grease. Equipment will be inspected daily and documented.
- Containers will be labelled according to the *Transportation of Dangerous Good Act* and *Workplace Hazardous Materials Information Systems* (WHMIS) regulations.
- Oil waste, filters, absorbent pads, and cartridges will be collected and disposed of off-site at an appropriate facility in accordance with federal, provincial, and municipal regulatory requirements.
- To prevent the release of substances toxic to fish, there will be no use of treated wood products within a watercourse.
- A spill response plan and spill kit will be on site and suitable for all substances on-site, and staff trained in its use.

Spill Response

- The contractor will prepare a spill management plan which includes notification procedures, contact telephone numbers and spill report forms.
- A spill kit will remain on site during construction. The kit will be stocked with appropriate supplies for the site size and conditions (e.g., absorbent pads, booms, granular absorbent). Staff will be trained in the proper use of the kit.
- Any spill of a toxic or deleterious substance over the reportable limits as outlined in the Ministry of Environment and Climate Change Strategy Spill Reporting Factsheet (MOE, 2021)[2] will be reported immediately to the BC Provincial Emergency Program 24–hour phone line at 1-800-663-3456.
- If a spill of toxic or deleterious substances occurs within a watercourse or waterbody both FOR and DFO will be notified immediately. All spills will be reported to the EM immediately.

5.9 Clean up and Restoration

- All construction materials, recyclables and garbage will be removed from site and responsibly disposed of after the Project is complete.
- Erosion and sediment control devices and measures will be removed following the stabilization of all disturbed areas.
- The contractor will be responsible for leaving the site in compliance with all Permits, Approvals, and Authorizations.

[2] https://www2.gov.bc.ca/assets/gov/environment/air-land-water/spills-and-environmental-emergencies/docs/materials/fact_sheet_spill_reporting.pdf

Report Submission

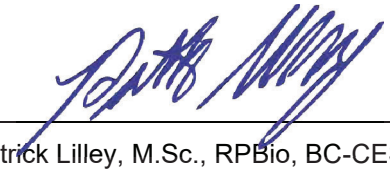
Prepared by:

KERR WOOD LEIDAL ASSOCIATES LTD.



Janice Kwo, M.Sc., RPBio
Project Biologist

Reviewed by:



Patrick Lilley, M.Sc., RPBio, BC-CESCL
Senior Biologist

Statement of Limitations

This document has been prepared by Kerr Wood Leidal Associates Ltd. (KWL) for the exclusive use and benefit of BC Ministry of Environment and Climate Change Strategy for the Construction Environmental Management Plan for the Deroche Creek Sediment Long-Term Solution Project. No other party is entitled to rely on any of the conclusions, data, opinions, or any other information contained in this document.

This document represents KWL's best professional judgement based on the information available at the time of its completion and as appropriate for the project scope of work. Services performed in developing the content of this document have been conducted in a manner consistent with that level and skill ordinarily exercised by members of the engineering profession currently practising under similar conditions. No warranty, express or implied, is made.

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Revision History

Revision #	Date	Status	Revision	Author
2	June 3, 2025	Final	Update Project footprint	JVK
1	November 20, 2024	Final	Updated based on schedule change to 2025 construction	JVK
0	May 30, 2024	Final	Issued for Tender	JVK

References

Fisheries and Oceans Canada (DFO). 1993. *Land Development Guidelines for the Protection of Aquatic Habitat.* URL http://www.sxd.sala.ubc.ca/9_resources/fed_%20files/fed%20land%20development%20guidelines.pdf

Fisheries and Oceans Canada (DFO). 2019. *Measures to Protect Fish and Fish Habitat*. URL https://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures-eng.html

Fisheries and Oceans Canada (DFO). 2020. *DFO Interim Code of Practice for End-of-pipe fish protection screens for small water intakes in freshwater.* URL https://www.dfo-mpo.gc.ca/pnw-ppe/codes/screen-ecran-eng.html.

Government of British Columbia. 2022. *Requirements and Best Management Practices for Making Changes In and About a Stream in British Columbia*. Version 2022.01. URL https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/wsa-cias-requirements-bmps.pdf

Ministry of Environment (MOE). 2006. *Guidelines for Reduced Risk Instream Work Windows*. URL: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/work_windows_low_main.pdf

Ministry of Environment (MOE). 2014. *Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia.* URL https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/best-management-practices/develop-with-care

Ministry of Environment and Climate Change Strategy (MOE). 2021. B.C. Approved Water Quality Guidelines: Aquatic Life, Wildlife, and Agriculture. URL https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/wqg_summary_aquaticlife_wildlife_agri.pdf

Ministry of Water, Land, and Air Protection (WLAP). 2002. *A Field Guide to Fuel Handling, Transportation and Storage*. URL https://www2.gov.bc.ca/assets/gov/environment/waste-management/industrial-waste/industrial-waste/oilandgas/fuel_handle_guide.pdf

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Appendix O

Record Drawings

KERR WOOD LEIDAL ASSOCIATES LTD.
consulting engineers

DEROCHE CREEK RECOVERY SOLUTION
PROJECT No. 2900712

ISSUED FOR RECORD,REVISION A, FEBRUARY, 2026

DRAWING INDEX		
SHEET No.	SHEET DESCRIPTION	REVISION
001	TITLE SHEET AND PROJECT LOCATION	A
002	EXISTING SITE PLAN	A
003	REACH 1 WORKS - PLAN AND PROFILE VIEWS	A
004	REACH 2 WORKS - PLAN AND PROFILE VIEWS	A
005	REACH 1 - TYPICAL SECTIONS AND PROFILES	A
006	REACH 2 - TYPICAL SECTIONS AND PROFILES	A
007	SEDIMENT BASIN - STANDARD SECTIONS	A
008	LOT 8-3-3 GRADING PLAN	A
009	OFF-SETTING WORKS	A
010	OFF-SETTING WORKS - TYPICAL SECTIONS AND PROFILES	A
011	PLANTING PLAN	A



LOCATION MAP
NOT TO SCALE



SITE MAP
NOT TO SCALE

CLIENT:

Ministry of Environment and Climate Change Strategy

REV	DATE	DESCRIPTION
A	27 FEB 2026	ISSUED FOR RECORD

The seal and signature of the undersigned on this drawing certifies that the design information contained in these drawings accurately reflects the original design and the material design changes made during construction that were brought to the undersigned's attention.
These drawings are intended to incorporate addenda, change orders, and other material design changes, but not necessarily all site instructions. The undersigned does not warrant or guarantee, nor accept any responsibility for, the accuracy or completeness of the as-constructed information supplied by others contained in these drawings, but does, by sealing and signing, certify that the as-constructed information, if accurate and complete, provides an as constructed system which substantially complies in all material respects with the original design intent.

nhc northwest hydraulic consultants

SEAL:

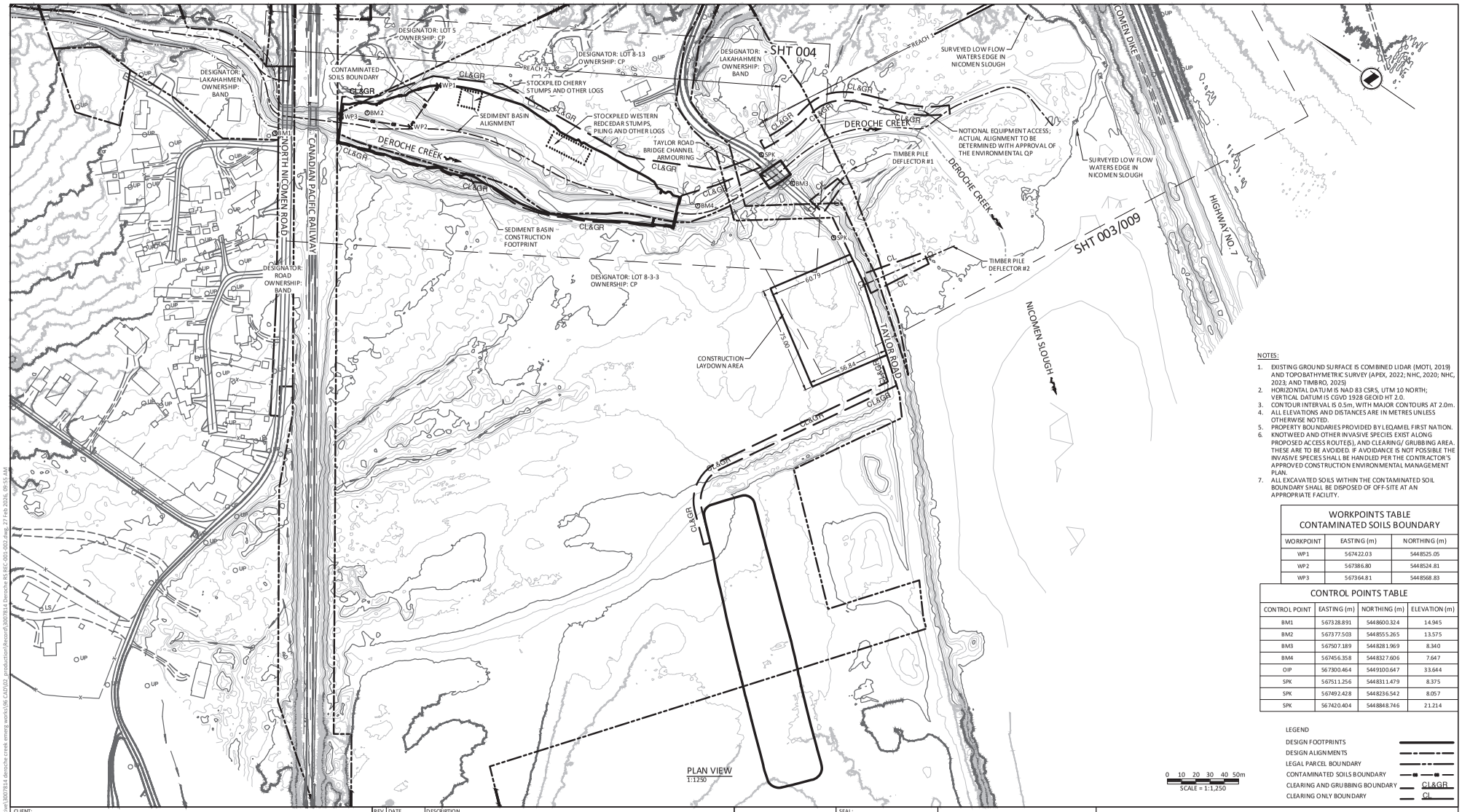
DEROCHE CREEK RECOVERY SOLUTION

TITLE SHEET AND PROJECT LOCATION

DESIGNED: DJG	SHEET ID: 2900712-DER RS-001	SHEET No:	
DRAFTED: CZZ	STATUS: ISSUED FOR RECORD	001	
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 27 FEB 2026	REV No: A	

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nanlfile-svr\projects\Active\2900712 deroche creek emerg work\06 CAD\02_production\Recon\52900712 Deroche RS REC-001-002.dwg, 27 Feb 2026, 09:55 AM



PLAN VIEW
1:1250

0 10 20 30 40 50m
SCALE = 1:1,250

NOTES:

1. EXISTING GROUND SURFACE IS COMBINED LIDAR (MOTI, 2019) AND TOPOBATHYMETRIC SURVEY (APEX, 2022; NHC, 2020; NHC, 2023; AND TIMBRO, 2025)
2. HORIZONTAL DATUM IS NAD 83 CSRS, UTM 10 NORTH; VERTICAL DATUM IS CGVD 1928 GEOID HT 2.0.
3. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
4. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
5. PROPERTY BOUNDARIES PROVIDED BY LEQAMEL FIRST NATION.
6. KNOTWEED AND OTHER INVASIVE SPECIES EXIST ALONG PROPOSED ACCESS ROUTE(S) AND CLEARING/ GRUBBING AREA. THESE ARE TO BE AVOIDED. IF AVOIDANCE IS NOT POSSIBLE THE INVASIVE SPECIES SHALL BE HANDLED PER THE CONTRACTOR'S APPROVED CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN.
7. ALL EXCAVATED SOILS WITHIN THE CONTAMINATED SOIL BOUNDARY SHALL BE DISPOSED OF OFF-SITE AT AN APPROPRIATE FACILITY.

WORKPOINTS TABLE
CONTAMINATED SOILS BOUNDARY

WORKPOINT	EASTING (m)	NORTHING (m)
WP1	567422.03	5448525.05
WP2	567386.80	5448524.81
WP3	567364.81	5448568.83

CONTROL POINTS TABLE

CONTROL POINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
BM1	567328.891	5448600.324	14.945
BM2	567377.503	5448555.265	13.575
BM3	567507.189	5448281.969	8.340
BM4	567456.358	5448327.606	7.647
OIP	567300.464	5449100.647	33.644
SPK	567511.256	5448311.479	8.375
SPK	567492.428	5448236.542	8.057
SPK	567420.404	5448848.746	21.214

LEGEND
DESIGN FOOTPRINTS
DESIGN ALIGNMENTS
LEGAL PARCEL BOUNDARY
CONTAMINATED SOILS BOUNDARY
CLEARING AND GRUBBING BOUNDARY — CL&GR
CLEARING ONLY BOUNDARY — CL

CLIENT:
BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV	DATE	DESCRIPTION
A	27 FEB 2026	ISSUED FOR RECORD

The seal and signature of the undersigned on this drawing certifies that the design information contained in these drawings accurately reflects the original design and the material design changes made during construction that were brought to the undersigned's attention.
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nhc northwest hydraulic consultants

SEAL:

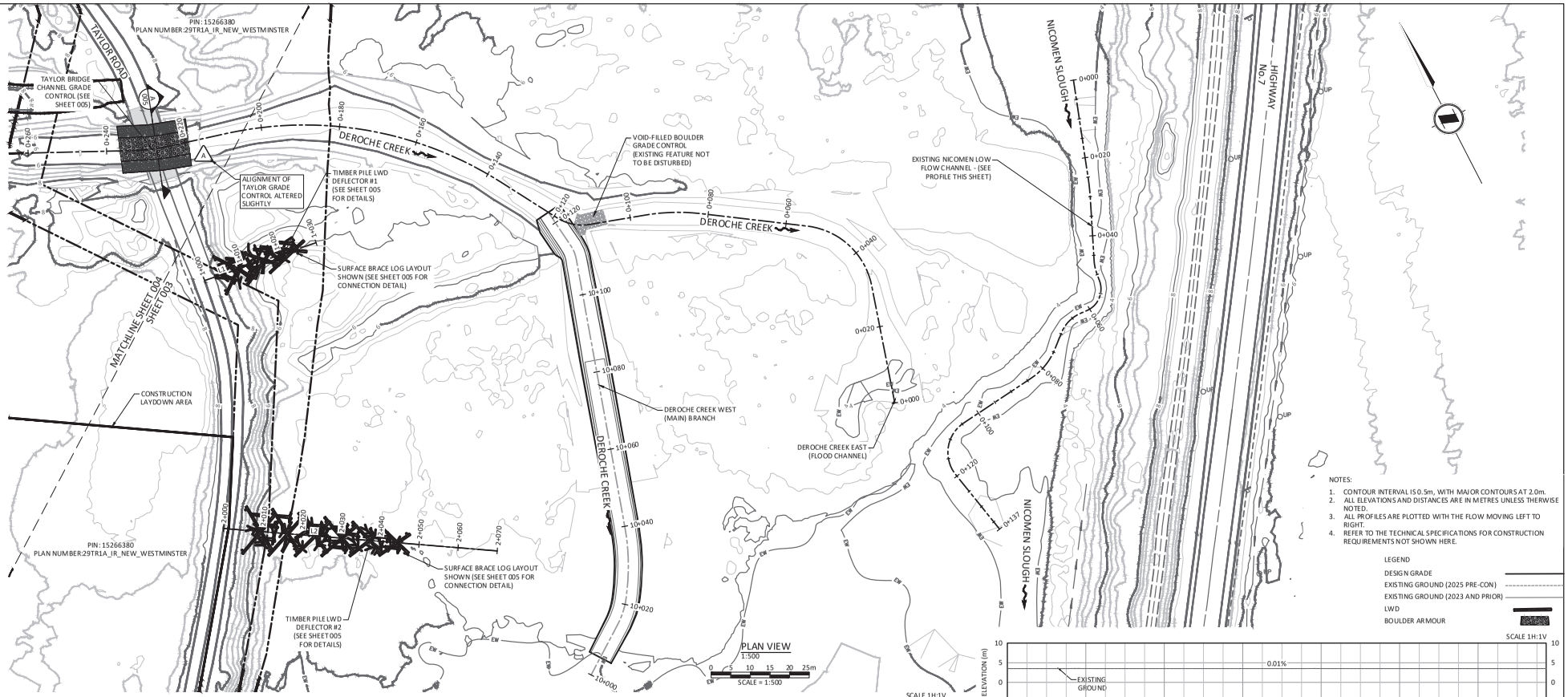
DEROCHE CREEK RECOVERY SOLUTION

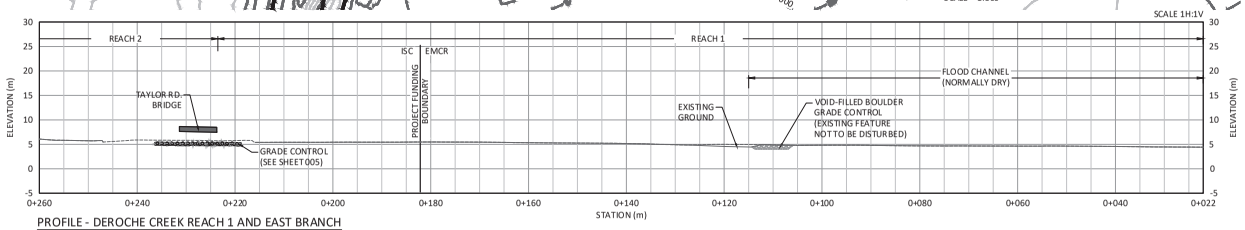
SITE PLAN

DESIGNED: DJG	SHEET ID: 2900712-DER RS-002		SHEET No: 002
DRAFTED: CZZ	STATUS: ISSUED FOR RECORD		
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 27 FEB 2026		REV No: A

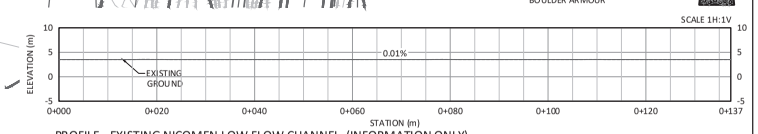
SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nanaiffile.nan\projects\Active\2900714 deroche creek emerg work\06 CAD\02_production\Recon\2900714_Deroche_RS-002-003.dwg, 27 Feb 2026, 09:56 AM

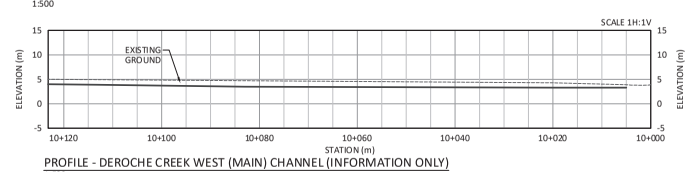




PROFILE - DEROCHE CREEK REACH 1 AND EAST BRANCH
1:500



PROFILE - EXISTING NICOMEN LOW FLOW CHANNEL (INFORMATION ONLY)
1:500



PROFILE - DEROCHE CREEK WEST (MAIN) CHANNEL (INFORMATION ONLY)
1:500

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
A	27 FEB 2026	ISSUED FOR RECORD

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nhc northwest hydraulic consultants

SEAL:

DEROCHE CREEK RECOVERY SOLUTION
REACH 1 WORKS

PLAN AND PROFILE

DESIGNED:	DJG	SHEET ID:	2900712-DER RS-003	SHEET No:
DRAFTED:	CZZ	STATUS:	ISSUED FOR RECORD	003
CHECKED:	DJG	SCALE:	AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE:	27 FEB 2026	REV No: A

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

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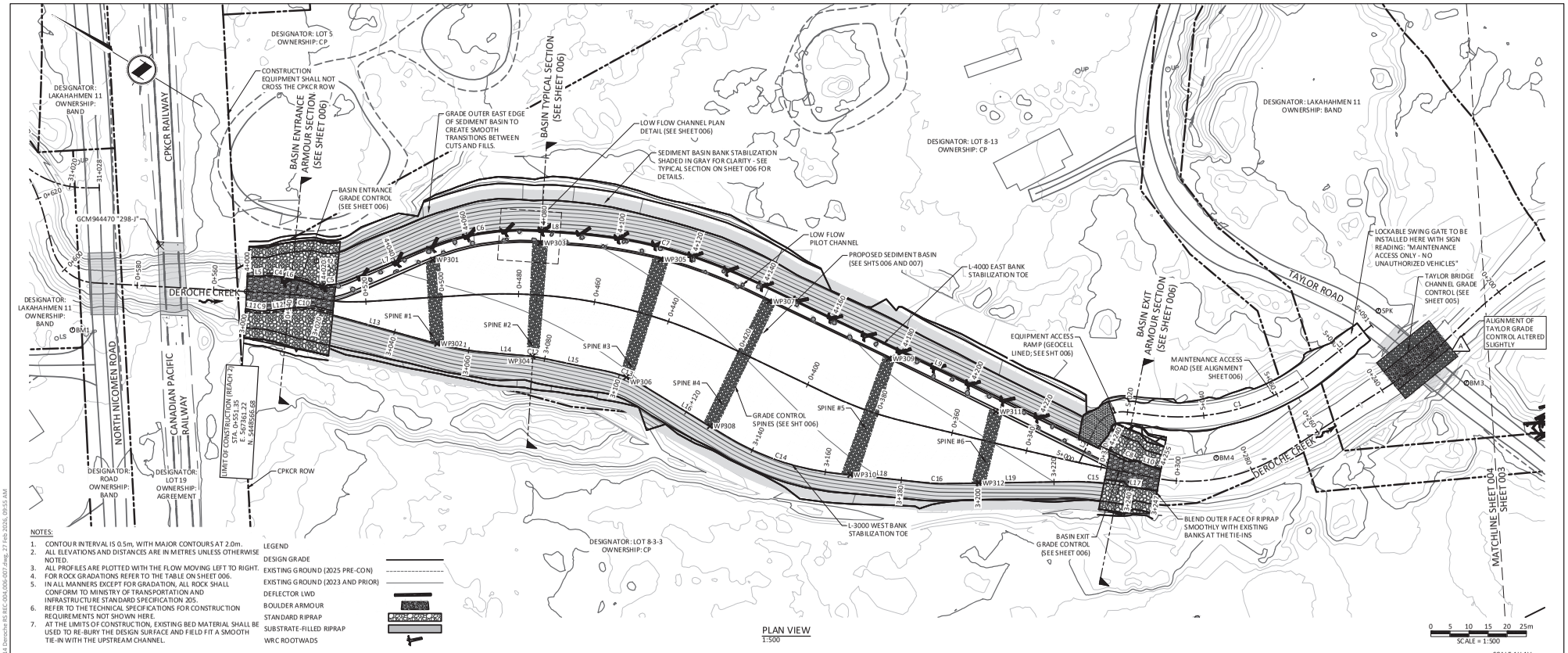


PLAN VIEW
1:500

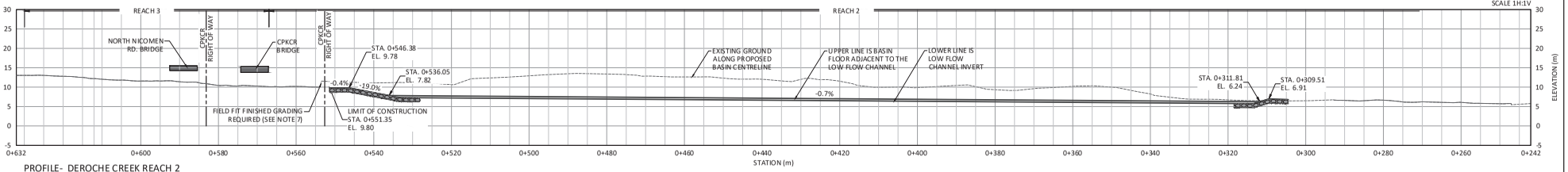
SCALE = 1:500

NOTES:

1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
3. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.
4. FOR ROCK GRADATIONS REFER TO THE TABLE ON SHEET 006.
5. IN ALL MANNERS EXCEPT FOR GRADATION, ALL ROCK SHALL CONFORM TO MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE STANDARD SPECIFICATION 205.
6. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.
7. AT THE LIMITS OF CONSTRUCTION, EXISTING BED MATERIAL SHALL BE USED TO RE-BURY THE DESIGN SURFACE AND FIELD FIT A SMOOTH TIE-IN WITH THE UPSTREAM CHANNEL.

LEGEND

- DESIGN GRADE
- EXISTING GROUND (2025 PRE-CON)
- EXISTING GROUND (2023 AND PRIOR)
- DEFLECTOR LWD
- BOULDER ARMOUR
- STANDARD RIPRAP
- SUBSTRATE-FILLED RIPRAP
- WRC ROOTWADS



PROFILE- DEROCHE CREEK REACH 2
1:500

CLIENT:

Ministry of Environment and Climate Change Strategy

REV	DATE	DESCRIPTION
A	27 FEB 2026	ISSUED FOR RECORD

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nhc northwest hydraulic consultants

SEAL:

DEROCHE CREEK RECOVERY SOLUTION

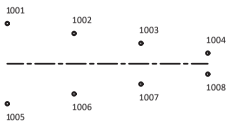
REACH 2 WORKS

PLAN AND PROFILE VIEWS

DESIGNED:	DJG	SHEET ID: 2900712-DER RS-004	SHEET No: 004
DRAFTED:	CZZ	STATUS: ISSUED FOR RECORD	
CHECKED:	DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE: 27 FEB 2026	REV No: A

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

ELEFNAME: \\nwinfile-van\projects\Active\2900712-deroche creek emerg works\06 CAD\02_production\Reconfi\2900712 Deroche RS REC-004_005-007.dwg, 27 Feb 2026, 09:55 AM

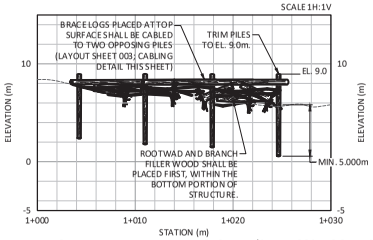


PILING PLAN - DEFLECTOR #1
1:250

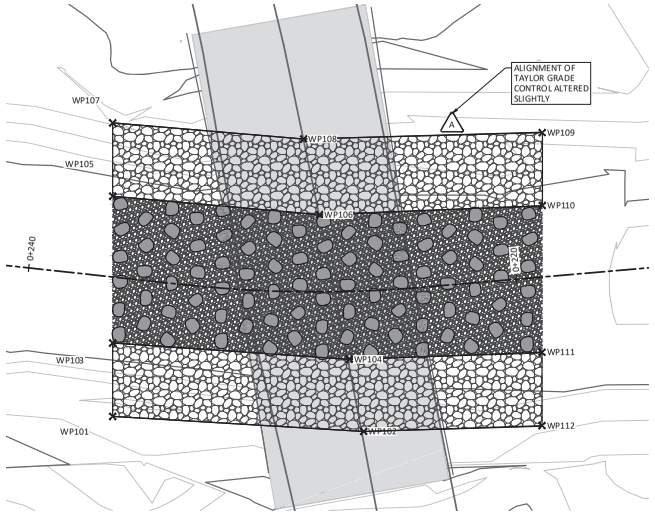
PILE LAYOUT TABLE - DEFLECTOR #1		
PILE #	EASTING (m)	NORTHING (m)
1001	567505.93	5448262.56
1002	567512.54	5448260.55
1003	567519.16	5448258.55
1004	567525.77	5448256.55
1005	567504.73	5448254.45
1006	567511.63	5448254.44
1007	567518.54	5448254.43
1008	567525.45	5448254.42

TIMBER PILE DEFLECTOR #1 ALIGNMENT LAYOUT						
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L1	1+000.000	567501.20	5448259.12	098° 28' 01.01"	30.000	

WORKPOINT TABLE - TAYLOR BRIDGE ARMOURING			
WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP101	567495.22	5448292.99	5.92
WP102	567504.69	5448288.95	5.86
WP103	567496.24	5448295.82	4.92
WP104	567505.12	5448291.93	4.87
WP105	567498.26	5448301.47	4.92
WP106	567505.97	5448297.91	4.87
WP107	567499.27	5448304.29	5.92
WP108	567506.40	5448301.04	5.88
WP109	567515.67	5448298.00	5.82
WP110	567514.67	5448295.19	4.82
WP111	567512.64	5448289.54	4.82
WP112	567511.63	5448286.72	5.81



PROFILE - TIMBER PILE DEFLECTOR #1 (SHEET 003; LOOKING NORTH)
1:250



TAYLOR BRIDGE CHANNEL ARMOURING
1:150

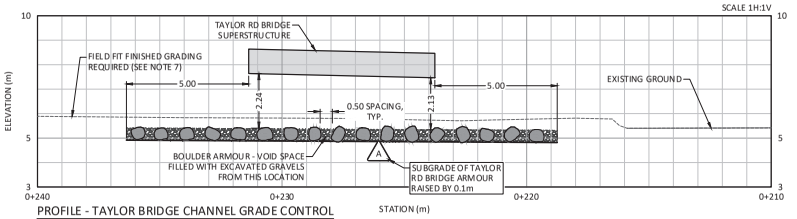


PILING PLAN - DEFLECTOR #2
1:250

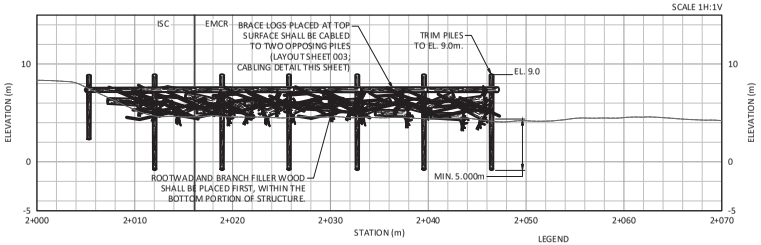
PILE LAYOUT TABLE - DEFLECTOR #2		
PILE #	EASTING (m)	NORTHING (m)
2001	567483.71	5448202.35
2002	567489.33	5448198.33
2003	567494.95	5448194.32
2004	567500.57	5448190.30
2005	567506.19	5448186.28
2006	567511.81	5448182.26
2007	567517.43	5448178.24

PILE LAYOUT TABLE - DEFLECTOR #2		
PILE #	EASTING (m)	NORTHING (m)
2008	567478.26	5448193.60
2009	567484.35	5448190.33
2010	567490.43	5448187.06
2011	567496.52	5448183.79
2012	567502.61	5448180.52
2013	567508.69	5448177.25
2014	567514.78	5448173.98

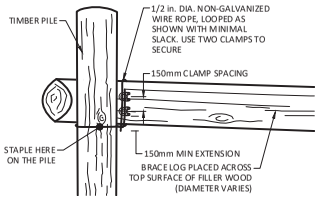
TIMBER PILE DEFLECTOR #2 ALIGNMENT LAYOUT						
TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L2	2+000.000	567476.59	5448200.71	121° 53' 59.96"	70.000	



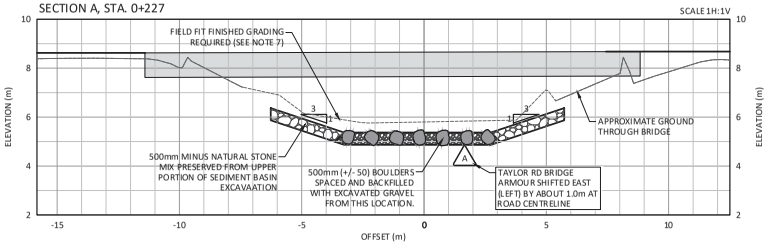
PROFILE - TAYLOR BRIDGE CHANNEL GRADE CONTROL (SHEET 003; LOOKING EAST)
1:100



PROFILE - TIMBER PILE DEFLECTOR #2 (SHEET 003; LOOKING NORTH)
1:250



BRACE LOG CABLING DETAIL
1:25



A / 003 TAYLOR BRIDGE CHANNEL GRADE CONTROL (LOOKING SOUTH)
1:100

LEGEND
- DESIGN GRADE
- EXISTING GROUND (2025 PRE-CON)
- EXISTING GROUND (2023 AND PRIOR)
- LARGE WOODY DEBRIS
- TIMBER PILE
- VOID-FILLED BOULDER ARMOURING

NOTES:
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
3. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.
4. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
5. IN ALL MANNERS EXCEPT FOR GRADATION, ROCK QUALITY SHALL CONFORM TO MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE STANDARD SPECIFICATION 205.
6. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.
7. AT TAYLOR BRIDGE EXISTING BED MATERIAL SHALL BE USED TO RE-BURY THE DESIGN SURFACE AND FIELD FIT A SMOOTH TIE-IN WITH THE CHANNEL UP- AND DOWNSTREAM.

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV	DATE	DESCRIPTION
A	27 FEB 2026	ISSUED FOR RECORD

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nhc northwest hydraulic consultants

SEAL:

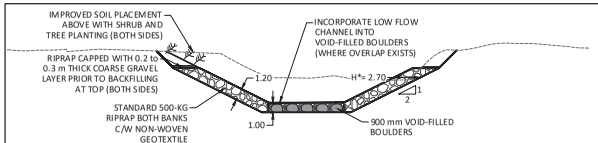
DEROCHE CREEK RECOVERY SOLUTION
REACH 1

TYPICAL SECTIONS AND PROFILE DETAILS

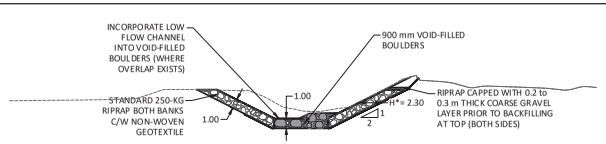
DESIGNED:	DJG	SHEET ID: 2900712-DER RS-005	SHEET No: 005
DRAFTED:	CZZ	STATUS: ISSUED FOR RECORD	
CHECKED:	DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE: 27 FEB 2026	REV No: A

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

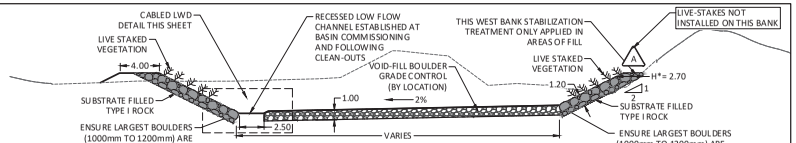
FILENAME: \\nanaimo-van\projects\Active\2900712 deroche creek emerg works\06 CAD\02_production\Record\2900712 Deroche RS REC-003_005.dwg, 27 Feb 2026, 01:50 PM



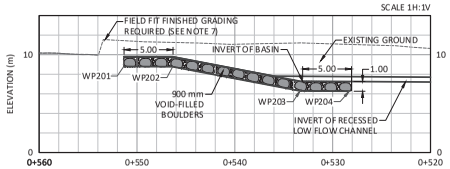
TYPICAL SECTION - BASIN ENTRANCE ARMOUR (SEE SHEET 004)
1:250



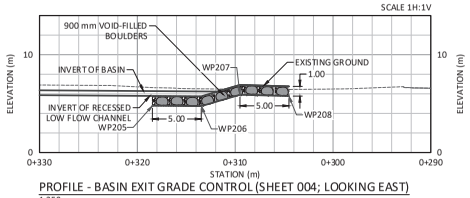
TYPICAL SECTION - BASIN EXIT ARMOUR (SEE SHEET 004)
1:250



TYPICAL SECTION - BASIN (SEE SHEET 004)
1:250



PROFILE - BASIN ENTRANCE GRADE CONTROL (SHEET 004; LOOKING EAST)
1:250



PROFILE - BASIN EXIT GRADE CONTROL (SHEET 004; LOOKING EAST)
1:250

WEST BANK STABILIZATION ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L11	3+000.000	567357.14	5448564.62	157° 30' 27.32"	2.803	
C9	3+002.803	567358.21	5448562.03	149° 56' 14.47"	2.907	11.000
L12	3+005.709	567359.66	5448559.52	142° 22' 01.61"	7.605	
C10	3+013.314	567364.30	5448553.50	153° 08' 19.07"	3.948	10.500
L13	3+017.262	567366.08	5448550.00	163° 54' 36.53"	34.242	
C11	3+051.504	567375.57	5448517.10	158° 44' 00.11"	12.649	70.000
L14	3+064.153	567380.15	5448505.32	153° 33' 23.68"	10.947	
C12	3+075.100	567385.02	5448495.52	156° 43' 38.64"	3.320	30.000
L15	3+078.420	567386.34	5448492.47	159° 53' 53.60"	17.959	
C13	3+096.379	567392.51	5448475.61	169° 55' 09.83"	10.494	30.000
L16	3+106.873	567394.33	5448465.33	179° 56' 26.06"	25.234	
C14	3+132.107	567394.36	5448440.09	167° 11' 53.43"	31.136	70.000
L18	3+163.243	567401.20	5448409.98	154° 27' 20.79"	23.184	
C16	3+186.427	567411.20	5448389.07	151° 03' 18.30"	5.935	50.000
L19	3+192.362	567414.07	5448383.87	147° 39' 15.81"	32.521	
C15	3+224.884	567431.47	5448356.40	152° 15' 55.54"	10.462	65.000
L17	3+235.346	567436.33	5448347.15	156° 52' 35.26"	11.832	

EAST BANK STABILIZATION ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L5	4+000.000	567364.60	5448568.54	148° 11' 05.50"	5.815	
C4	4+005.815	567367.66	5448563.59	154° 10' 14.71"	4.387	20.995
C5	4+017.349	567372.00	5448552.93	143° 10' 38.73"	9.399	15.858
L7	4+026.748	567377.55	5448545.52	126° 11' 53.53"	22.305	
C6	4+049.053	567395.55	5448532.34	139° 21' 17.98"	29.393	64.000
L8	4+078.446	567414.53	5448510.24	152° 30' 42.42"	9.419	
C7	4+087.864	567418.87	5448501.88	163° 16' 57.04"	48.500	129.000
L9	4+136.364	567432.74	5448455.70	174° 03' 11.66"	107.249	
C8	4+243.613	567443.85	5448349.03	170° 38' 17.75"	3.576	30.000
L10	4+247.189	567444.43	5448345.51	167° 13' 23.84"	7.393	

ENTRANCE GRADE CONTROL WORKPOINTS TABLE

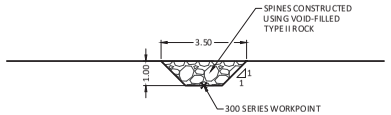
WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP201	567361.22	5448566.68	8.80
WP202	567363.57	5448562.29	8.74
WP203	567369.12	5448550.51	6.30
WP204	567371.06	5448545.87	6.26

EXIT GRADE CONTROL WORKPOINTS TABLE

WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP205	567439.09	5448350.55	4.78
WP206	567440.80	5448345.86	4.75
WP207	567442.17	5448342.15	5.91
WP208	567443.91	5448337.47	5.77

BASIN MAINTENANCE ACCESS ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L2	5+000.000	567436.58	5448357.58	083° 59' 09.03"	9.673	
C2	5+009.673	567446.20	5448358.59	119° 46' 07.66"	9.992	8.000
C1	5+026.784	567457.27	5448347.47	132° 57' 25.88"	44.956	57.000
L1	5+071.740	567489.32	5448317.62	110° 21' 45.47"	18.959	



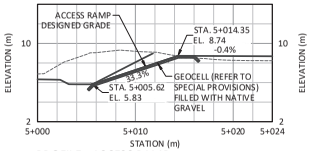
TYPICAL SECTION - GRADE CONTROL SPINE
1:100

GRADE CONTROL SPINE WORKPOINTS TABLE

WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP301	567393.69	5448529.45	6.39
WP302	567375.58	5448517.03	6.83
WP303	567412.07	5448507.78	6.12
WP304	567385.73	5448494.04	6.72
WP305	567424.84	5448478.65	5.90
WP306	567393.90	5448470.28	6.55

GRADE CONTROL SPINE WORKPOINTS TABLE

WORKPOINT	EASTING (m)	NORTHING (m)	ELEVATION (m)
WP307	567430.27	5448448.70	5.69
WP308	567394.39	5448444.92	6.41
WP309	567433.83	5448414.20	5.45
WP310	567402.65	5448406.96	6.09
WP311	567436.62	5448383.10	5.36
WP312	567418.34	5448377.21	5.74



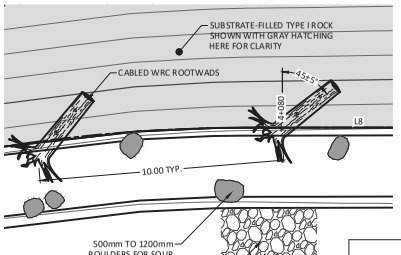
PROFILE - ACCESS RAMP (SHEET 004; LOOKING NORTH)
1:250

WEST BANK STABILIZATION OFFSET/ELEVATION TABLE

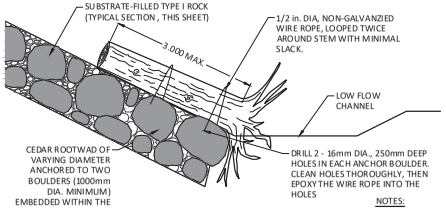
STATION	O/S TO TOE OF CUT	ELEV TOE OF CUT	O/S TO TOP OF CUT	ELEV TOP OF CUT
3+000.000	0.16	8.60	7.53	12.31
3+002.803	0.11	8.60	7.36	12.24
3+005.709	0.13	8.48	7.86	12.16
3+010.000	0.14	7.65	9.60	12.08
3+013.314	0.15	6.99	10.86	11.95
3+017.262	-0.64	6.20	10.85	11.96
3+020.000	-0.84	6.09	10.73	11.90
3+030.000	0.27	6.63	10.39	11.84
3+040.000	0.27	6.63	9.79	11.66
3+050.000	0.27	6.62	9.33	11.41
3+060.000	0.26	6.61	9.19	11.19
3+070.000	0.28	6.56	9.56	11.22
3+080.000	0.28	6.49	9.37	11.08
3+090.000	0.28	6.43	9.00	10.79
3+096.379	0.28	6.37	8.44	10.44
3+100.000	0.31	6.34	8.31	10.35
3+110.000	0.28	6.29	8.07	10.28
3+120.000	0.28	6.24	8.05	10.16
3+130.000	0.28	6.19	7.39	9.77
3+140.000	0.26	6.13	7.32	9.66
3+150.000	0.27	6.05	7.49	9.69
3+160.000	0.21	5.95	7.51	9.66
3+170.000	0.28	5.84	7.41	9.46
3+180.000	0.28	5.75	7.34	9.30
3+190.000	0.28	5.65	7.09	9.13
3+200.000	0.27	5.53	6.94	8.96
3+210.000	0.27	5.42	6.97	8.85
3+220.000	0.28	5.30	7.07	8.77
3+230.000	0.28	5.19	7.34	8.74
3+235.346	-0.91	4.77	6.98	8.72
3+240.000	0.10	5.31	6.72	8.73
3+247.178	0.11	5.77	5.96	8.70

EAST BANK STABILIZATION OFFSET/ELEVATION TABLE

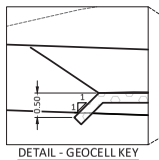
STATION	O/S TO TOE OF CUT	ELEV TOE OF CUT	O/S TO TOP OF CUT	ELEV TOP OF CUT
4+000.000	0.37	8.60	7.77	12.30
4+003.275	0.37	8.60	7.62	12.26
4+007.661	0.37	8.24	8.24	12.15
4+010.000	0.39	7.90	8.78	12.11
4+017.298	-0.41	6.40	10.54	11.97
4+020.000	-0.50	6.09	10.78	11.92
4+026.696	0.46	6.43	10.49	11.86
4+030.000	0.32	6.39	10.09	11.82
4+040.000	0.27	6.25	10.24	11.59
4+050.000	0.21	6.12	10.06	11.37
4+060.000	0.12	6.01	10.43	11.29
4+070.000	0.06	5.92	10.44	11.14
4+080.000	0.21	5.85	10.60	11.05
4+090.000	0.18	5.79	10.50	10.96
4+100.000	0.18	5.71	10.07	10.67
4+110.000	0.21	5.65	9.60	10.34
4+120.000	0.25	5.58	9.63	10.27
4+130.000	0.26	5.52	9.66	10.22
4+136.313	0.22	5.47	9.45	10.08
4+140.000	0.27	5.45	9.37	10.00
4+150.000	0.28	5.38	9.01	9.74
4+160.000	0.28	5.31	8.98	9.66
4+170.000	0.28	5.24	9.17	9.68
4+180.000	0.28	5.17	8.77	9.46
4+190.000	0.28	5.13	8.36	9.26
4+200.000	0.28	5.10	8.10	9.10
4+210.000	0.28	5.08	7.83	8.93
4+220.000	0.28	5.05	7.68	8.83
4+230.000	0.28	5.03	7.58	8.77
4+240.000	0.27	5.00	7.07	8.73
4+243.562	-0.61	4.76	7.16	8.73
4+247.138	0.19	5.16	6.93	8.73
4+250.000	0.35	5.90	5.87	8.67
4+254.531	0.34	5.77	6.17	8.69



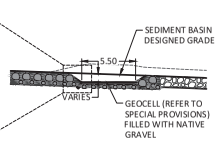
DETAIL - LOW FLOW CHANNEL PLAN
1:100



DETAIL - WRC ROOTWAD
1:50



DETAIL - GEOCELL KEY
1:50



TYPICAL SECTION - ACCESS RAMP (LOOKING WEST)
1:250

GRADATION TABLE - IMPORTED ROCK MATERIALS

	ROCK DIAMETER (mm)					
	250-KG RIPRAP	500-KG RIPRAP	TYPE I ROCK	TYPE II ROCK	900mm BOULDERS	500mm BOULDERS
D_{100}	1000	1250	1250	750	-	-
D_{85}	830	1050	1050	610	-	-
D_{50}	575	725	725	425	900 (± 100)	500 (± 50)
D_{35}	270	340	550	350	-	-
D_{0}	200	250	450	300	-	-

NOTES:
1. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
2. ALL PROFILES ARE PLOTTED WITH THE FLOW MOVING LEFT TO RIGHT.
3. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
4. FOR ROCK GRADATIONS REFER TO THE TABLE ON THIS SHEET.
5. IN ALL MANNERS EXCEPT FOR GRADATION, ROCK QUALITY SHALL CONFORM TO MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE STANDARD SPECIFICATION 205.
6. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.
7. AT THE LIMITS OF CONSTRUCTION, EXISTING BED MATERIAL SHALL BE USED TO RE-BURY THE DESIGN SURFACE AND FIELD FIT A SMOOTH TIE-IN WITH THE UPSTREAM CHANNEL.

LEGEND
- DESIGN GRADE
- EXISTING GROUND (2025 PRE-CON)
- EXISTING GROUND (2023 AND PRIOR)
- SUBSTRATE FILLED RIPRAP
- BOULDER ARMOUR
- STANDARD RIPRAP
- 6-INCH MINUS STREAM GRAVEL

CLIENT:

Ministry of Environment and Climate Change Strategy

REV	DATE	DESCRIPTION
A	27 FEB 2026	ISSUED FOR RECORD

The seal and signature of the undersigned on this drawing certifies that the design information contained in these drawings accurately reflects the original design and the material design changes made during construction that were brought to the undersigned's attention.
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nhc northwest hydraulic consultants

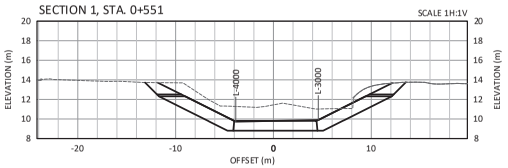
SEAL:

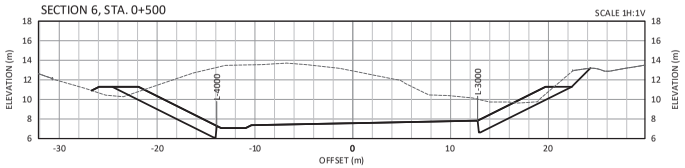
DEROCHE CREEK RECOVERY SOLUTION
REACH 2
TYPICAL SECTIONS AND PROFILE DETAILS

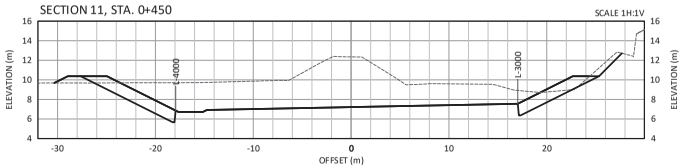
DESIGNED: DJG	SHEET ID: 2900712-DER RS-006	SHEET No:	
DRAFTED: CZZ	STATUS: ISSUED FOR RECORD	006	
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 27 FEB 2026	REV No: A	

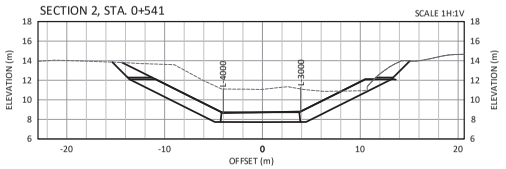
SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

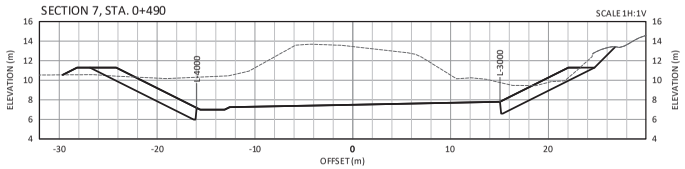
FILENAME: \\nanlfile-svr\projects\Active\2900712-deroche creek emerg work\06 CAD\02_production\Rev0\2900712 Deroche RS REC-004,006-007.dwg, 27 Feb 2026, 09:55 AM

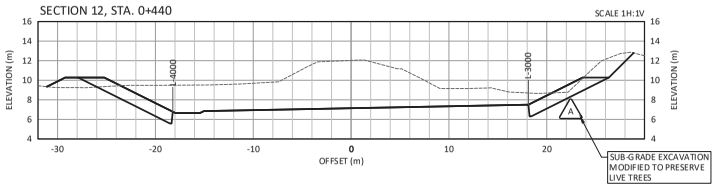


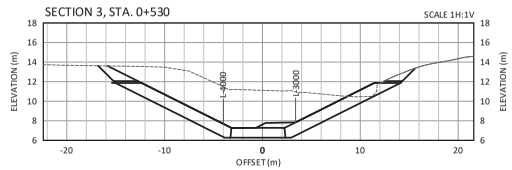


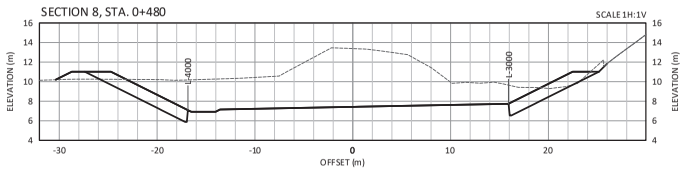


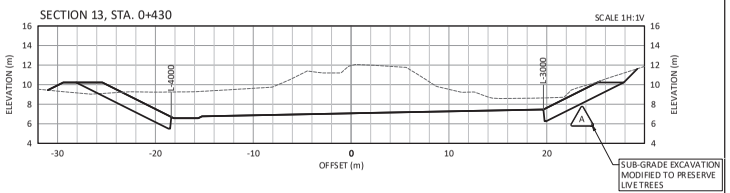


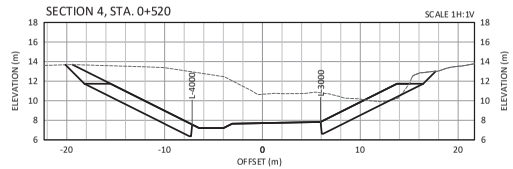


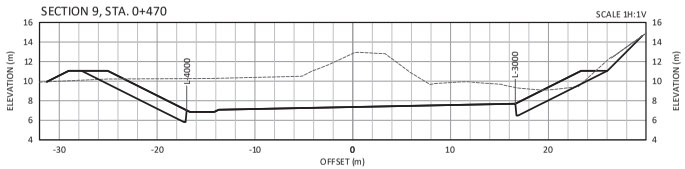


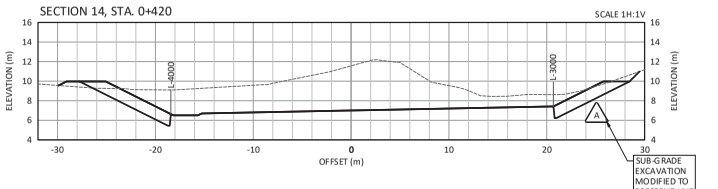


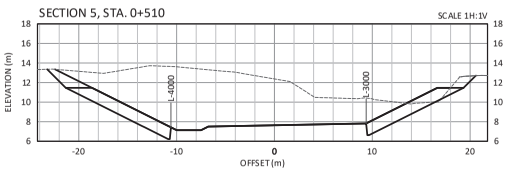


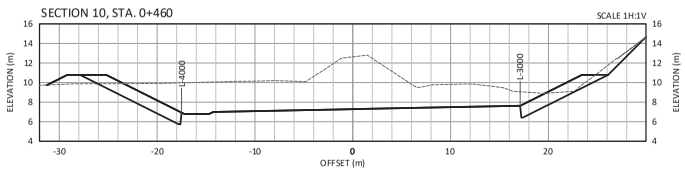


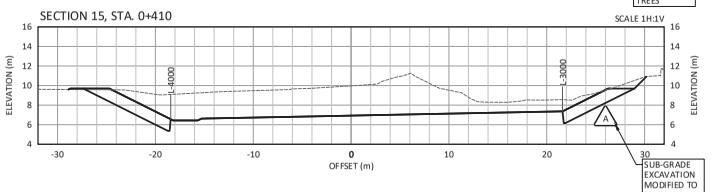












LEGEND

DESIGN GRADE

EXISTING GROUND (2025 PRE-CON)

EXISTING GROUND (2023 AND PRIOR)

NOTES:

1. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
2. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
3. REFER TO SHEET 006 FOR L-3000 AND L-4000 ALIGNMENT TABLES, AND OFFSET/ ELEVATION TABLES

CLIENT:

Ministry of Environment and Climate Change Strategy

REV	DATE	DESCRIPTION
A	27 FEB 2026	ISSUED FOR RECORD

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nhc northwest hydraulic consultants

SEAL:

DEROCHE CREEK RECOVERY SOLUTION

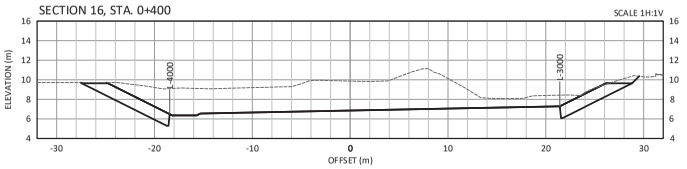
SEDIMENT BASIN

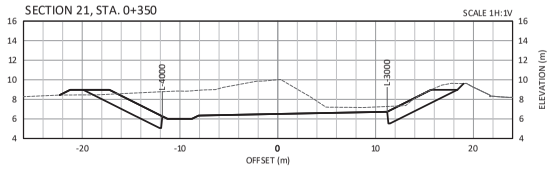
STANDARD SECTIONS

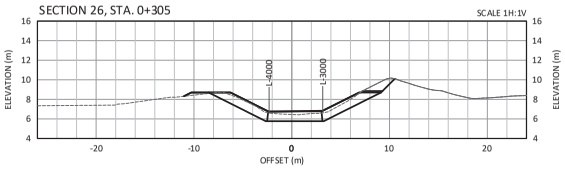
DESIGNED: DJG	SHEET ID: 2900712-DER RS-007A	SHEET No:	007A
DRAFTED: CZZ	STATUS: ISSUED FOR RECORD		
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE		
APPROVED: DJG	DATE: 27 FEB 2026	REV No: A	

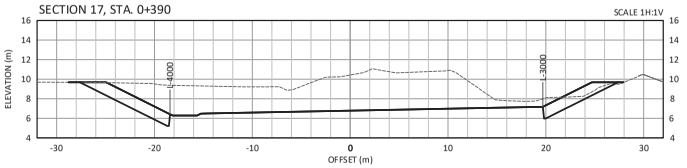
SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

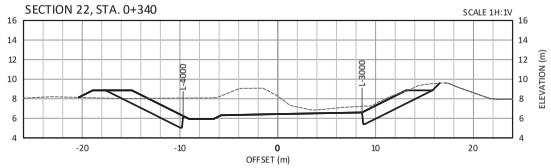
FILENAME: \\nanaimo-van\projects\Active\2900712 deroche creek emerg works\06 CAD\02_production\Record\2900712 Deroche RS REC-004,005,007.dwg, 27 Feb 2026, 09:55 AM

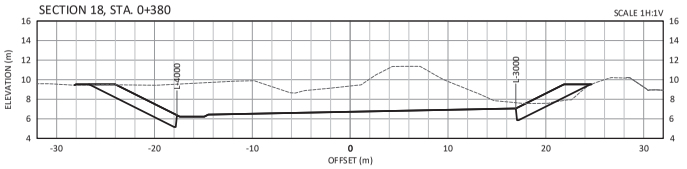


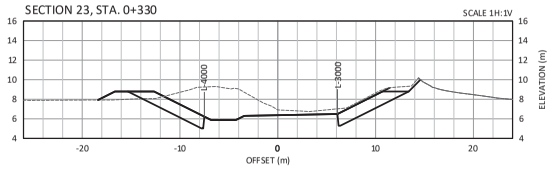


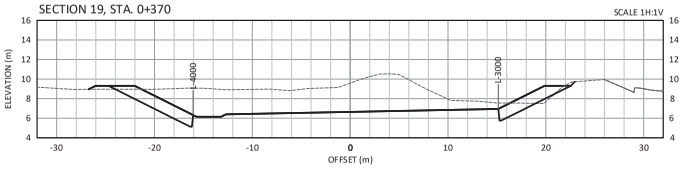


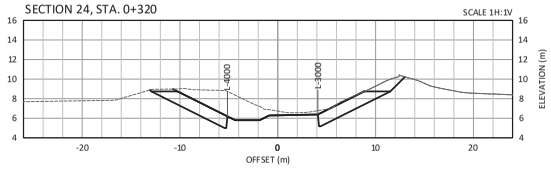


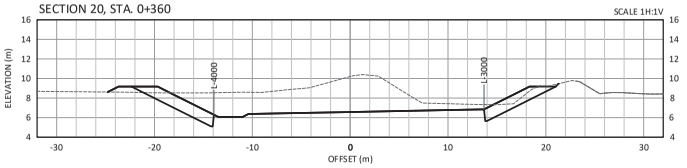


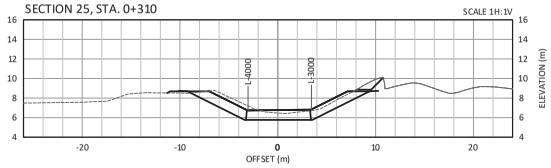












LEGEND

DESIGN GRADE

EXISTING GROUND (2025 PRE-CON)

EXISTING GROUND (2023 AND PRIOR)

NOTES:

1. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
2. CROSS-SECTIONS ARE VIEWED DOWNSTREAM UNLESS OTHERWISE NOTED.
3. REFER TO SHEET 006 FOR L-3000 AND L-4000 ALIGNMENT TABLES, AND OFFSET/ ELEVATION TABLES

CLIENT:

BRITISH COLUMBIA Ministry of Environment and Climate Change Strategy

REV	DATE	DESCRIPTION
A	27 FEB 2026	ISSUED FOR RECORD

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nhc northwest hydraulic consultants

SEAL:

DEROCHE CREEK RECOVERY SOLUTION

SEDIMENT BASIN

STANDARD SECTIONS

DESIGNED:	DJG	SHEET ID:	2900712-DER RS-007B	SHEET No:	007B
DRAFTED:	CZZ	STATUS:	ISSUED FOR RECORD		
CHECKED:	DJG	SCALE:	AS SHOWN WHEN PLOTTED D SIZE		
APPROVED:	DJG	DATE:	27 FEB 2026	REV No:	A

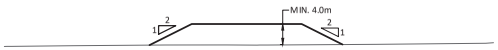
SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nanithlie-svr\projects\Active\2900712 deroche creek emerg work\06 CAD\02_production\Record\2900712 Deroche RS REC-004,006-007.dwg, 27 Feb 2026, 09:55 AM

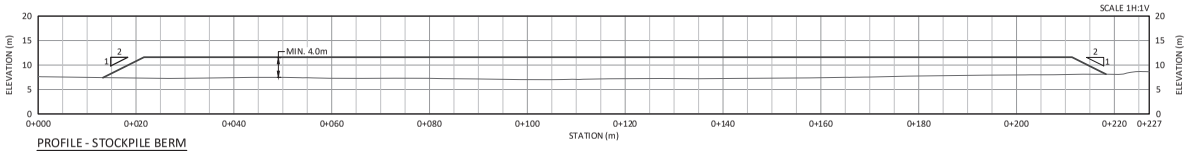


PLAN VIEW - LOT 8-3-3
1:1000

0 10 20 30 40 50m
SCALE = 1:1,000



TYPICAL SECTION - STOCKPILE BERM
1:500



PROFILE - STOCKPILE BERM
1:500

NOTES:
1. EXISTING GROUND SURFACE IS LIDAR (MOTI, 2019).
2. HORIZONTAL DATUM IS NAD 83 CSRS, UTM 10 NORTH; VERTICAL DATUM IS CGVD 1928 GEOID HT 2.0.
3. REFER TO DRAWING SHEET 002 FOR CONTROL TABLE.
4. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
5. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
6. PROPERTY BOUNDARIES PROVIDED BY LEQAMEL FIRST NATION.
7. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.

LEGEND
PROPERTY BOUNDARIES
DESIGN GRADE
EXISTING GROUND (2023 AND PRIOR)

CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
A	27 FEB 2026	ISSUED FOR RECORD

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nhc northwest hydraulic consultants

SEAL:

DEROCHE CREEK RECOVERY SOLUTION
REACH 2
LOT 8-3-3 GRADING

DESIGNED:	DJG	SHEET ID:	2900712-DER RS-008	SHEET No:
DRAFTED:	CZZ	STATUS:	ISSUED FOR RECORD	008
CHECKED:	DJG	SCALE:	AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE:	27 FEB 2026	REV No: A

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\mainfile-van\projects\Active\3007814 deroche creek emerg works\96 CAD\02_production\Record\3007814 Deroche RS REC-008.dwg, 27 Feb 2026, 09:55 AM



CLIENT:

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

REV.	DATE	DESCRIPTION
A	27 FEB 2026	ISSUED FOR RECORD

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nhc northwest hydraulic consultants

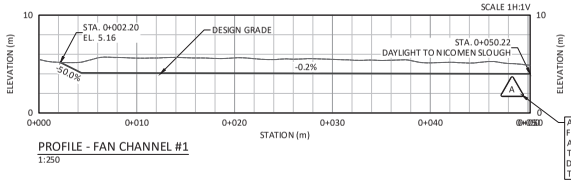
SEAL:

DEROCHE CREEK RECOVERY SOLUTION
OFF-SETTING WORKS
PLAN

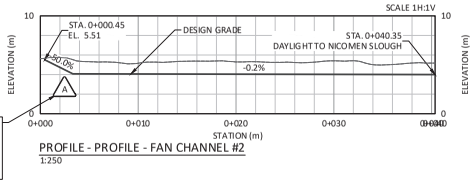
DESIGNED: DJG	SHEET ID: 2900712-DER RS-009	SHEET No: 009
DRAFTED: CZZ	STATUS: ISSUED FOR RECORD	
CHECKED: DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED: DJG	DATE: 27 FEB 2026	REV No: A

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nanoffice-van\projects\Active\2900712-deroche creek remng work\06 CAD\02_production\[Microsoft]2900712-Deroche Plan Rev C-009-010.dwg, 27 Feb 2026, 11:10 AM

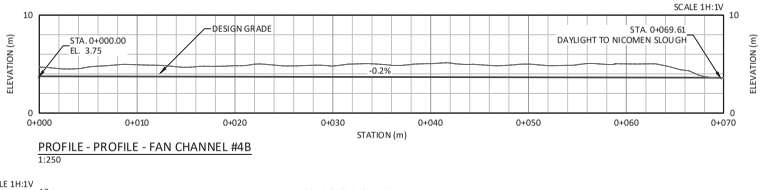


PROFILE - FAN CHANNEL #1
1:250

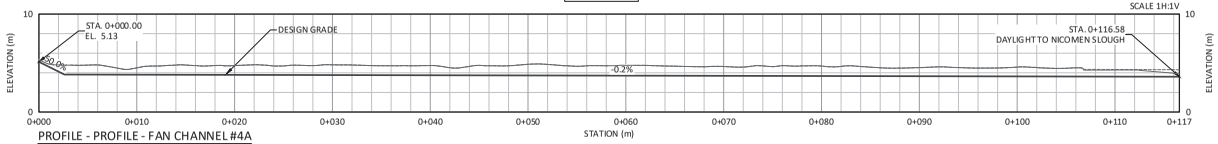


PROFILE - PROFILE - FAN CHANNEL #2
1:250

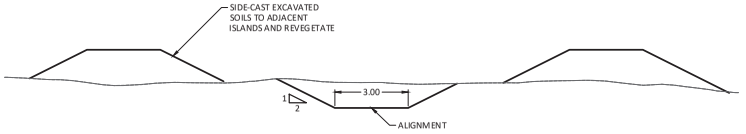
ALIGNMENT OF FAN CHANNELS 1 AND 2 MODIFIED TO TIE-IN WITH DFO CHANNEL TO THE NORTH



PROFILE - PROFILE - FAN CHANNEL #4B
1:250



PROFILE - PROFILE - FAN CHANNEL #4A
1:250



TYPICAL SECTION, FAN CHANNEL 1-4 (SEE SHEET 006)
1:100

FAN CHANNEL 1 ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L1	0+000.000	567581.74	5448355.64	120° 08' 23.70"	5.708	
C1	0+005.708	567586.68	5448352.77	079° 47' 38.43"	7.042	5.000
L2	0+012.750	567593.05	5448353.92	039° 26' 53.15"	2.514	
C2	0+015.264	567594.65	5448355.86	088° 01' 06.32"	15.259	9.000
L3	0+030.522	567608.14	5448356.33	136° 35' 19.49"	4.601	
C3	0+035.123	567611.30	5448352.98	090° 20' 15.26"	11.301	7.000
L4	0+046.425	567621.41	5448352.92	044° 05' 11.03"	3.796	

FAN CHANNEL 2 ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L5	0+000.000	567597.76	5448323.44	049° 11' 11.75"	1.308	
C4	0+001.308	567598.75	5448324.29	073° 26' 20.84"	4.233	5.000
L6	0+005.541	567602.69	5448325.47	097° 41' 29.92"	4.208	
C5	0+009.749	567606.86	5448324.90	073° 06' 58.60"	6.005	7.000
L7	0+015.754	567612.43	5448326.59	048° 32' 27.27"	12.583	
C6	0+028.337	567621.86	5448334.92	065° 58' 50.42"	3.044	5.000
L8	0+031.381	567624.60	5448336.14	083° 25' 13.57"	3.757	
C7	0+035.137	567628.33	5448336.57	077° 14' 38.75"	1.725	8.000
L9	0+036.862	567630.01	5448336.95	071° 04' 03.94"	3.490	

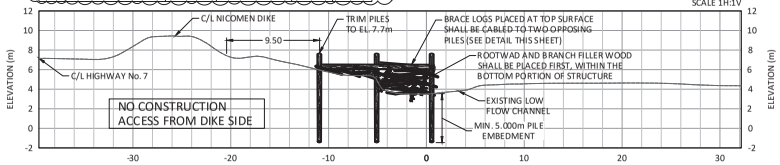
FAN CHANNEL 4B ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L10	0+000.000	567529.59	5448201.74	029° 11' 52.45"	13.098	
C8	0+013.098	567535.98	5448213.17	089° 51' 38.87"	14.823	7.000
L11	0+027.920	567548.19	5448213.20	150° 31' 25.29"	13.018	
C9	0+040.939	567554.59	5448201.87	118° 18' 26.91"	8.996	8.000
L12	0+049.935	567562.10	5448197.83	086° 05' 28.53"	5.027	
C10	0+054.962	567567.12	5448198.17	116° 30' 34.99"	7.433	7.000
L13	0+062.395	567573.46	5448195.01	146° 55' 41.45"	7.545	

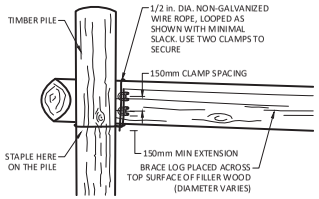
FAN CHANNEL 4A ALIGNMENT LAYOUT

TAG	START STA.	START E.	START N.	START TANGENT	LENGTH	RADIUS
L15	0+000.000	567497.09	5448215.67	101° 10' 45.55"	8.777	
C12	0+008.777	567505.70	5448213.96	136° 30' 31.15"	7.399	6.000
L16	0+016.176	567510.47	5448208.93	171° 50' 16.75"	3.456	
C13	0+019.632	567510.96	5448205.51	127° 43' 43.89"	9.238	6.000
L17	0+028.870	567517.57	5448200.40	083° 37' 11.03"	19.059	
C14	0+047.930	567536.51	5448202.52	148° 17' 09.33"	13.544	6.000
L18	0+061.473	567542.21	5448193.29	212° 57' 07.62"	4.159	
C15	0+065.632	567539.95	5448189.80	178° 12' 11.59"	21.833	18.000
L19	0+087.466	567540.59	5448169.29	143° 27' 15.55"	3.321	
C16	0+090.786	567542.57	5448166.62	155° 33' 49.34"	6.763	16.000
L20	0+097.550	567545.35	5448160.51	167° 40' 23.13"	2.743	
C17	0+100.292	567545.93	5448157.83	154° 18' 28.02"	4.665	10.000
L21	0+104.957	567547.94	5448153.66	140° 56' 32.91"	2.870	
C18	0+107.827	567549.75	5448151.44	146° 19' 52.20"	3.762	20.000
L22	0+111.589	567551.83	5448148.31	151° 43' 11.49"	4.995	

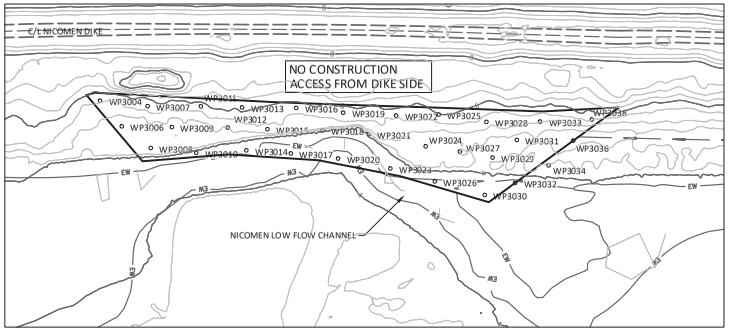
ALIGNMENT OF FAN CHANNELS 1 AND 2 MODIFIED TO TIE-IN WITH DFO CHANNEL TO THE NORTH



LWD REEF - TYPICAL SECTION 1 (NARROW, ENCROACHING ON CHANNEL)
1:250

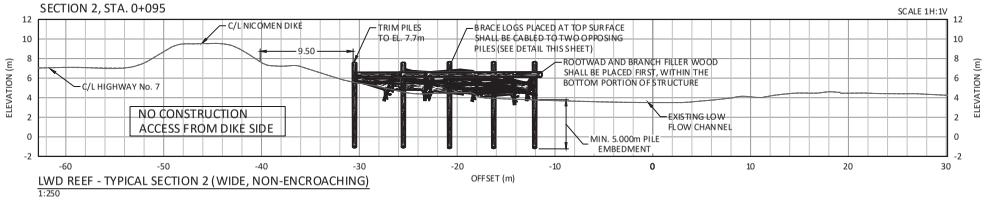


BRACE LOG CABLING DETAIL
1:25



PILING PLAN - LWD REEF
1:500

SECTION 2, STA. 0+095



LWD REEF - TYPICAL SECTION 2 (WIDE, NON-ENCROACHING)
1:250

LEGEND
- DESIGN GRADE
- EXISTING GROUND (2023 AND PRIOR)
- DEFLECTOR LWD
- WRC ROOTWADS

NOTES:
1. CONTOUR INTERVAL IS 0.5m, WITH MAJOR CONTOURS AT 2.0m.
2. ALL ELEVATIONS AND DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
3. CROSS-SECTIONS ARE VIEWED DOWNSTREAM.
4. REFER TO THE TECHNICAL SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS NOT SHOWN HERE.

PILE LAYOUT TABLE - LWD REEF

PILE #	EASTING (m)	NORTHING (m)
3004	567736.93	5448188.08
3006	567730.10	5448187.21
3007	567730.67	5448180.54
3008	567723.15	5448184.66
3009	567724.39	5448178.72
3010	567717.27	5448177.41
3011	567724.70	5448171.44
3012	567718.06	5448169.20
3013	567719.92	5448164.50
3014	567712.09	5448168.56
3015	567713.36	5448162.59

PILE LAYOUT TABLE - LWD REEF

PILE #	EASTING (m)	NORTHING (m)
3016	567713.80	5448155.27
3017	567706.59	5448161.28
3018	567707.04	5448153.25
3019	567707.75	5448147.78
3020	567700.46	5448153.76
3021	567701.20	5448145.80
3022	567701.35	5448139.00
3023	567692.93	5448145.89
3024	567692.78	5448137.38
3025	567696.75	5448131.58
3026	567685.74	5448139.73

PILE LAYOUT TABLE - LWD REEF

PILE #	EASTING (m)	NORTHING (m)
3027	567688.07	5448132.11
3028	567690.20	5448124.25
3029	567683.37	5448127.17
3030	567677.85	5448132.68
3031	567683.71	5448121.04
3032	567676.53	5448126.14
3033	567684.27	5448115.03
3034	567675.81	5448118.45
3036	567677.29	5448111.45
3038	567678.84	5448105.92

CLIENT:

Ministry of Environment and Climate Change Strategy
BRITISH COLUMBIA

REV	DATE	DESCRIPTION
A	27 FEB 2026	ISSUED FOR RECORD

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nhc northwest hydraulic consultants

SEAL:

DEROCHE CREEK RECOVERY SOLUTION
OFF-SETTING WORKS

TYPICAL SECTIONS AND PROFILE

DESIGNED:	DJG	SHEET ID: 2900712-DER RS-010	SHEET No: 010
DRAFTED:	CZZ	STATUS: ISSUED FOR RECORD	
CHECKED:	DJG	SCALE: AS SHOWN WHEN PLOTTED D SIZE	
APPROVED:	DJG	DATE: 27 FEB 2026	REV No: A

SUPERSEDES ALL REVISIONS WITH NUMBER PRECEDING

FILENAME: \\nanaimo-van\projects\Active\2900712-deroche creek emerg works\06 CAD\02_production\Record\2900712-deroche RS REC-009-010.dwg, 27 Feb 2026, 11:10 AM