Place Creek Emergency Response Completion Report

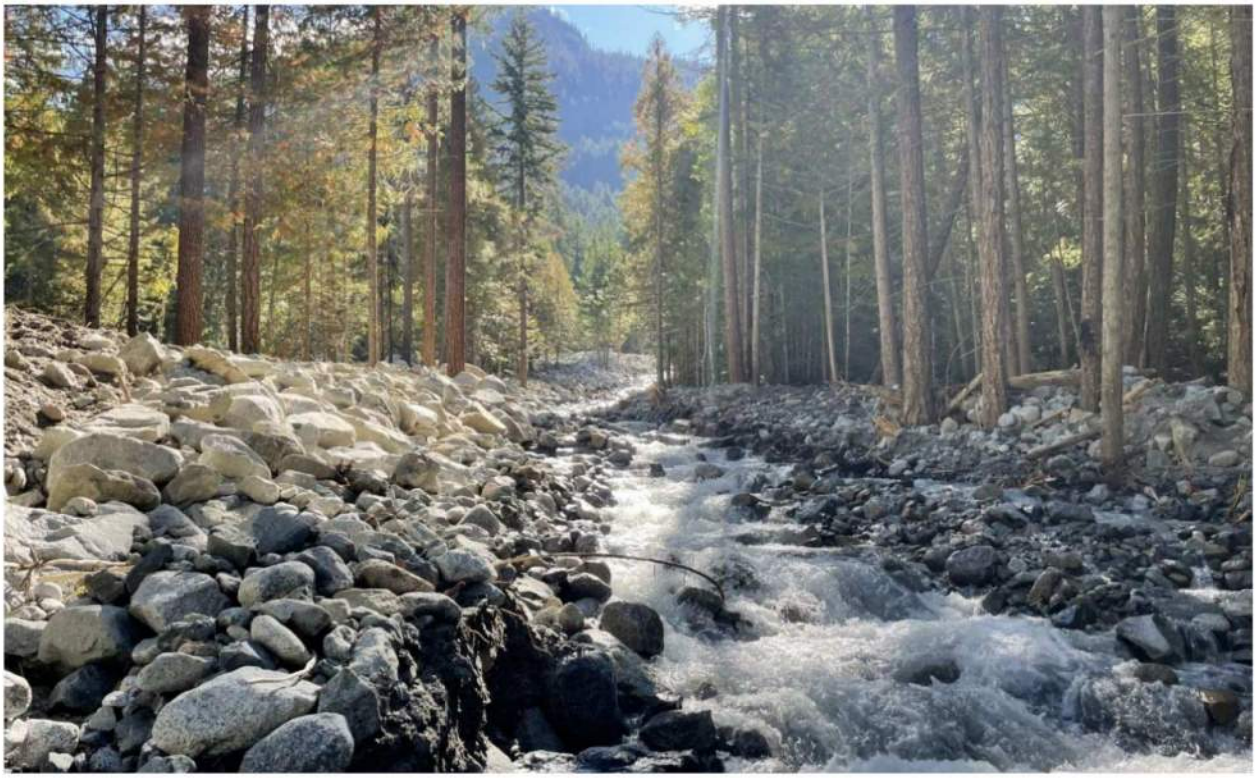
Final

Prepared for:
Squamish-Lillooet Regional District

December 2, 2024

Prepared by:
Stantec Consulting Ltd.

Project/File:
111700815



Stantec Consulting Ltd.

Revision	Description	Author	Date	Quality Check	Date	Independent Review	Date
0	Draft	GV	2024/11/06	JB	2024/11/07	CC	2024/11/8
0	Final	GV	2024/12/02	JB	2024/12/02	CC	2024/12/02

The conclusions in the Report titled Place Creek Emergency Response Completion Report are Stantec's professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

Stantec has assumed all information received from Squamish-Lillooet Regional District (the "Client") and third parties in the preparation of the Report to be correct. While Stantec has exercised a customary level of judgment or due diligence in the use of such information, Stantec assumes no responsibility for the consequences of any error or omission contained therein.

This Report is intended solely for use by the Client in accordance with Stantec's contract with the Client. While the Report may be provided by the Client to applicable authorities having jurisdiction and to other third parties in connection with the project, Stantec disclaims any legal duty based upon warranty, reliance or any other theory to any third party, and will not be liable to such third party for any damages or losses of any kind that may result.

Prepared by

Signature

Graeme Vass, P.Eng.

Printed Name

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
G. M. B. VASS
46630
EGBC Permit to Practice No: 1002662
2024-12-04

Reviewed by

2024-12-02

Signature

James Bigelow, P.Eng.

Printed Name

Approved by

Signature

Carter Chan, P.Eng.

Printed Name

Table of Contents

List of Tables

List of Figures

List of Appendices

1 Introduction

On July 21st, 2024 a sudden and large volume of water flowed from Place Glacier into Place Creek, within the Squamish-Lillooet Regional District (SLRD). This event is likely attributable to the rapid outflow of glacial meltwater from the Place Glacier into Place Creek, in what is typically referred to as a glacial lake outburst flood. The event caused flooding and deposition of sediment and debris at the valley bottom near 9102-9126 Pemberton Portage Rd, and SLRD was advised by residents of localized flooding on Monday, July 22 (the Event).

Prior to the Event, Place Creek flowed west into Poole Creek. However, the deposition of sediment and debris that occurred during the Event caused Place Creek to form a distributary channel, such that the majority of flow altered to draining east into a drainage channel and onwards to Gates Lake, rather than west into Poole Creek (Figure 1). The SLRD retained Stantec Consulting Ltd. to assess the new alignment of Place Creek and conduct a qualitative assessment to determine whether it posed geohazard, flood and debris flood hazards to the general public and structures situated along Gates Lake and immediately downstream of the lake along Gates River. This assessment found that a sufficient flood hazard was posed to the properties around Gates Lake to warrant immediate mitigative actions be taken.

To mitigate the immediate hazard, SLRD further retained Stantec to develop an accelerated, field-based channel modification based on rudimentary hydrologic and channel capacity analyses to re-direct Place Creek back to the pre-Event alignment and provide engineer of record services during construction (the Project). Active Mountain Contracting Ltd. was the prime contractor (the Contractor) and Cascade Environmental Resource Group Ltd. (CERG) provided environmental supervision during construction – both were retained by the SLRD. Alpine Solutions Avalanche Services (ASAS) was retained by Stantec to collect the record LiDAR survey following construction. This completion report summarizes the basis for the channel modification and mitigative action concept utilised for the Project and records the associated construction activities.

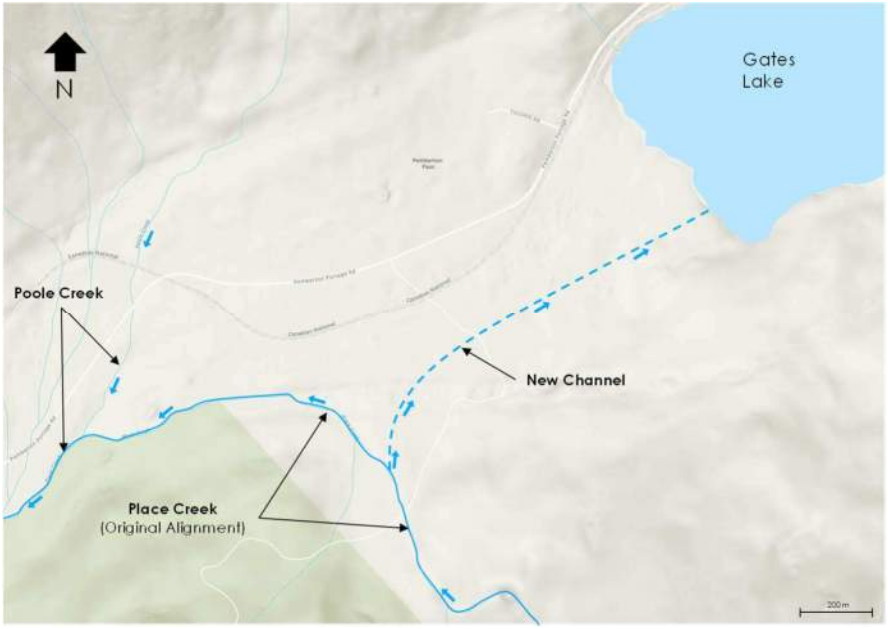


Figure 1: Map Sketch Illustrating Relevant Flow Paths Pre and Post Event (New Channel)

1.1 Information Sources

The Project was completed based on the data and background information contained within the following sources:

- Stantec, 2024. Gates Lake Flood, Debris Flood, and Geohazard Preliminary Hazard Assessment.
- BC Freshwater Atlas.
- Water Survey of Canada Historical Flow Data.
- MFLNRORD, 2020. British Columbia Extreme Flood Project.
- NHC, 1984. Hydraulic Design of Stable Flood Control Channels, 11-DRAFT Guidelines for Preliminary Design. Prepared for U.S. Army Corps of Engineers Seattle District.

2 Background Information

2.1 Stantec Qualitative Hazard Assessment (2024)

A detailed description of the Project location and pre- and post-Event conditions are provided in the qualitative hazard assessment prepared by Stantec (2024). The following sections provides a summary of pertinent findings and conclusions from the qualitative hazard assessment.

Following the Event that occurred on July 21, 2024 the new Place Creek alignment conveyed flow into Gates Lake rather than the pre-Event alignment towards Poole Creek. Properties around Gates Lake and along Gates River downstream of Gates Lake experienced overland flooding and shoreline erosion in the immediate response to the Event. Immediate overland flooding from Place Creek within properties along the south-west end of Gates Lake had been temporarily mitigated by the implementation of emergency works (excavation of a drainage ditch and placement of bulk bags to route flow away from properties and into Gates Lake); however, flooding still persisted at 9234 Pemberton Portage Road and the drainage ditch conveying all of the Place Creek flow through 9102 Pemberton Portage Road was at capacity.

The Gates Lake water level remained high and had fluctuated in response to low magnitude rainfall events, exacerbating shoreline erosion from waves and flooding crawl spaces within homes.

The potential for further avulsions along the new alignment of Place Creek increased the potential for further debris flood events to occur and further retrograding of the grade change within the channel up to the avulsion location threatened to leave the previous Place Creek alignment perched and no longer conveying any portion of flow.

The emergency works implemented along 9102 Pemberton Portage Road. was a temporary structure with the sole purpose of alleviating immediate overland flooding hazards. It was not intended to be relied

upon for longer term purposes (i.e. peak flows that generally occur in the fall) and had not been designed based on quantitative engineering analyses.

Based on these considerations, imminent more extreme rainfall events, and the absence of quantitative hazard analysis associated with how water levels within the new Place Creek channel, Gates Lake, and Gates River will respond to larger magnitude rainfall or glacier meltwater events, it was determined that a sufficient flood hazard was posed to the properties around Gates Lake to warrant immediate mitigative actions be taken.

The mitigative action proposed by Stantec included immediately realigning Place Creek back into the previous, pre-Event alignment. This included the following actions:

1. Clear an access route up the mountainous portion of the previous alignment from the BC Hydro ROW up to the avulsion point and divert all flow into the new alignment to allow further works within the previous alignment to proceed in the dry. If a qualified environmental professional would prefer some flow be maintained within the previous alignment while further work proceeds, the diversion of flow could be forgone.

2. Excavate a suitably sized channel along the previous alignment to convey the mean annual flow from the avulsion point down the mountainous slope and along the BC Hydro ROW to the location where flow is currently channelized.

3. Remove a sufficient volume of material from the large woody debris (LWD) jams along the previous Place Creek alignment to mitigate the potential for obstructed flow to result in avulsions of the channel.

4. Divert all flow back into the enhanced, previous alignment and re-establish the pre-Event right channel embankment with available, onsite material to reduce the potential for further avulsions at this location.

3 Mitigative Action Concept Basis

Due to the emergency nature of the works and to mitigate the imminent flood and debris flood hazards, a formal engineering design could not be developed; rather, an accelerated, field-based channel modification based on a rudimentary hydrologic and channel capacity analyses was developed. The following sections detail the basis for the channel modification.

3.1 Project Criteria

The following project criteria were utilized for the channel modifications:

- Channel modifications are to alleviate the immediate debris flood and flood hazards posed to the properties around Gates Lake and portion of Gates River immediately downstream of Gates Lake prior to the imminent extreme rainfall events generally experienced in the fall. The channel modifications are deemed “emergency response measures”; as such, no design life or design flow is associated with the channel modifications.

- Channel modification alignment to be based on pre-Event Place Creek alignment.
- Channel modification is to function as a pilot channel to promote re-establishment of the pre-Event Place Creek alignment.
- Typical section for channel modification to be based on 2-year mean annual flow.
- Re-established embankment to tie into high ground at the upstream extent to reduce the potential for future avulsions.
- Flow to be diverted into channel modification and pre-Event Place Creek alignment prior to September 15, 2024 (as requested by Department of Fisheries and Oceans during various meetings held in August 2024).

3.2 Project Limitations

The purpose of the Project is to reduce the potential for another avulsion event to occur in the immediate future. The channel modification is to function as a pilot channel and is anticipated to incise and laterally shift as the channel re-establishes and self armours with cobbles and boulders entrained within the deposited debris flood material.

Due to the location, physiography, and geography Place Creek will likely continue to be prone to avulsion and lateral migration. Implementing an engineer designed structure could provide long-term protection from similar events (not included within the Project scope). Detailed monitoring of Place Creek conditions and evaluating potential frequency and associated risk further outbursts from the glacial lake perched on Place Glacier poses to the public is recommended (not included within the Project scope).

3.3 Hydrology

A rudimentary hydrological assessment using regional flood frequency analysis (RFFA) was completed to determine a 2-year return period maximum daily flow for development of the channel modification. The RFFA is conducted using data from the selected Water Survey of Canada (WSC) station and scaled to the project site based on watershed areas and a regional coefficient (MFLNRORD, 2021). The following list of available historical/active WSC hydrometric stations were examined (Table 1). Note that nearby hydrometric stations with less than 15 years of flow data have been excluded due to insufficient data for frequency analysis.

Table 1. Summary of Historical/Active Hydrometric Stations Examined

Watershed	Watershed Area (km^2)	Years of Flow Data	Approximate Distance from Project Watershed (km)

Place Creek (Station ID: 08MG019)	7.25	19	Within watershed
Hurley River (Station ID: 08ME027)	312	27	35.8
Fitzsimmons Creek (Station ID: 08MG026)	89.7	18	44.5

Their respective watershed catchment areas were determined based on the national hydrometric network watershed polygons provided by WSC. The watershed area for the pre-Event Project extents of Place Creek was delineated using PCSWMM, a water management modelling software capable of processing geospatial data and watershed delineation and estimated to be 13.5 km^2. The resulting watershed extent and catchment area are shown below in Figure 2.

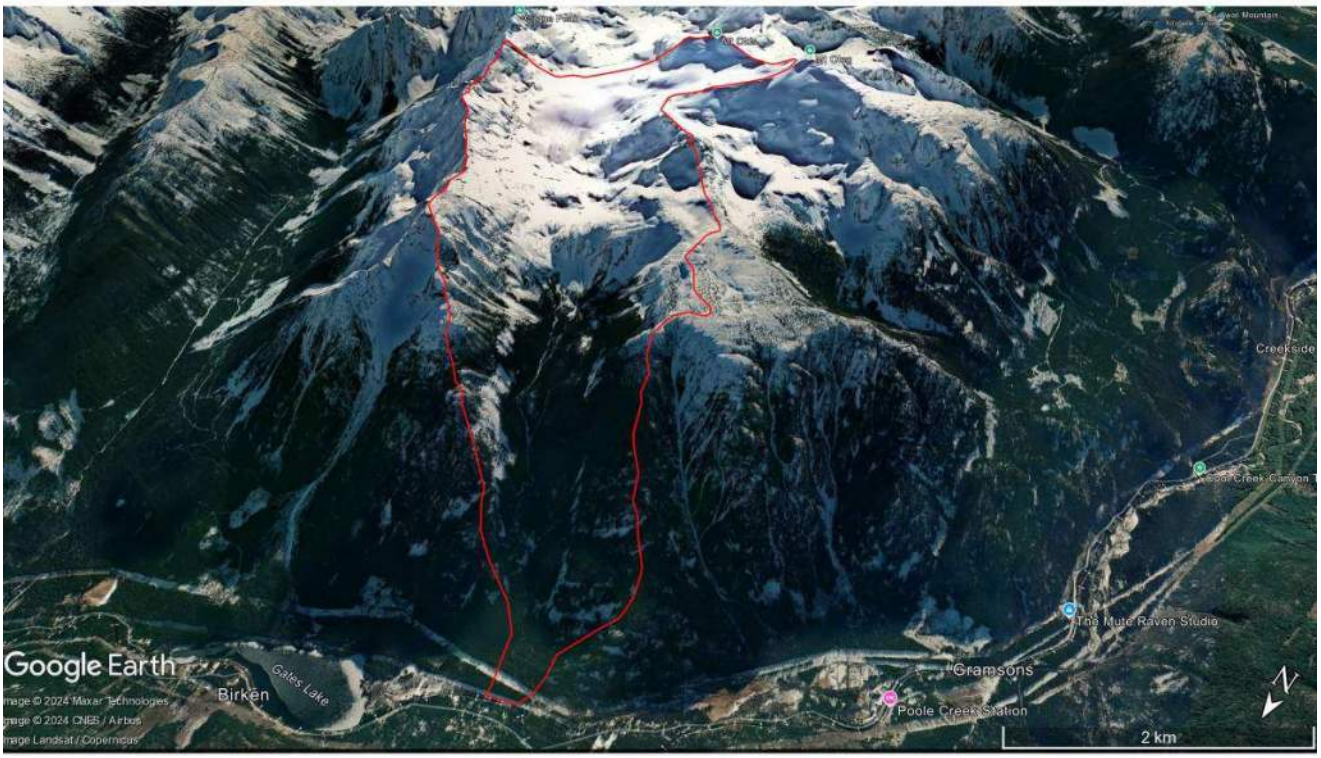


Figure 2. Place Creek Watershed Catchment Area at Project Site (Red Polygon - Background Image Source: Google Earth)

As the Place Creek WSC gauge (08MG019) is located on the same watercourse, and has a similar watershed catchment area to the Project Site, it was used to conduct the RFFA utilising HyfranPlus[1] software. Various distribution fittings such as, Generalized Extreme Value (GEV), Gumbel, Lognormal, Log-Pearson Type 3, and 3-parameter Lognormal were assessed to determine the best fit for the dataset.

[1] A software that allows for fitting of several statistical distributions to a data sample for comparison and analysis purposes.

Upon visual comparison, it was determined that the Gumbel produced the best fit. The corresponding 2-year return period maximum daily flow was estimated[2]. to be 3.6 m^3/s

An area scaling equation (MFLNRORD, 2021) was used to estimate the peak flows at the ungauged watershed of the Project Site from the gauged peak flow at Place Creek WSC gauge. The area scaling equation follows the form:

$$Q_{ungauged} = Q_{gauged} * (\frac{Area_{ungauged}}{Area_{gauged}})^b$$

Where Q_{gauged} is a flow (of a particular return period) of a gauged site, and $Area_{gauged}$ and $Area_{ungauged}$ are watershed areas for gauged and ungauged watersheds. The scaling exponent, b, varies based on the terrestrial ecozone/Eco-province in which the station is situated.

Based on the terrestrial ecozones figure provided within the British Columbia Extreme Flood Project report (MFLNRORD, 2021), both the Project Site and Place Creek WSC gauge are situated within the Southern Montane Cordillera terrestrial ecozone 14.3 - the corresponding value for the scaling exponent, b, is suggested as 0.98. The estimated clearwater[3] 2-year return period maximum daily flow for the Project Site is 7 m^3/s.

3.4 Waterway Opening

The waterway opening of the channel modification was estimated utilizing the estimated 2-year return period maximum daily flow, a pre-Event average channel slope for the Project Site (estimated to be 47%), and empirical equations based on the regime method for determining stable channel design (NHC, 1984).

Based on this approach the estimated channel modification geometry would include the following:

- Minimum bottom width = 4.7 m
- Maximum bank slope = 3H:1V
- Minimum depth = 1.5 m for mountainous section; 0.5 m for portion through BC Hydro ROW.

3.5 Mitigative Action Concept

The mitigative action concept included the following elements and was based on waterway opening assessment (Section 3.4) and findings from the qualitative hazard assessment (Section 2.1):

1. Establish access road up to the avulsion point and divert flow (as required)

[2] Impacts of climate change on the flow was not assessed as the purpose of the channel modification is to function as a pilot channel to promote re-establishment of the pre-Event Place Creek alignment
[3] Does not include potential bulking of flow due to entrained sediments.

2. Excavate the channel modification and re-establish the embankment with available onsite excavated material through mountainous terrain
3. Excavate the channel modification through the BC Hydro ROW
4. Re-establish east embankment with available onsite excavated material extending upstream of the avulsion to tie into existing high ground.

A figure that presents the mitigation action concept is provided in Appendix A. The intent of this figure was to provide a general concept to be followed by the Contractor with the actual layout being field-fit based on existing conditions at the time of construction.

4 Construction

The Contractor initiated construction activities on August 26, 2024. During construction CERG provided environmental supervision with Lil'Wat Nation providing further environmental supervision with an onsite environmental technician. Stantec provided engineering quality assurance and provided technical guidance for the execution of the mitigative action concept. BC Hydro was kept informed of the construction activities throughout construction and SLRD retained permission to work within their ROW. SLRD also retained permission to access 9102 Pemberton Portage Road property during the course of construction (if required).

Table 2 presents a summary of construction activities. Daily field review reports that summarize Stantec's observations of contractor activities and quality assurance activities are presented in Appendix B.

Table 2. Summary of Construction Activities

Activity	Dates
Site walkthrough to discuss mitigative action concept and Contractor's construction plan (Stantec, DFO, CERG, BC Hydro, SLRD, Lil'Wat First Nation)	Aug 23, 2024
Contractor mobilisation and complete clearing large woody debris jams	Aug 26, 2024
Establish access road through mountainous section up to avulsion point	Aug 26 to 27, 2024

Clear channel modification alignment through mountainous section up to avulsion point	Aug 26 to 28, 2024
Excavate channel modification through BC Hydro ROW	Aug 27 to 28, 2024
Excavate channel modification through mountainous section and re-establish pre-Event east embankment.	Aug 28 to Sept 13, 2024
Flow diverted into channel modification and into pre-Event Place Creek alignment	Sept 13, 2024
Re-establish pre-Event east embankment upstream of avulsion site	Aug 28 to Sept 23, 2024
Remove emergency works established within BC Hydro ROW and 9102 Pemberton Portage Rd	Sept 23 to 26, 2024
Contractor demobilised from site	Sept 26, 2024

4.1 Environmental

The following environmental permits were acquired by CERG for the Project[4]:

- Ministry of Water, Land & Resource Stewardship – Water Sustainability Act Section 11 Approval – Change in and About a Stream – File Number 2011626 (August 23, 2024).

Daily reports detailing environmental supervision activities are provided in a separate document prepared by CERG.

4.2 Quality Assurance

A hydrotechnical field reviewer from Stantec was onsite to provide technical guidance to the Contractor throughout construction and quality assurance that the constructed works met the Project criteria. Stantec directed the Contractor to make the following changes to the concept during construction:

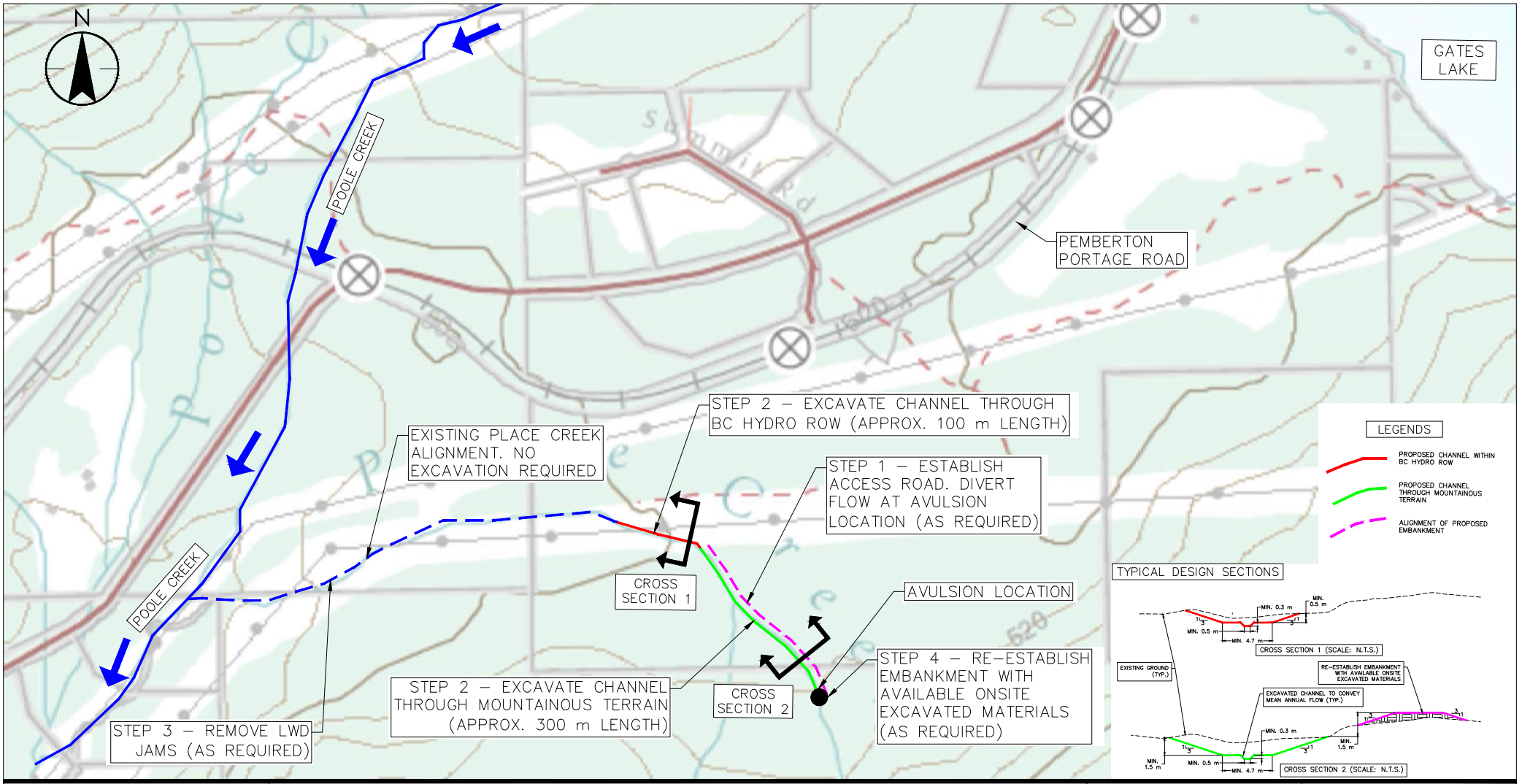
- Only include low-flow notch within the steep mountainous portion extending approximately 50 m downstream from avulsion point
- Source large rounded boulders from excavated material and place along waterside bank of the re-established east embankment to provide erosion protection.
- At the request from CERG, fill used for the emergency works was not backfilled within wetted portions of the emergency drainage channel

A record survey (LiDAR) of the Project site was collected by ASAS on October 13, 2024. Record drawings developed based on the record survey are provided in Appendix C.

[4] A copy of the permit is included within a separate environmental report prepared by CERG.

In general, the constructed works met the established Project criteria.

Appendix A Mitigative Action Concept Figure



Stantec

500, 4515 Central Blvd
Burnaby, British Columbia V5H 0C6
www.stantec.com

Notes

1. BACKGROUND IMAGE IS BASED ON "MAP 092J047" PRODUCED BY GeoBC OF THE MINISTRY OF FORESTS, LANDS AND NATURAL RESOURCE OPERATIONS.
2. CONCEPT INCLUDED WITHIN THIS DRAWING IS FOR EMERGENCY RESPONSE PURPOSES ONLY. CONCEPT WAS PREPARED WITHOUT POST-EVENT LIDAR AND BASED ON CURSORY HYDROTECHNICAL ENGINEERING ASSESSMENT LIMITED TO VISUAL OBSERVATIONS, REVIEW OF AVAILABLE STUDIES PROVIDED BY SLRD AND PRELIMINARY HYDROLOGIC ANALYSIS. NO HYDRAULIC MODELING, GEOMORPHIC ANALYSIS, OR DEBRIS FLOOD MODELLING WAS COMPLETED TO INFORM THIS CONCEPT - ACTUAL LAYOUT OF WORKS WILL BE FIELD-FIT BASED ON EXISTING CONDITIONS AT TIME OF CONSTRUCTION. THE PURPOSE OF THE CONCEPT INCLUDED WITHIN THIS DRAWING IS TO MITIGATE IMMEDIATE FLOOD HAZARDS ASSOCIATED WITH PLACE CREEK POSED TO THE COMMUNITY OF BIRKEN, BC FOLLOWING THE JULY 21, 2024 EVENT. FOR FURTHER DETAILS ON THE QUALITATIVE HAZARD ASSESSMENT THAT INFORMED THIS CONCEPT SEE "rpt_Gates_Prelim_Hazard_v0.pdf" - Stantec, 2024.

1:2500 0 25 75 125m

Client/Project
SQUAMISH-LILLOOET REGIONAL DISTRICT
PLACE CREEK CHANNEL REALIGNMENT

Project No.
111700815

Title
MITIGATION ACTION CONCEPT

Revision	Date
0	AUG/22/2024
SCALE	Figure No.
1:2500	1

Appendix B Daily Field Review Reports

Field Review

Project:	Poole Creek Channel Realignment		
To:	Squamish-Lillooet Regional District (SLRD)		
From:	Graeme Vass (graeme.vass@stantec.com) |Jason Fan (Jason.Fan@stantec.com)		
Revision:	0	**Contract:**	111700815
Date:	August 30, 2024	**Stantec No.**	111700815
Client:	Mike Fusca (mfusca@slrd.bc.ca)	**Prime:**	Active Mountain Contracting Ltd.

Conditions:

Review Date:	August 30, 2024	**Time:**	6:00 AM PST to 12:00 PM PST
Drawing Ref.:	Emergency response – details provided in this report		
Weather:	Sunny		
Location:	5590816.10 N, 525160.23 m E along original alignment of Place Creek		

Personnel & Equipment:

- Jason Fan (Stantec)
- Niki (Environmental Technician from Lil'Wat Nation)
- Vicki (Senior Biologist from Cascade Environmental)
- 350 excavator and operator
- 250 excavator and operator

Observations:

Construction Activity:

Place Creek channel realignment work along the original alignment of Place Creek. Excavating proposed channel. Placing excavated materials to build up the proposed embankment. Sorting through excavated materials to stockpile large boulders to be used as riprap protection along the channel bank, and toe of the proposed embankment.

Terminology:

"Proposed Embankment" refers to the proposed earthen berm that will be built parallel to the proposed channel (Dashed purple line in Image 1)

"Proposed Channel" refers to the channel that is being excavated along the original alignment of Place Creek. (Green and red lines in Image 1)

Activities:

- Contractor and Niki were already on site at 6:05 when Stantec arrived.
- 6:00 AM – 7:00 AM: 250 excavator continued to excavate the proposed channel within the mountainous area. 350 excavator was sorting through excavated materials to stockpile large boulders that will be used for riprap armoring (Images 2 & 3).
- 7:30 AM - The 250 excavator continued to excavate the proposed channel within the mountainous area (Image 4).
- 7:30 AM - the 350 excavator started to place some riprap along the right channel bank looking downstream (Image 5).
- At 8:15 AM, Vicki arrived on site and spoke with Jason regarding the potential eagle nest spotted by Tammy from Lil'wat Nation. We traversed up to the avulsion location where the tree containing the potential eagle nest is at. Vicki mentioned that she will start doing a danger tree assessment, and the coordination process with the wildlife department for permitting and recommendations related to this matter (images 6 & 7).
- 9:05 AM – 12:00 PM, the 250 excavator continued to excavate the proposed channel within the mountainous area. While the 350 excavator was still placing riprap along the right channel bank looking downstream (Images 8, 9, 10, 11, 12 & 13).
- All work for the day ended by approximately 12:00 PM. Contractor stayed for 1 hour after work as part of the fire watch protocol.

Observations / Issues Noted:

- Niki would like to be informed of the BC Hydro tree removal plan, and any remediation work related to the transmission line tower near the vicinity of the original Place Creek alignment. Environmental and archaeological technicians from Lil'Wat Nation will need to be onsite to monitor any remediation work of the BC Hydro transmission line towers that are near the original Place Creek alignment.

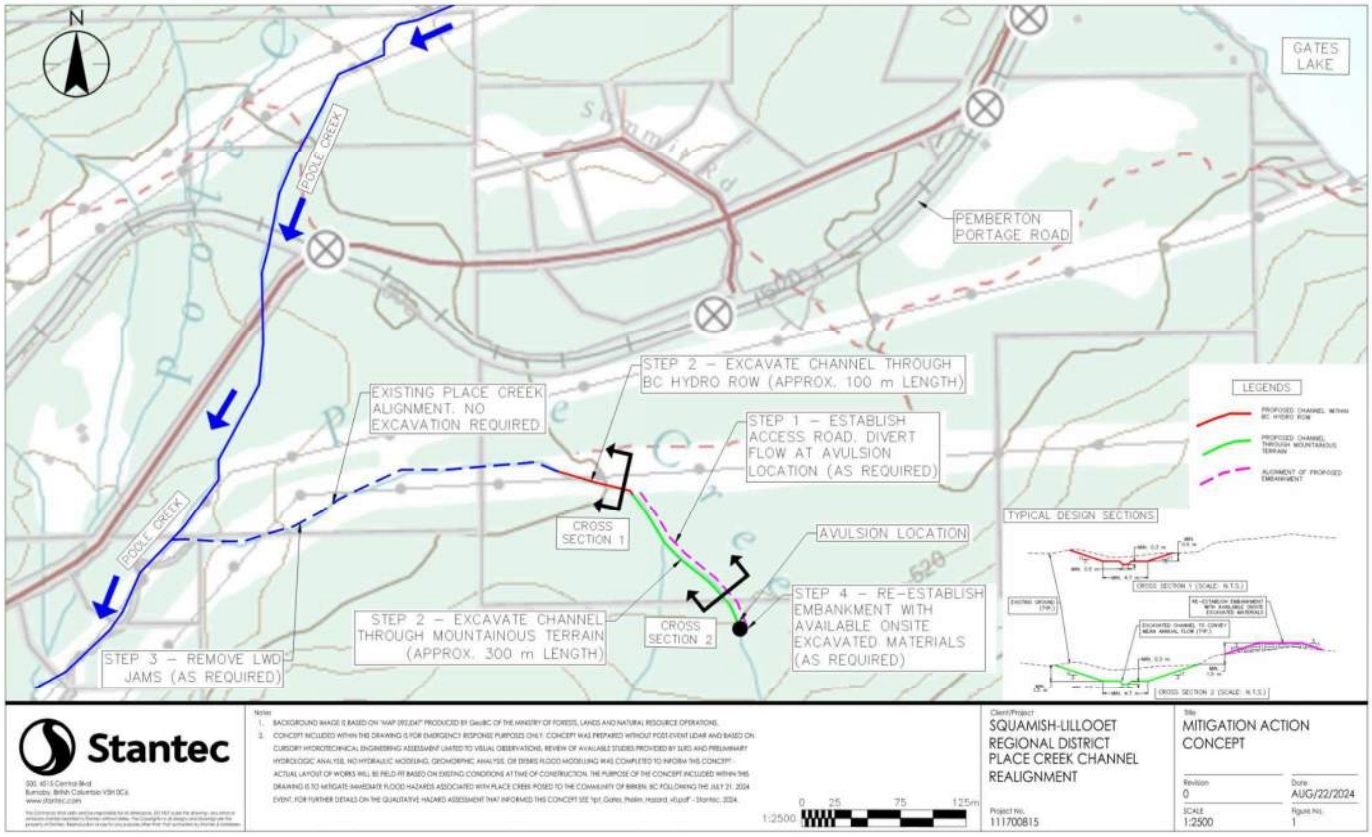


Image 1: Emergency Mitigation Action Concept Plan for the Place Creek Channel Realignment

Image 2: 350 excavator sorting through excavated materials to stockpile large boulders for riprap armoring (2024-08-30 6:16 AM)

Image 3: 250 excavator excavating the proposed channel (2024-08-30 @ 6:31 AM)

Image 4: 250 excavator continued to excavate the proposed channel (2024-08-30 7:34 AM)

Image 5: 350 excavator placing riprap along the right channel bank looking downstream (2024-08-30 @ 7:35 AM)

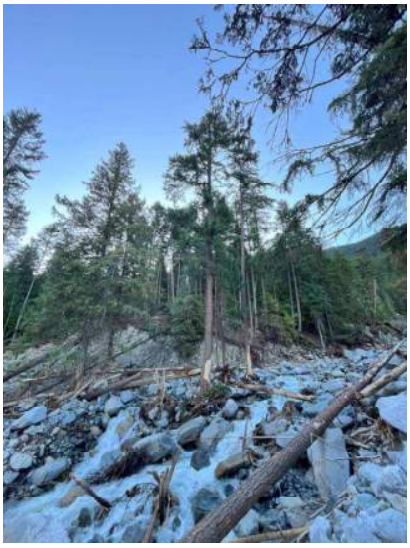


Image 6: Tree with the potential eagle nest (2024-08-30)

Image 7: Close-up view of the tree with the potential eagle nest (2024-08-30)

Image 8: 350 excavator sorting through excavated materials to stockpile large boulders for riprap armoring (2024-08-30 @ 9:05 AM)

Image 9: Riprap placed along the right channel bank looking downstream (2024-08-30 @ 9:05 AM)

Image 10: 250 excavator continued to excavate the proposed channel (2024-08-30 @ 9:13 AM)

Image 11: 350 excavator continuted to sort through excacvated materials to find large boulders for riprap armoring (2024-08-30 @ 11:22 AM)

Image 12: 350 excavator placing riprap along the right channel bank looking downstream (2024-08-30 @ 11:46 AM)

Image 13: 250 excavator continued to excavate the proposed channel (2024-08-30 @ 11:46 AM)

Field Review Report Reviewed by:

_____

Signature & Date

Graeme Vass, P.Eng

Name Printed

Field Review

Project:	Poole Creek Channel Realignment		
To:	Squamish-Lillooet Regional District (SLRD)		
From:	Graeme Vass (graeme.vass@stantec.com) |Jason Fan (Jason.Fan@stantec.com)		
Revision:	0	**Contract:**	111700815
Date:	September 03, 2024	**Stantec No.**	111700815
Client:	Mike Fusca (mfusca@slrd.bc.ca)	**Prime:**	Active Mountain Contracting Ltd.

Conditions:

Review Date:	September 03, 2024	**Time:**	7:55 AM PST to 2:00 PM PST
Drawing Ref.:	Emergency response – details provided in this report		
Weather:	Sunny		
Location:	5590816.10 N, 525160.23 m E along original alignment of Place Creek		

Personnel & Equipment:

- Jason Fan (Stantec)
- Niki and Thomas (Environmental and Archaeological Technician from Lil'Wat Nation)
- Jessica (Environmental Technician from Cascade Environmental)
- 350 excavator and operator
- 250 excavator and operator

Observations:

Construction Activity:

Place Creek channel realignment work along the original alignment of Place Creek. Excavating proposed channel. Placing excavated materials to build up the proposed embankment. Sorting through excavated materials to stockpile large boulders to be used as riprap protection along the channel bank, and toe of the proposed embankment.

Terminology:

"Proposed Embankment" refers to the proposed earthen berm that will be built parallel to the proposed channel (Dashed purple line in Image 1)

"Proposed Channel" refers to the channel that is being excavated along the original alignment of Place Creek. (Green and red lines in Image 1)

Activities:

- Contractor, Niki, Thomas and Jessica were already on site at 7:55 when Stantec arrived.
- 7:55 AM - 250 excavator continued to excavate the proposed channel within the mountainous area (image 2). 350 excavator crossed the new Place Creek channel to clear vegetations/trees along the left bank (looking upstream) where the proposed embankment will be constructed (image 3).
- Jason noted to the operator of the 350 excavator avoid clearing any vegetations/trees, or disturb in-stream rocks within the 30m perimeter measured from the tree containing the potential eagle nest.
- 9:00 AM –350 excavator blocked off side channel along the left bank (looking upstream) to promote water to flow towards the orientation of the proposed channel (images 4 & 5).
- 10:00 AM – 250 excavator continued to excavate the proposed channel within the mountainous area (image 6).
- 11:00 AM – 12:00 PM: 350 excavator blocked off the side channel along the left bank (looking upstream) while the 250 excavator continued to excavate the proposed channel (images 7 & 8). Niki instructed Jason/contractor to halt any in-stream works until the turbidity level of the creek restores back to what it was before any in-stream disturbance occurred.

- 12:00 PM – 2:00 PM: the 350 excavator proceeded to source materials from the debris flood deposits to build up the proposed embankment along the left bank (looking upstream) of the new Place Creek channel. This section of the channel will be tied back to original alignment of Place Creek where the proposed channel is currently being excavated (images 9 & 10).
- Jessica was periodically taking water samples immediately downstream of the location where the side channel has been blocked off (image 11).
- Jason departed from site at around 2:05 PM. The 350 excavator was still sourcing materials from the debris flood deposits to build up the proposed embankment (image 12). While the 250 excavator continued to excavate the proposed channel (image 13).

Observations / Issues Noted:

- Niki would like to minimize the number of times an excavator crosses Place Creek. She would also like the contractor to be mindful of the turbidity level within the current Place Creek channel. Should the water turbidity reach an unacceptable level, all in-stream works must be halted until the water turbidity reaches back to an acceptable level.

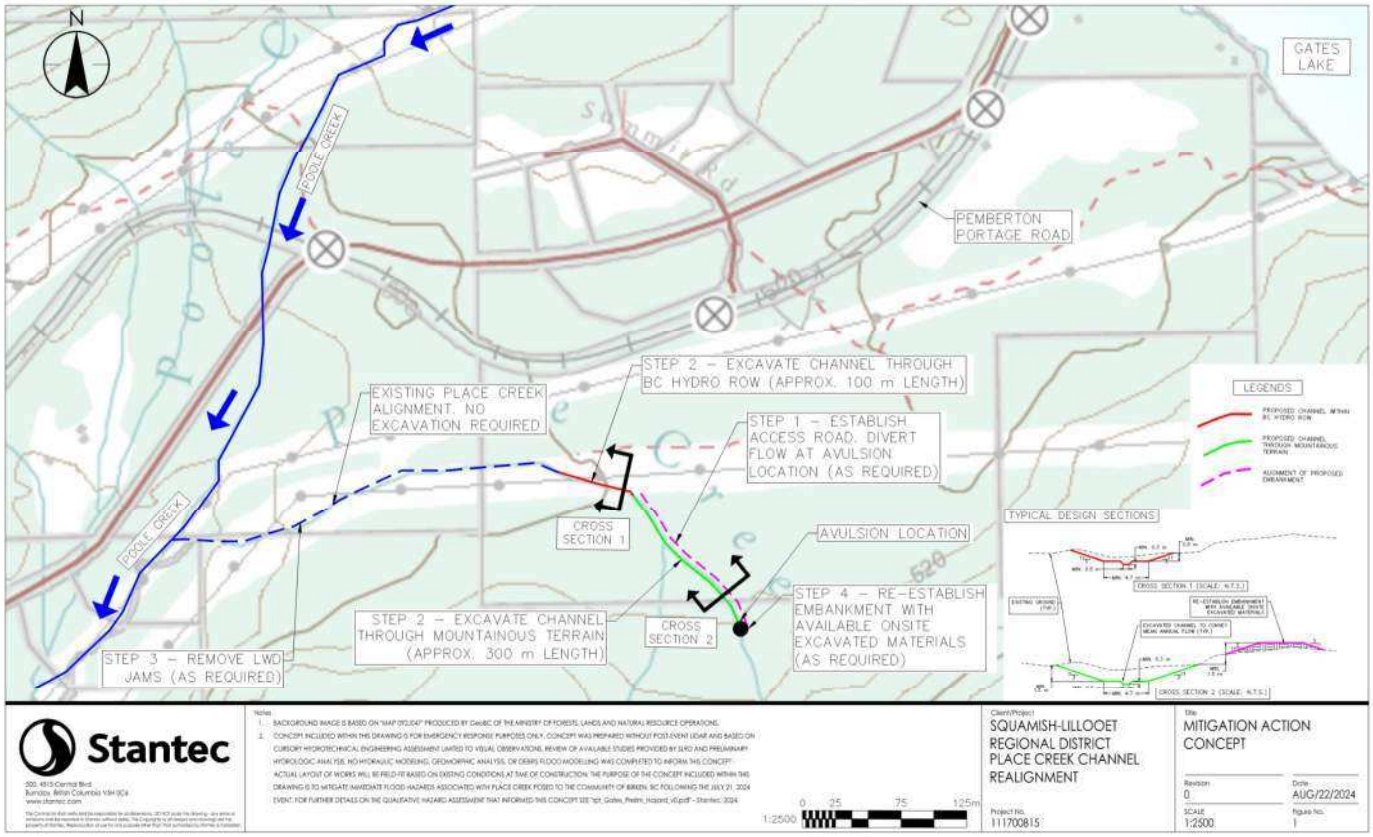


Image 1: Emergency Mitigation Action Concept Plan for the Place Creek Channel Realignment

Image 2: 250 excavator continued to excavate the proposed channel (2024-09-03 7:58 AM)

Image 3: 350 excavator clearing trees along the left bank of Place Creek channel where the proposed embankment will be built (2024-09-03 @ 8:10 AM)

Image 4: 350 excavator relocating boulders within the existing channel to block off the side channel hugging the left bank (looking upstream) (2024-09-03 9:18 AM)

Image 5: 350 excavator relocating boulders within the existing channel to block off the side channel hugging the left bank (looking upstream) (2024-09-03 9:39 AM)

Image 6: 250 excavator continued to excavate the proposed channel (2024-09-03 @ 10:00 AM)

Image 7: 350 excavator completed blocking the side channel that was along the left bank (looking upstream) (2024-09-03 @ 11:37 AM)

Image 8: Existing Place Creek channel after the side channel has been blocked off – looking downstream (2024-09-03 @ 11:46 AM)

Image 9: 350 excavator proceeded to source materials from the debris flood deposits to build up the proposed ermbankment (2024-09-03 @ 12:23 PM)

Image 10: 350 excavator proceeded to source materials from the debris flood deposits to build up the proposed ermbankment (2024-09-03 @ 12:23 PM)

Image 11: Jessica taking water sample (2024-09-03 @ 12:15 PM)

Image 12: 350 excavator continued to source materaisl from the debris flood deposits to build up the proposed embankment (2024-09-03 @ 1:56 PM)

Image 13: 250 excavator continued to excavate the proposed channel (2024-09-03 @ 2:03 PM)

Field Review Report Reviewed by:

_____

Signature & Date

Graeme Vass, P.Eng

Name Printed

Field Review

Project:	Poole Creek Channel Realignment		
To:	Squamish-Lillooet Regional District (SLRD)		
From:	Graeme Vass (graeme.vass@stantec.com) |Jason Fan (Jason.Fan@stantec.com)		
Revision:	0	**Contract:**	111700815
Date:	September 04, 2024	**Stantec No.**	111700815
Client:	Mike Fusca (mfusca@slrd.bc.ca)	**Prime:**	Active Mountain Contracting Ltd.

Conditions:

Review Date:	September 04, 2024	**Time:**	7:12 AM PST to 2:15 PM PST
Drawing Ref.:	Emergency response – details provided in this report		
Weather:	Sunny		
Location:	5590816.10 N, 525160.23 m E along original alignment of Place Creek		

Personnel & Equipment:

- Jason Fan (Stantec)
- Niki and Thomas (Environmental and Archaeological Technician from Lil'Wat Nation)
- Vicki (Senior Biologist from Cascade Environmental)
- 350 excavator and operator
- 210 excavator and operator

Observations:

Construction Activity:

Place Creek channel realignment work along the original alignment of Place Creek. Excavating proposed channel. Placing excavated materials to build up the proposed embankment. Sorting through excavated materials to stockpile large boulders to be used as riprap protection along the channel bank, and toe of the proposed embankment.

Terminology:

"Proposed Embankment" refers to the proposed earthen berm that will be built parallel to the proposed channel (Dashed purple line in Image 1)

"Proposed Channel" refers to the channel that is being excavated along the original alignment of Place Creek. (Green and red lines in Image 1)

Activities:

- Contractor, Niki and Thomas were already on site at 7:15 AM when Stantec arrived.
- 7:15 AM - 350 excavator continued to source through materials from the debris flood deposits to build up the proposed embankment (image 2). 210 excavator continued to excavate the proposed channel within the mountainous area (images 3 & 4).
- 8:00 AM – 350 excavator continued to build up the proposed embankment along the left bank (looking upstream) of the current Place Creek channel (image 5).
- 8:23 AM – 350 excavator started to reinforce the toe of the proposed embankment along the left bank (looking upstream) of the existing Place Creek channel (Images 6, 7, & 8).
- 9:00 AM – 210 excavator continued to excavate the proposed channel within the mountainous area (image 9).
- 9:30 AM – 11:00 AM: 350 excavator continued to reinforce the toe of the proposed embankment along the left bank (looking upstream) (images 10, 11, & 12). 210 excavator continued to excavate the proposed channel within the mountainous area (images 13 & 14)

- 11:00 AM – 12:00 PM: 210 excavator continued to excavate the proposed channel (image 15). 350 excavator was building up the proposed embankment (image 16).
- 12:00 PM – 2:00 PM: 350 excavator was sorting through materials from the debris flood deposits to build up the proposed embankment (images 17 & 18). 210 excavator continued to excavate the proposed channel within the mountainous area (images 19 & 20).
- At around 1:50 PM, Vicki visited to have a brief look at the construction progress. She also provided an update to Jason and Niki on the work plan around the tree with the potential eagle nest.

Observations / Issues Noted:

- Niki asked Jason to remind Vicki that the Lil'wat Nation must be consulted for the potential removal of the tree containing the potential eagle nest.
- Overall construction progress of proposed channel excavation: 65% complete (see yellow highlighted area in image 1 – note that the drainage notch has not been excavated, and minor refinement is still required for the channel side slopes and depth)
- Overall construction progress of embankment re-establishment: 25% complete (all vegetations/tress have been cleared along its alignment up to the edge of the 30 m perimeter measured from the tree with the potential eagle nest.

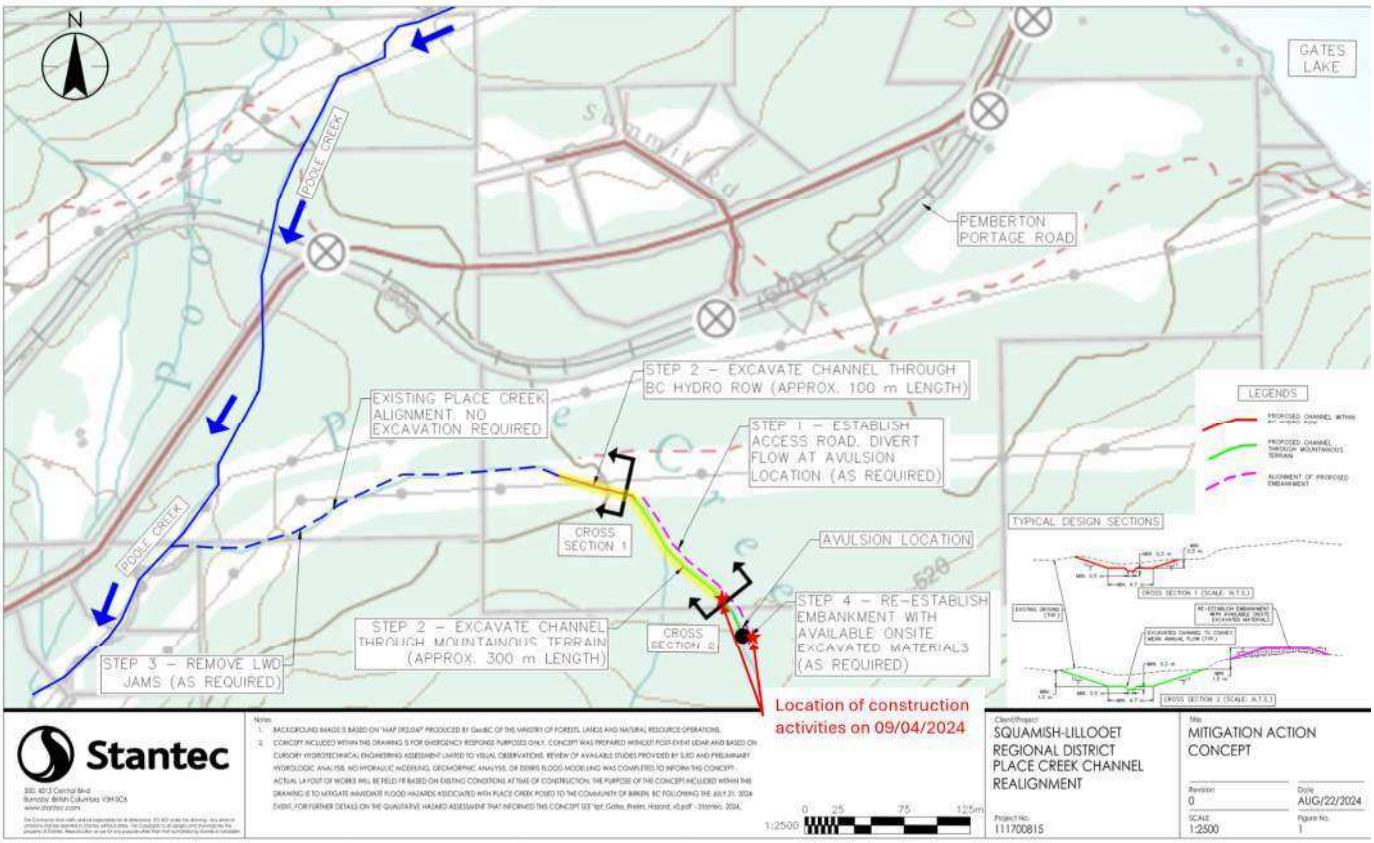


Image 1: Emergency Mitigation Action Concept Plan for the Place Creek Channel Realignment

Image 2: 350 excavator continued to sort through materials from the debris flood deposits to build up the proposed embankment (2024-09-04 7:28 AM)

Image 3: 210 excavator continued to excavate the proposed channel (2024-09-04 @ 7:37 AM)

Image 4: 210 excavator continued to excavate the proposed channel (2024-09-04 7:47 AM)

Image 5: 350 excavator continued to build up the proposed embankment along the left bank (looking upstream) of the current Place Creek channel (2024-09-04 8:08 AM)

Image 6: 350 excavator continued to reinforce the toe of the proposed embankment (2024-09-04 @ 8:23 AM)

Image 7: 350 excavator continued to reinforce the toe of the proposed embankment (2024-09-04 @ 8:32 AM)

Image 8: 350 excavator continued to reinforce the toe of the proposed embankment (2024-09-04 @ 8:52 AM)

Image 9: 210 excavator continued to excavate the proposed channel (2024-09-04 @ 9:00 AM)

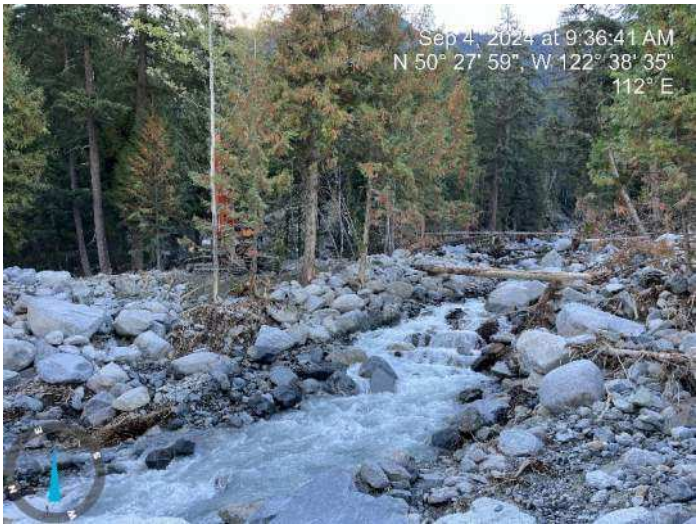


Image 10: Riprap placed on the toe of the proposed embankment along the left bank (looking upstream) of the existing Place Creek channel (2024-09-04 @ 9:36 AM)

Image 11: 350 excavator continued to reinforce the toe of the proposed embankment along the left bank (looking upstream) (2024-09-04 @ 10:36 AM)

Image 12: 350 excavator continued to reinforce the toe of the proposed embankment along the left bank (looking upstream) (2024-09-04 @ 10:39 AM)

Image 13: 210 excavator continued to excavate the proposed channel (2024-09-04 @ 9:54 AM)

Image 14: 210 excavator continued to excavate the proposed channel (2024-09-04 @ 10:33 AM)

Image 15: 210 excavator continued to excavate the proposed channel (2024-09-04 @ 11:00 AM)

Image 16: 350 excavator building up the proposed embankment (2024-09-04 @ 11:33 AM)

Image 17: 350 excavator sorting through materials from the debris flood deposits to build up the proposed embankment (2024-09-04 @ 12:48 PM)

Image 18: 350 excavator sorting through materials from the debris flood deposits to build up the proposed embankment (2024-09-04 @ 2:08 PM)

Image 19: 210 excavator continued to excavate the proposed channel (2024-09-04 @ 12:24 PM)

Image 20: 210 excavator continued to excavate the proposed channel (2024-09-04 @ 2:09 PM)

Field Review Report Reviewed by:

Signature & Date

Graeme Vass, P.Eng

Name Printed

Field Review

Project:	Poole Creek Channel Realignment		
To:	Squamish-Lillooet Regional District (SLRD)		
From:	Graeme Vass (graeme.vass@stantec.com) |Jason Fan (Jason.Fan@stantec.com)		
Revision:	0	**Contract:**	111700815
Date:	September 05, 2024	**Stantec No.**	111700815
Client:	Mike Fusca (mfusca@slrd.bc.ca)	**Prime:**	Active Mountain Contracting Ltd.

Conditions:

Review Date:	September 05, 2024	**Time:**	7:00 AM PST to 2:10 PM PST
Drawing Ref.:	Emergency response – details provided in this report		
Weather:	Sunny		
Location:	5590816.10 N, 525160.23 m E along original alignment of Place Creek		

Personnel & Equipment:

- Jason Fan (Stantec)
- Niki and Thomas (Environmental and Archaeological Technician from Lil'Wat Nation)
- Jessica (Environmental Technician from Cascade Environmental)
- 350 excavator and operator
- 210 excavator and operator

Observations:

Construction Activity:

Place Creek channel realignment work along the original alignment of Place Creek. Excavating proposed channel. Placing excavated materials to build up the proposed embankment. Sorting through excavated materials to stockpile large boulders to be used as riprap protection along the channel bank, and toe of the proposed embankment.

Terminology:

"Proposed Embankment" refers to the proposed earthen berm that will be built parallel to the proposed channel (Dashed purple line in Image 1)

"Proposed Channel" refers to the channel that is being excavated along the original alignment of Place Creek. (Green and red lines in Image 1)

Activities:

- Contractor, Niki, Thomas and Jessica were already on site at 7:00 AM when Stantec arrived.
- 7:25 AM – Jason discussed with the operator of the 350 excavator the extent of the in-stream work that will be completed today. 350 excavator started to relocate rocks, and remove fallen trees to create an access road along the right bank (looking upstream) of the existing channel (image 2).
- 7:25 AM – 210 excavator started sorting through the excavated materials to build up the proposed embankment (image 3).
- 7:40 AM – 350 excavator started to place boulders to reinforce the toe of the proposed embankment along the left bank of the existing channel (looking upstream) (images 4 & 5).
- 8:00 AM – 350 excavator continued to reinforce the toe of the proposed embankment along the left bank (looking upstream) of the existing channel (image 6). 210 excavator continued to sort through the excavated materials to build up the proposed embankment (image 7).
- 8:30 AM – 350 excavator went back to relocating rocks and removing fallen trees to create an access road along the right bank (looking upstream) (image 8). 210 excavator continued to sort through excavated materials to build up the proposed embankment (image 9).

- 9:00 AM – 350 excavator continued reinforce the toe of the proposed embankment along the left bank (looking upstream) (image 10).
- 9:30 AM – 11:00 AM: 210 excavator continued to sort through excavated materials to build up the proposed embankment (images 11 & 12). 350 excavator started to widen the right bank (looking upstream) of the existing channel to promote water towards the orientation of the proposed channel (images 13, 14 & 15).
- 11:00 AM – 12:00 PM: 210 excavator continued to sort through excavated materials to build up the proposed embankment (image 16). 350 excavator continued to widen the existing channel along the right bank (looking upstream) (images 17 & 18).
- 12:00 PM – 1:00 PM: 210 excavator continued to sort through excavated materials to build up the proposed embankment. 350 excavator continued to widen the right bank (looking upstream) of the existing channel (image 19).
- 1:00 PM – 2:00 PM: 350 excavator started to excavate the proposed channel near the tie-in point to the existing Place Creek channel. 210 excavator continued to sort through excavated materials to build up the proposed embankment (images 20 & 21).
- Jason departed from site around 2:10 PM. Existing channel condition at time of departure is shown in image 22.

Observations / Issues Noted:

- Overall construction progress of proposed channel excavation: 75% complete (see yellow highlighted area in image 1 – note that the drainage notch has not been excavated, and minor refinement is still required for the channel side slopes and depth)
- Overall construction progress of embankment re-establishment: 35% complete (all vegetations/tress have been cleared along its alignment up to the edge of the 30 m perimeter measured from the tree with the potential eagle nest.

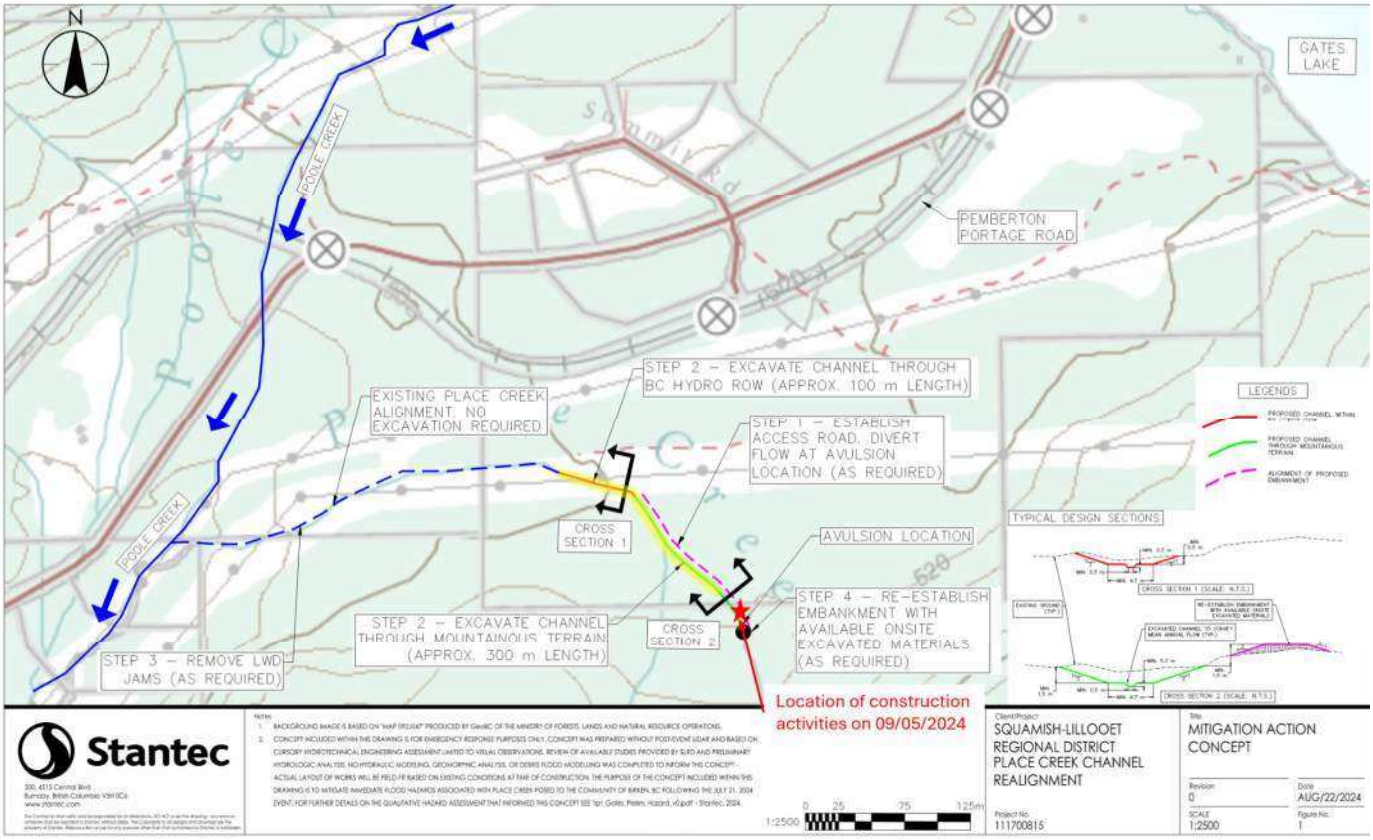


Image 1: Emergency Mitigation Action Concept Plan for the Place Creek Channel Realignment

Image 2: 350 excavator relocating rocks and removing fallen trees to create an access road (2024-09-05 7:27 AM)

Image 3: 210 excavator started sorting through excavated materials to build up the proposed embankment (2024-09-05 @ 7:27 AM)

Image 4: 350 excavator started reinforcing the toe of the proposed embankment along the left bank (looking upstream) of the existing channel (2024-09-05 7:43 AM)

Image 5: 350 excavator started reinforcing the toe of the proposed embankment along the left bank (looking upstream) of the existing channel (2024-09-05 7:52 AM)

Image 6: 350 excavator continued reinforcing the toe of the proposed embankment along the left bank (looking upstream) of the existing channel (2024-09-05 @ 8:06 AM)

Image 7: 210 excavator continued sorting through excavated materials to build up the proposed embankment (2024-09-05 @ 8:09 AM)

Image 8: 350 excavator was removing fallen trees and reloating rocks to create an access road (2024-09-05 @ 8:31 AM)

Image 9: 210 excavator continued sorting through excavated materials to build up the proposed embankment (2024-09-05 @ 8:41 AM)

Image 10: 350 excavator was reinforcing the toe of the proposed embankment along the left bank (looking upstream) of the existing channel (2024-09-05 @ 9:13 AM)

Image 11: 210 excavator continued sorting through excavated materials to build up the proposed embankment (2024-09-05 @ 9:32 AM)

Image 12: 210 excavator continued sorting through excavated materials to build up the proposed embankment (2024-09-05 @ 10:45 AM)

Image 13: 350 excavator started to widen the right bank of the existing channel to promote water towards the orientation of the proposed channel (2024-09-05 @ 9:45 AM)

Image 14: 350 excavator started to widen the right bank of the existing channel (2024-09-05 @ 10:06 AM)

Image 15: Condition of right bank of the existing channel at 10:34 AM on 2024-09-05

Image 16: 210 excavator continued sorting through excavated materials to build up the proposed embankment (2024-09-05 @ 11:13 AM)

Image 17: 210 excavator continued sorting through excavated materials to build up the proposed embankment. 350 excavator continued to widen the right bank of the existing channel (2024-09-05 @ 11:24 AM)

Image 18: 210 excavator continued sorting through excavated materials to build up the proposed embankment. 350 excavator continued to widen the right bank of the existing channel (2024-09-05 @ 11:42 AM)

Image 19: 210 excavator continued sorting through excavated materials to build up the proposed embankment. 350 excavator continued to widen the right bank of the existing channel (2024-09-05 @ 12:30 PM)

Image 20: 210 excavator continued sorting through excavated materials to build up the proposed embankment. 350 excavator started excavating the proposed channel (2024-09-05 @ 1:23 PM)

Image 21: 210 excavator continued sorting through excavated materials to build up the proposed embankment. 350 excavator continued excavating the proposed channel (2024-09-05 @ 1:49 PM)

Image 22: Existing channel condition at time of departure (2024-09-05 @ 1:53 PM)

Field Review Report Reviewed by:

Signature & Date

Graeme Vass, P.Eng

Name Printed

Field Review

Project:	Poole Creek Channel Realignment		
To:	Squamish-Lillooet Regional District (SLRD)		
From:	Graeme Vass (graeme.vass@stantec.com) |Jason Fan (Jason.Fan@stantec.com)		
Revision:	0	**Contract:**	111700815
Date:	September 06, 2024	**Stantec No.**	111700815
Client:	Mike Fusca (mfusca@slrd.bc.ca)	**Prime:**	Active Mountain Contracting Ltd.

Conditions:

Review Date:	September 06, 2024	**Time:**	7:05 AM PST to 2:20 PM PST
Drawing Ref.:	Emergency response – details provided in this report		
Weather:	Sunny		
Location:	5590816.10 N, 525160.23 m E along original alignment of Place Creek		

Personnel & Equipment:

- Jason Fan (Stantec)
- Niki and Thomas (Environmental and Archaeological Technician from Lil'Wat Nation)
- Vicki (Environmental Technician from Cascade Environmental)
- Tom Rimmer (Contracting Manager from Active Mountain Contracting Ltd.)
- 350 excavator and operator
- 210 excavator and operator

Observations:

Construction Activity:

Place Creek channel realignment work along the original alignment of Place Creek. Excavating proposed channel. Placing excavated materials to build up the proposed embankment. Sorting through excavated materials to stockpile large boulders to be used as riprap protection along the channel bank, and toe of the proposed embankment.

Terminology:

"Proposed Embankment" refers to the proposed earthen berm that will be built parallel to the proposed channel (Dashed purple line in Image 1)

"Proposed Channel" refers to the channel that is being excavated along the original alignment of Place Creek. (Green and red lines in Image 1)

Activities:

- Contractor, Niki, Thomas and Vicki were already on site at 7:05 AM when Stantec arrived.
- 7:00 AM – 9:55 AM: 350 and 210 excavators working together to excavate the proposed channel, and stockpile materials to build up the proposed embankment (images 2, 3, 4 & 5).
- 9:55 AM – 350 excavator was having mechanical issues and temporarily departed the site for further assessment.
- 9:55 AM – 12:00 PM: 210 excavator continued to stockpile excavated materials for the proposed embankment (images 7 & 8).
- 11:15 AM – 350 excavator was still out of service and under assessment/repair (image 9).
- 11:38 AM – 350 excavator went back into operation, and started excavating the proposed channel again (images 10 & 11).
- 12:00 PM – 1:15 PM: 350 and 210 excavators working together to excavate the proposed channel, and stockpile excavated materials to build up the proposed embankment (images 12 & 13).

- 12:30 PM – Tom Rimmer from Active Mountain Contracting Ltd. came to site to check on construction progress. He mentioned a rock truck is arriving next Monday noon (September 9th, 2024), and should be ready on the project site on Tuesday morning (September 10th, 2024).
- Jason temporarily departed from site at around 1:00 PM to attend a meeting.
- Jason came back to site at around 2:00 PM and departed from site at 2:20 PM.

Observations / Issues Noted:

- Vicki discussed with Jason regarding the tentative date for flipping Place Creek back to its original alignment. The date in which Place Creek will be rediverted back to its original alignment is tentatively set for either September 12th, 13th of 2024.
- Vicki would also like to place the logs from the trees felled randomly along the travel surface of the proposed embankment. This creates valuable habitat space for the native wildlife and insects.
- Overall construction progress of proposed channel excavation: 85% complete (see yellow highlighted area in image 1 – note that the drainage notch has not been excavated, and minor refinement is still required for the channel side slopes and depth)
- Overall construction progress of embankment re-establishment: 35% complete (all vegetations/tress have been cleared along its alignment up to the edge of the 30 m perimeter measured from the tree with the potential eagle nest.

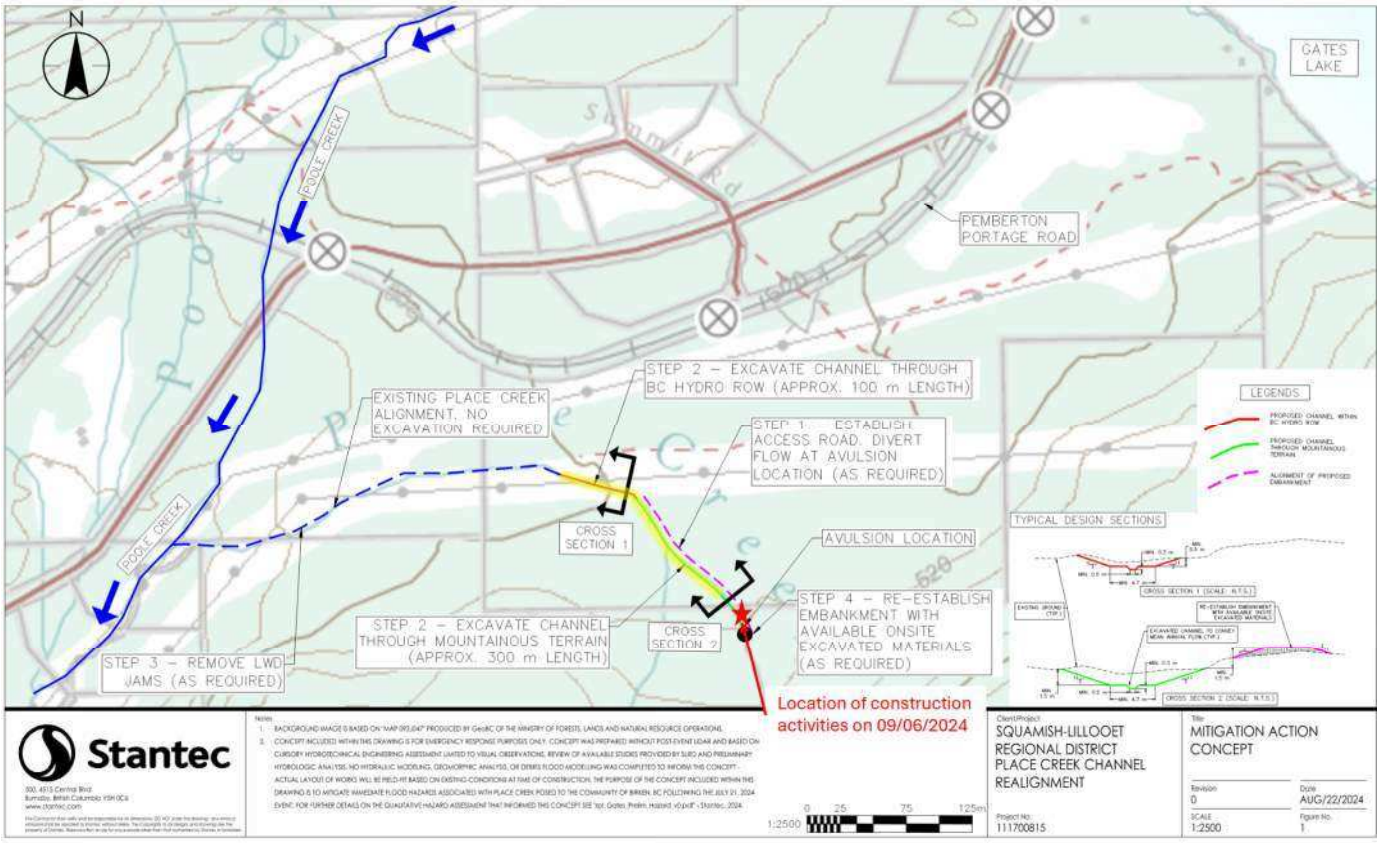


Image 1: Emergency Mitigation Action Concept Plan for the Place Creek Channel Realignment

Image 2: 350 and 210 excavators working together to excavate proposed channel, and stockpile materials to build up the proposed embankment (2024-09-06 7:35 AM)

Image 3: 350 and 210 excavators working together to excavate proposed channel, and stockpile materials to build up the proposed embankment (2024-09-06 @ 8:11 AM)

Image 4: 350 and 210 excavators working together to excavate proposed channel, and stockpile materials to build up the proposed embankment (2024-09-06 8:43 AM)

Image 5: 350 and 210 excavators working together to excavate proposed channel, and stockpile materials to build up the proposed embankment (2024-09-06 9:09 AM)

Image 6: 350 and 210 excavators working together to excavate proposed channel, and stockpile materials to build up the proposed embankment (2024-09-06 @ 9:42 AM)

Image 7: 210 excavator continued to stockpile materials to build up the proposed embankment while 350 excavator was out of service (2024-09-06 @ 10:02 AM)

Image 8: 210 excavator continued to stockpile materials to build up the proposed embankment while 350 excavator was out of service (2024-09-06 @ 11:02 AM)

Image 9: 350 excavator was still out of service and under assesment/repair (2024-09-06 @ 11:14 AM)

Image 10: 350 excavator went back into operation at around 11:38 AM (2024-09-06 @ 11:38 AM)

Image 11: 350 excavator started to excavate the proposed channel after being temporarily out of service from 9:55 AM – 11:38 AM (2024-09-06 @ 11:43 AM)

Image 12: 350 and 210 excavators working together to excavate proposed channel, and stockpile materials to build up the proposed embankment (2024-09-06 @ 12:05 PM)

Image 13: 350 and 210 excavators working together to excavate proposed channel, and stockpile materials to build up the proposed embankment (2024-09-06 @ 12:55 PM)

Field Review Report Reviewed by:

_____

Signature & Date

Graeme Vass, P.Eng

Name Printed

Field Review

Project:	Place Creek Channel Realignment		
To:	Squamish-Lillooet Regional District (SLRD)		
From:	Graeme Vass (graeme.vass@stantec.com) |Duncan McTaggart (duncan.mctaggart@stantec.com)		
Revision:	0	**Contract:**	111700815
Date:	September 10, 2024	**Stantec No.**	111700815
Client:	Mike Fusca (mfusca@slrd.bc.ca)	**Prime:**	Active Mountain Contracting Ltd.

Conditions:

Review Date:	September 09, 2024	**Time:**	6:30 AM PST to 16:00 PM PST
Drawing Ref.:	Emergency response – details provided in this report		
Weather:	Sunny, 25 degrees		
Location:	5590816.10 N, 525160.23 m E along original alignment of Place Creek		

Personnel & Equipment:

- Duncan McTaggart (Stantec)
- Niki (Environmental Technician from Lil'Wat Nation)
- Vicki (Environmental Technician from Cascade Environmental)
-

- 350 excavator and operator
- 210 excavator and operator

Observations:

Construction Activity:

Place Creek channel realignment work along the original alignment of Place Creek. Excavating proposed channel. Placing excavated materials to build up the proposed embankment. Sorting through excavated materials to stockpile large boulders to be used as riprap protection along the channel bank, and toe of the proposed embankment.

Terminology:

"Proposed Embankment" refers to the proposed earthen berm that will be built parallel to the proposed channel (Dashed purple line in Image 1)

"Proposed Channel" refers to the channel that is being excavated along the original alignment of Place Creek. (Green and red lines in Image 1)

Activities:

- Contractor and Niki were already on site at 6:30 AM when Stantec arrived.
- 6:30 – 16:00: 350 excavator removed large boulders from the channel above the diversion point. The boulders that were removed were used to armour the right (east) bank and create a stockpile on the left (west) bank for use elsewhere (images 2-4).
- 6:30 – 16:00: 210 excavator armoured the right (east) bank with large boulders and regraded the left (west) bank. See Images 5-7.
- The haul truck was delivered to the site in the afternoon.

Observations / Issues Noted:

- Overall construction progress of proposed channel excavation: 85% complete. Minor refinement is still required to meet the intended channel side slopes and depth.

- Overall construction progress of embankment re-establishment: 45% complete.

- Armouring of the embankment and channel is progressing well. Large diameter boulders are being used at the bottom and being keyed to a depth equivalent to the D100. These boulders have a b-axis diameter that is generally in the range of 500-1000 mm.

- Based on progress to date and estimate of remaining work, the scheduled date to divert flow is Friday September 13. All instream work may be complete as of the 13th; however, there is a possibility of instream continuing beyond September 15th, which is the end of the instream work window. Therefore, Vicki will draft a memo to notify regulators that there is potential for instream work to continue beyond the instream work window and provide justification.

- Approximately 11 gabion bags have slumped into the drainage ditch just downstream from the edge of the hydro corridor (Image 8). The gabions have retained some of the soil inside and are still providing some degree of erosion and flood protection. Repairs are not recommended at this time, based on current/anticipated flow conditions and timeline for diversion of Place Creek back to the original alignment.

- The gabion bags that were previously repaired remain in stable condition and there has been negligible erosion of the channel bank beside them (Image 9).

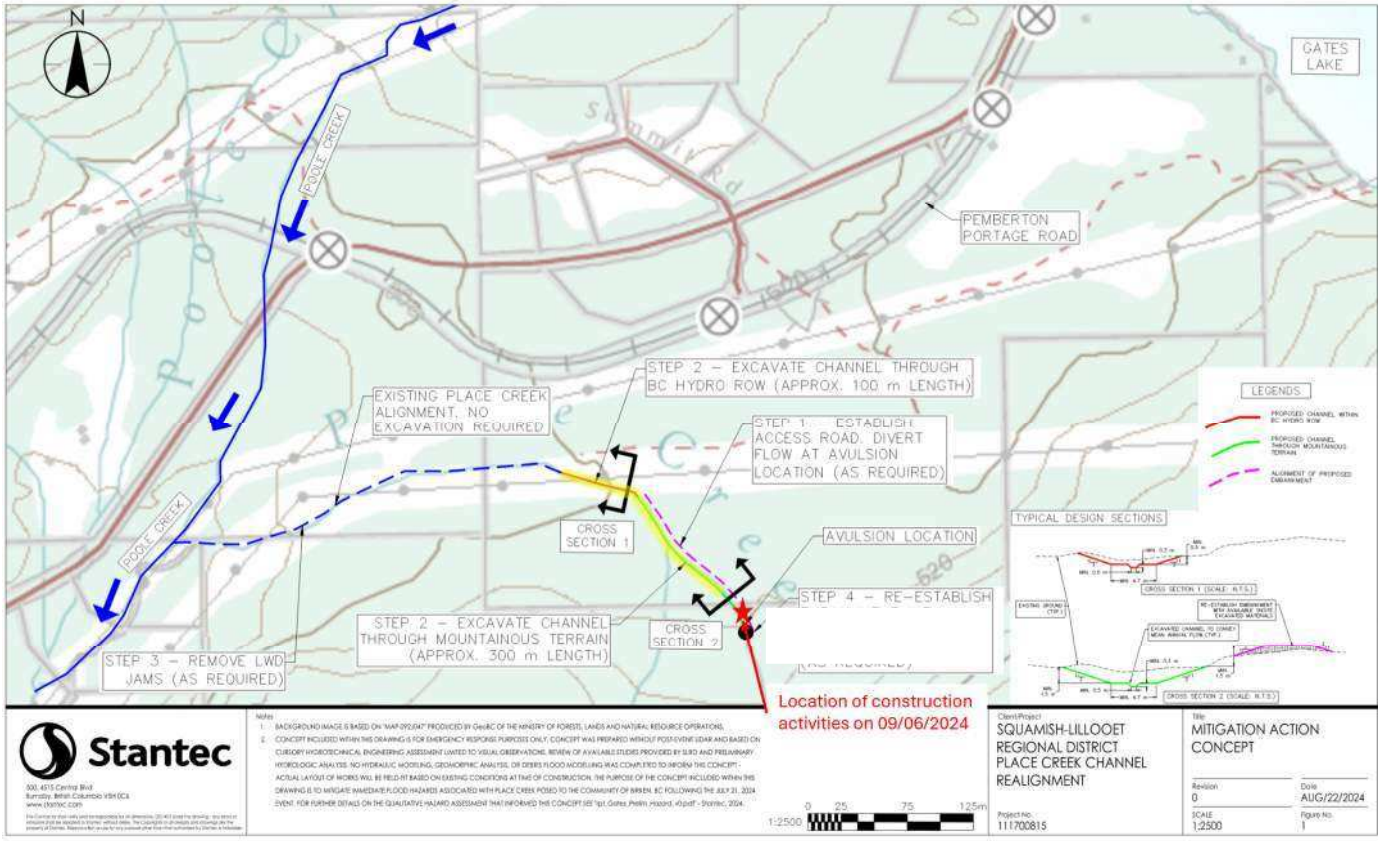


Image 1: Emergency Mitigation Action Concept Plan for the Place Creek Channel Realignment

Image 2: 350 excavator armouring east channel bank above diversion point (2024-09-09 10:09 AM)

Image 3: 350 excavators moving large boulder to prevent flow from impinging on the embankment (2024-09-09 @ 10:04 AM)

Image 4: 350 excavator armouring east bank (2024-09-09 10:18 AM)

Image 5: 210 excavator armouring the east bank of the channel and embankment (2024-09-09 11:02 AM)

Image 6: channel depth measured to be 1.6 m (2024-09-09 @ 11:29 AM)

Image 7: typical size of large boulders at base of channel bank armouring. 1.0 m tape measure for scale. (2024-09-09 @ 12:56 PM)

Image 8: Approximately 11 gabion bags have slumped into the drainage ditch, just downstream of the edge of the hydro corridor. (2024-09-09 @ 3:19 PM)

Image 9: Looking downstream at the previously repared section of gabion bags (2024-09-09 @ 3:21 PM)

Field Review Report Reviewed by:

_____

Signature & Date

Graeme Vass, P.Eng

Name Printed

Field Review

Project:	Place Creek Channel Realignment		
To:	Squamish-Lillooet Regional District (SLRD)		
From:	Graeme Vass (graeme.vass@stantec.com) |Duncan McTaggart (duncan.mctaggart@stantec.com)		
Revision:	0	**Contract:**	111700815
Date:	September 11, 2024	**Stantec No.**	111700815
Client:	Mike Fusca (mfusca@slrd.bc.ca)	**Prime:**	Active Mountain Contracting Ltd.

Conditions:

Review Date:	September 10, 2024	**Time:**	6:30 AM PST to 4:15 PM PST
Drawing Ref.:	Emergency response – details provided in this report		
Weather:	Mix of sun and clouds, 22 degrees		
Location:	5590816.10 N, 525160.23 m E along original alignment of Place Creek		

Personnel & Equipment:

- Duncan McTaggart (Stantec)
- Niki (Environmental Technician from Lil'Wat Nation)

- 350 excavator and operator
- 210 excavator and operator
- 30 ton rock truck

Observations:

Construction Activity:

Place Creek channel realignment work along the original alignment of Place Creek. Excavating proposed channel. Placing excavated materials to build up the proposed embankment. Sorting through excavated materials to stockpile large boulders to be used as riprap protection along the channel bank, and toe of the proposed embankment.

Terminology:

"Proposed Embankment" refers to the proposed earthen berm that will be built parallel to the proposed channel (Dashed purple line in Image 1)

"Proposed Channel" refers to the channel that is being excavated along the original alignment of Place Creek. (Green and red lines in Image 1)

Activities:

- Stantec, Contractor, and Niki met on site at 6:30 AM
- 6:30 – 9:30: 350 excavator loaded boulders from stockpile on left (west) bank into the rock truck. Rock truck hauled boulders down to the right (east) channel bank to armour the embankment (Image 2).
- 9:30 – 16:00: 350 excavator moved material near the diversion to facilitate the transition from the existing to the proposed alignment. Stockpiled finer material to be used higher up on the embankment and moved boulders to armour the lower areas (Image 3).
- 6:30 – 12:00: 210 excavator regraded the channel banks to reduce the side slope (Image 4-6)
- 12:00 – 16:00: 210 excavator embedded boulders along the channel bed to help mitigate channel degradation (i.e., downcutting) once water is diverted (Image 7).

Observations / Issues Noted:

- Overall construction progress of proposed channel excavation: 90% complete. Minor refinement is still required to meet the intended channel side slopes and depth and add boulders along the channel bed (see next bullet).

- Boulders are being added to the channel bed to mitigate against degradation (i.e., downcutting, or lowering of the channel bed) once water begins flowing.

- Overall construction progress of embankment re-establishment: 55% complete.

- Armouring of the embankment and channel is progressing well. Large diameter boulders are being used at the bottom and being keyed to a depth equivalent to the D100. These boulders have a b-axis diameter that is generally in the range of 500-1000 mm.

- Based on progress to date and estimate of remaining work, flow could be diverted as early as Thursday morning, but timing for diversion will be confirmed on Wednesday morning based on updated check on progress. After diverting flow, it's anticipated that several additional days of work will be required to finish the embankment and perform basic restoration activities consisting of salvaged logs placed over the crest of the embankment and access roads.

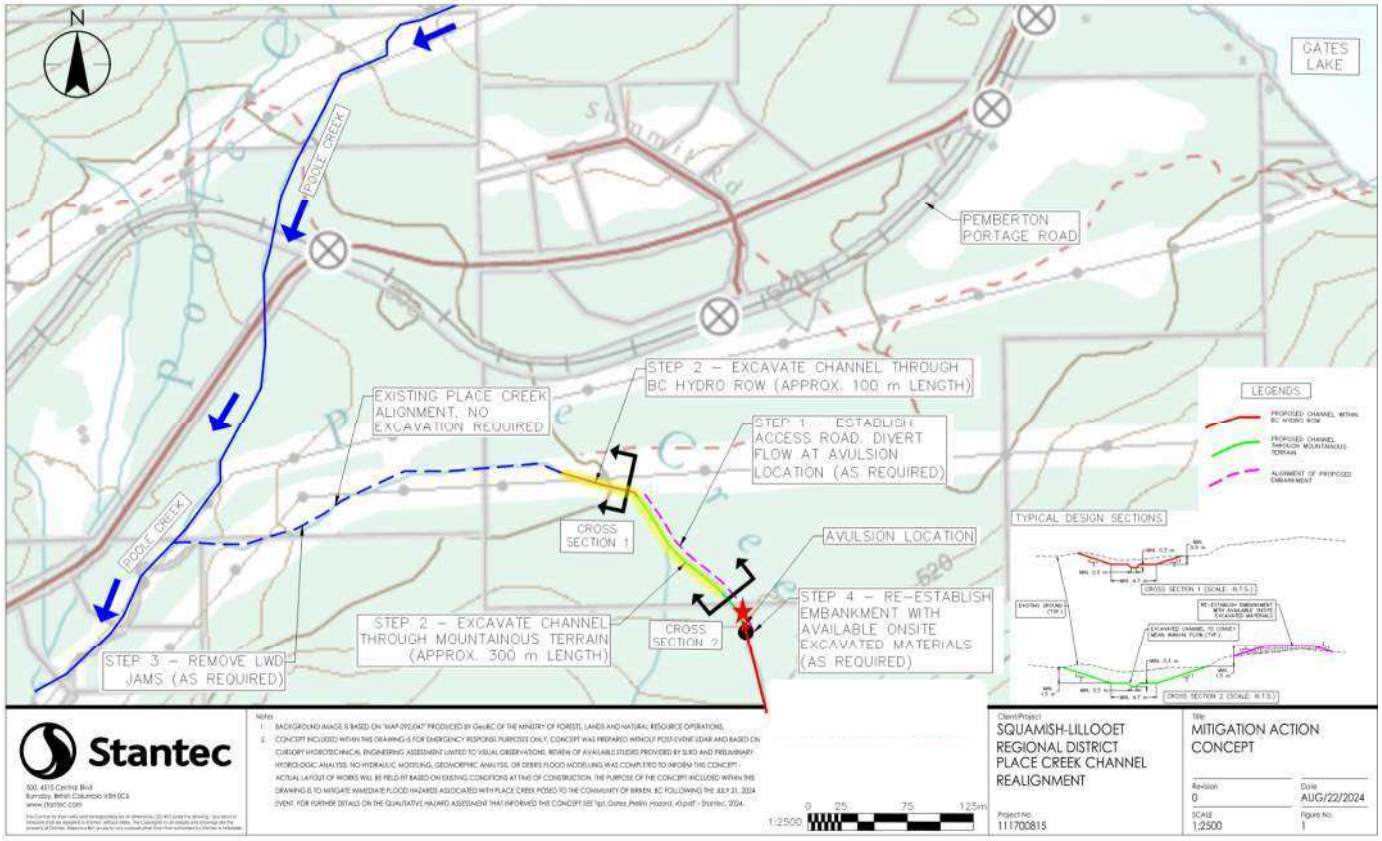


Image 1: Emergency Mitigation Action Concept Plan for the Place Creek Channel Realignment

Image 2: 350 excavator loading rock truck with boulders to be used to armour embankment (2024-09-10 7:44 AM)

Image 3: 350 excavators moving large boulder to prevent flow from impinging on the embankment (2024-09-10 @ 10:41 AM)

Image 4: 210 excavator embedding boulders to protect toe of embankment from erosion (2024-09-10 8:31 AM)

Image 5: 210 excavator regrading channel banks (2024-09-10 7:04 AM)

Image 6: 210 excavator regrading channel banks (2024-09-10 @ 11:32 AM)

Image 7: 210 excavator embedding boulders on bottom of channel. (2024-09-10 @ 2:32 PM)

Field Review Report Reviewed by:

Signature & Date

Graeme Vass, P.Eng

Name Printed

Field Review

Project:	Place Creek Channel Realignment		
To:	Squamish-Lillooet Regional District (SLRD)		
From:	Graeme Vass (graeme.vass@stantec.com) |Duncan McTaggart (duncan.mctaggart@stantec.com)		
Revision:	0	**Contract:**	111700815
Date:	September 12, 2024	**Stantec No.**	111700815
Client:	Mike Fusca (mfusca@slrd.bc.ca)	**Prime:**	Active Mountain Contracting Ltd.

Conditions:

Review Date:	September 11, 2024	**Time:**	6:30 AM to 2:30 PM PST
Drawing Ref.:	Emergency response – details provided in this report		
Weather:	Overcast and light rain throughout the day, 17 degrees		
Location:	5590816.10 N, 525160.23 m E along original alignment of Place Creek		

Personnel & Equipment:

- Duncan McTaggart (Stantec)
- Niki (Environmental Technician from Lil'Wat Nation)
- 350 excavator and operator
- 210 excavator and operator
- 30 ton rock truck

Observations:

Construction Activity:

Place Creek channel realignment work along the original alignment of Place Creek. Excavating proposed channel. Placing excavated materials to build up the proposed embankment. Sorting through excavated materials to stockpile large boulders to be used as riprap protection along the channel bank, and toe of the proposed embankment.

Terminology:

"Proposed Embankment" refers to the proposed earthen berm that will be built parallel to the proposed channel (Dashed purple line in Image 1)

"Proposed Channel" refers to the channel that is being excavated along the original alignment of Place Creek. (Green and red lines in Image 1)

Activities:

- Stantec, Contractor, and Niki met on site at 6:30 AM
- 6:30 – 7:00: Stantec and contractor did a walkthrough of the site to formulate a plan for construction activities to occur today.
- 7:00 – 9:00: the 350 excavator graded, shaped, and compacted the fill material that had been dumped previously by the rock truck to form the embankment at the downstream end (Image 2).
- 7:00 – 9:00: the 210 excavator moved material out of forested areas and onto the embankment near the middle of the site (Image 3).
- 9:00 – 14:00: the 350 excavator worked on the proposed diversion point by embedding boulders along the toe of the embankment and staging material to be used to block the existing channel (Image 4-6).
- 9:00 – 14:30: the 210 excavator loaded surplus material from the left (west) channel bank into the rock truck, which was hauled down to the lower end of the site to build up the embankment (Image 7).

Observations / Issues Noted:

- Overall construction progress of proposed channel excavation: 95% complete.
- Overall construction progress of embankment re-establishment: 65% complete.
- Additional boulders will be added to the channel bank and toe of the embankment to further enhance the erosion protection.
- The work is on schedule to divert flow on Friday September 13.
- Since Monday There has been no discernable change to the condition of the gabion bags and other emergency flood mitigation measures near Gates Lake.
- If time permits prior to the diversion, more material will be hauled from left (east) bank to be used to build up the embankment.
- BC Hydro has begun felling trees in the more norther of the two hydro corridors. This work is not expected to interfere with the ongoing construction for the Place Creek diversion.

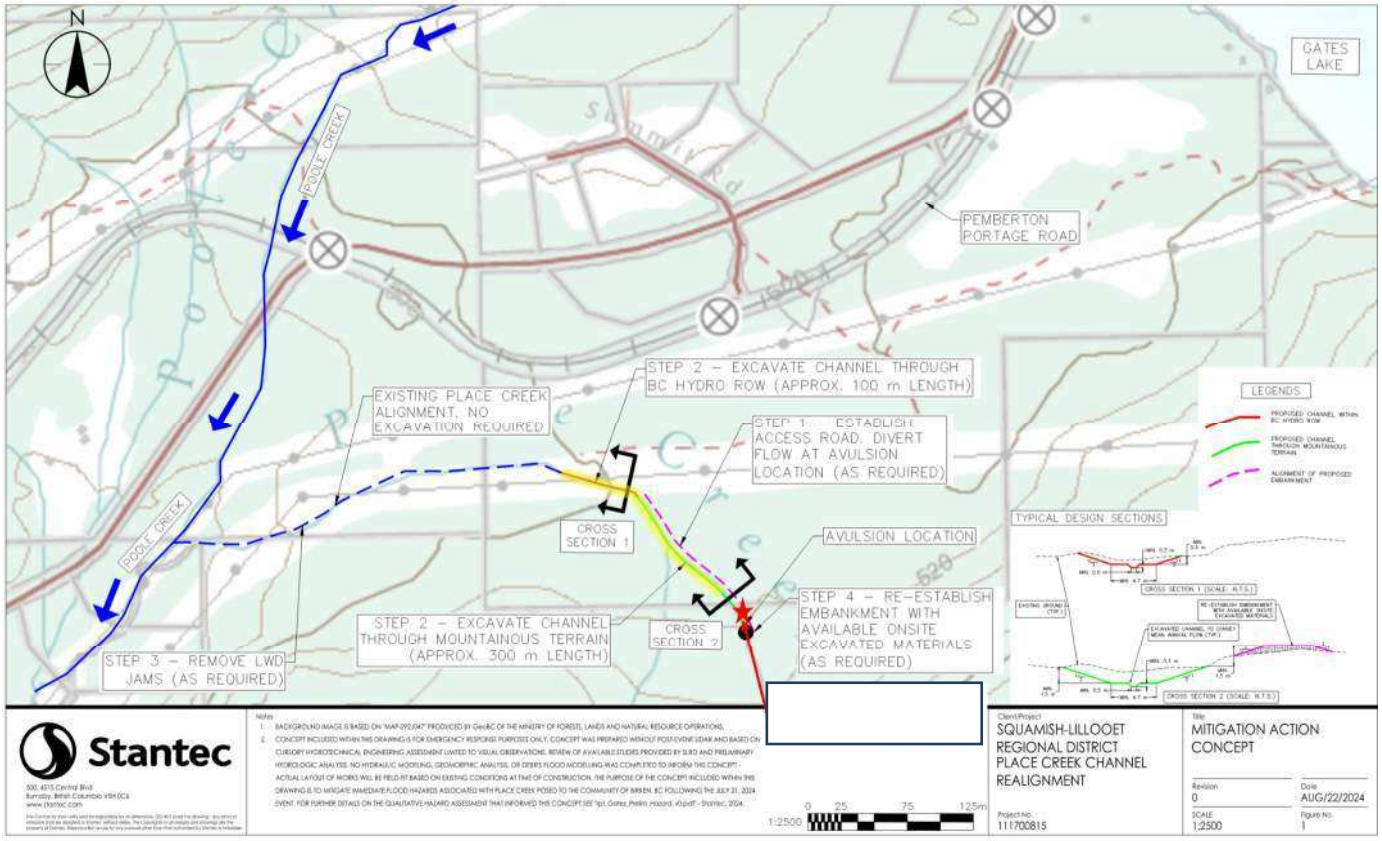


Image 1: Emergency Mitigation Action Concept Plan for the Place Creek Channel Realignment

Image 2: material dumped by rock truck prior to being shaped and compacted (2024-09-11 6:55 AM)

Image 3: 210 excavators moving material to be used on embankment (2024-09-11 @ 9:21 AM)

Image 4: 350 excavator working on the diversion point (2024-09-11 12:47 AM)

Image 5: diversion point circled in blue (2024-09-11 11:43 AM)

Image 6: embankment immediately downstream of diversion point (2024-09-11 @ 2:28 PM)

Image 7: 210 excavator loading rock truck with material for embankment at the downstream end of the site (2024-09-11 @ 2:06 PM)

Field Review Report Reviewed by:

Signature & Date

Graeme Vass, P.Eng

Name Printed

Field Review

Project:	Place Creek Channel Realignment		
To:	Squamish-Lillooet Regional District (SLRD)		
From:	Graeme Vass (graeme.vass@stantec.com) |Duncan McTaggart (duncan.mctaggart@stantec.com)		
Revision:	0	**Contract:**	111700815
Date:	September 12, 2024	**Stantec No.**	111700815
Client:	Mike Fusca (mfusca@slrd.bc.ca)	**Prime:**	Active Mountain Contracting Ltd.

Conditions:

Review Date:	September 12, 2024	**Time:**	6:30 AM to 2:30 PM PST
Drawing Ref.:	Emergency response – details provided in this report		
Weather:	Mainly sunny, 17-24 degrees		
Location:	5590816.10 N, 525160.23 m E along original alignment of Place Creek		

Personnel & Equipment:

- Duncan McTaggart (Stantec)
- Niki (Environmental Technician from Lil'Wat Nation)

- 350 excavator and operator
- 210 excavator and operator
- 30 ton rock truck

Observations:

Construction Activity:

Place Creek channel realignment work along the original alignment of Place Creek. Performing final grading of the proposed channel. Placing excavated materials to build up the proposed embankment. Sorting through excavated materials to stockpile large boulders to be used as riprap protection along the channel bank, and toe of the proposed embankment.

Terminology:

"Proposed Embankment" refers to the proposed earthen berm that will be built parallel to the proposed channel (Dashed purple line in Image 1)

"Proposed Channel" refers to the channel that is being excavated along the original alignment of Place Creek. (Green and red lines in Image 1)

Activities:

- Contractor, Duncan and Niki met on site at 6:30 AM
- 6:30 – 13:00: the 350 excavator removed material from the left (west) channel bank upstream of the proposed diversion point and loaded it into the rock truck (Image 2). The rock truck hauled the material down to build up the embankment (Image 6).
- 6:30 – 16:00: the 210 excavator added boulders to the channel bed and right (east) bank to armour it and help protect against erosion of the embankment (Image 3-5).
- 13:00 – 15:00: the 350 excavator worked on refining diversion point to prepare it for the flow change to occur tomorrow.
- 15:00 – 16:00: the 350 excavator cut a notch in the center of the channel from the diversion point to mid-way down the constructed channel. The purpose being to concentrate flows in the center of the channel and away from the embankment when the flow is diverted (Image 7).
- All worked finished for the day at 16:00.

Observations / Issues Noted:

- Overall construction progress of proposed channel excavation: 95% complete.
- Overall construction progress of embankment re-establishment: 75% complete.
- There was not sufficient time to add boulders to the entire channel bed for armouring and achieve the Sept 15, 2024 re-activation date requested by environmental professionals associated with the project. Therefore the steeper sections of the channel were prioritized. Armouring the channel bed with boulders was not included within the original concept and it was anticipated that the channel will incise and laterally shift through the debris flood material when flow is conveyed.
- The work is on schedule to divert flow on Friday September 13 at the start of the day. Lil'wat First Nation and Cascade Environmental are aware and will be on site to monitor conditions and perform a fish salvage.
- After flow is diverted it will not be possible to source any more material from the left (west) channel bank, as this would requiring tracking equipment through the wetted channel. Therefore, as much material as possible was hauled across prior to the diversion.
- The embankment still needs to be raised higher and armoured upstream of the diversion point. This work will occur after the diversion occurs on Friday to avoid tracking through the wetted channel.
- After flow is diverted, the gabion bags that were placed during the initial emergency response to protect 9201 Pemberton Portage Rd and other adjacent properties should be removed and the fill material used to backfill the ditch. The gabion bags can potentially be salvaged for reuse but would be labour intensive to dismantle in a manner that would facilitate reuse. Alternatively the gabion bags can be disposed of, in which case hauling and landfill tipping fees should be anticipated.

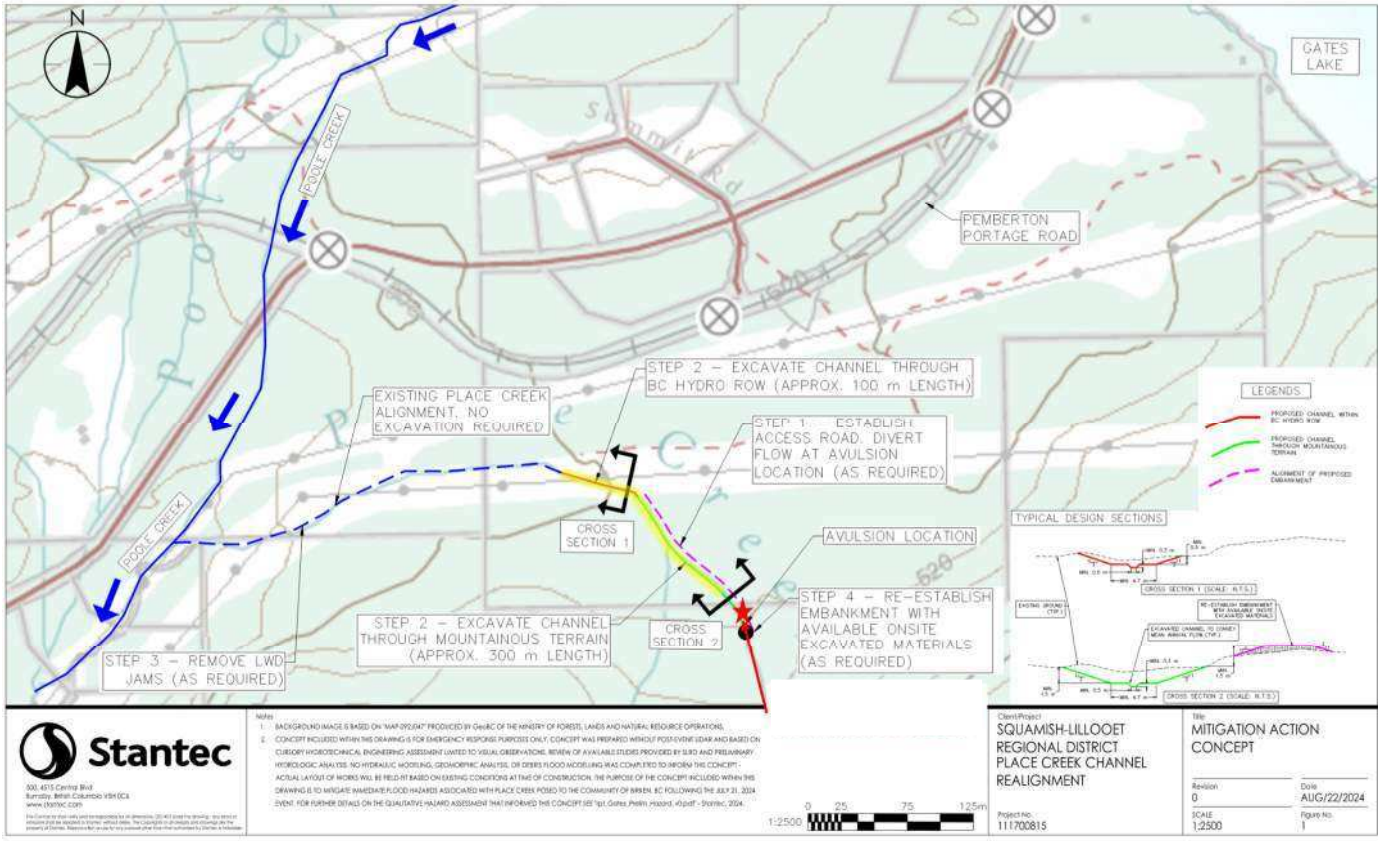


Image 1: Emergency Mitigation Action Concept Plan for the Place Creek Channel Realignment

Image 2: 310 excavator removing surplus material from left (west) channel bank to be used to build the embankment (2024-09-12 8:43 AM)

Image 3: 210 excavator adding boulders to channel bed (2024-09-12 @ 6:56 AM)

Image 4: 210 excavator adding boulders to channel bed (2024-09-12 @ 9:02 AM)

Image 5: 210 excavator adding boulders to channel bed (2024-09-12 @ 10:19 AM)

Image 6: rock truck hauling material for embankment (2024-09-12 @ 1:55 PM)

Image 7: 350 excavator cutting a notch in the center of the channel (2024-09-12 @ 2:26 PM)

Field Review Report Reviewed by:

Signature & Date

Graeme Vass, P.Eng

Name Printed

Field Review

Project:	Place Creek Channel Realignment		
To:	Squamish-Lillooet Regional District (SLRD)		
From:	Graeme Vass (graeme.vass@stantec.com) |Duncan McTaggart (duncan.mctaggart@stantec.com)		
Revision:	0	**Contract:**	111700815
Date:	September 16, 2024	**Stantec No.**	111700815
Client:	Mike Fusca (mfusca@slrd.bc.ca)	**Prime:**	Active Mountain Contracting Ltd.

Conditions:

Review Date:	September 13, 2024	**Time:**	6:30 AM to 15:00 PM PST
Drawing Ref.:	Emergency response – details provided in this report		
Weather:	Mix of sun and cloud, 13-19 degrees		
Location:	5590816.10 N, 525160.23 m E along original alignment of Place Creek		

Personnel & Equipment:

- Duncan McTaggart (Stantec)
- Graeme Vass (Stantec)
- Niki (Environmental Technician from Lil'Wat Nation)
- Vicki (Cascade Environmental)
- 3x environmental technicians (Cascade Environmental)
- 350 excavator and operator
- 210 excavator and operator
- 30 ton rock truck

Observations:

Construction Activity:

Place Creek channel realignment work along the original alignment of Place Creek. Performing final grading of the proposed channel. Placing excavated materials to build up the proposed embankment. Sorting through excavated materials to stockpile large boulders to be used as riprap protection along the channel bank, and toe of the proposed embankment.

Terminology:

"Proposed Embankment" refers to the proposed earthen berm that will be built parallel to the proposed channel (Dashed purple line in Image 1)

"Proposed Channel" refers to the channel that is being excavated along the original alignment of Place Creek. (Green and red lines in Image 1)

Activities:

- Contractor, Niki, Stantec, and Cascade Environmental met on site at 6:30 AM
- 6:30 – 7:00: Stantec and Cascade Environmental reviewed the site and made plans for diversion.
- 6:30 – 7:00: the 350 and 250 excavator added boulders to the right (east) channel bank, occasionally utilizing the rock truck as necessary.
- 7:00 – 9:45: the 350 excavator began removing material to divert flow into the channel that had been re-established (Image 2-6). Flow was slowly introduced into the excavated channel and gradually ramped up during this time period until all flow was conveyed through the excavated channel.
- 9:45 – 15:30: the 350 excavator blocked off the former channel, armoured the bank with boulders, and built up the embankment along the diversion point (Image 7-9).

- 6:30 – 15:30: the 210 excavator added boulders to the right (east) bank to armour it and help protect against erosion of the embankment (Image 10). The 210 excavator also loaded stockpiled material into the rock truck, which was used to haul it down and build up the embankment. The 210 excavator graded the material dumped by the rock truck to create a compacted embankment with 4 m wide top width.
- All worked finished for the day at 15:30.

Observations / Issues Noted:

- Overall construction progress of proposed channel excavation: 100% complete.
- Overall construction progress of embankment re-establishment: 75% complete.
- Flow was diverted into the reestablished channel in several stages – approximately 30%, 60%, and 100%, with approximately 30 minutes between each increase.
- After activating flow into the reestablished channel the fine material (sand, silt) was rapidly eroded away and transported downstream as suspended load, exposing courser material as anticipated. The exposed gravels and cobbles were transported downstream as bed load, but were generally not transported out of the constructed section of channel. At the current discharge the gravels and cobbles were observed to be depositing mainly in the middle (longitudinally) of the constructed reach, causing the channel to aggrade (i.e., increase in bed elevation). At higher discharges that occur in the future it is expected that considerable sediment transport will occur.
- Flow in the drainage ditch that was constructed as part of the initial emergency response was considerably reduced after the diversion (Image 10). However, there is still a small amount of flow and this is attributed to groundwater upwelling. The flow in the drainage ditch may go down in the coming days or weeks as the ground becomes desaturated now that the diversion has occurred. It's unlikely that flow will cease entirely. Therefore, backfilling of the drainage channel may produce some turbidity as water flows towards Gates Lake. As well, due to the amount of sediment transported by erosional processes and deposited into Gates Lake, there will not be sufficient material to reestablish the ground surface to match the pre-flood grade. Seeding the area to establish a vegetative cover may help to reduce erosion. A seed mix should be prescribed by a professional biologist. Considering the location within the BC Hydro right-of-way trees and shrubs should likely not be planted.
- As indicated in Sept. 12, 2024 inspection report the embankment still needs to be raised higher and armoured upstream of the diversion point. This work can begin on Monday, Sept. 16 now that the diversion is complete. Most of the stockpiled material has been utilized to establish the embankment. Thus, it will take some time to source new material on site to construct the remaining section of embankment.

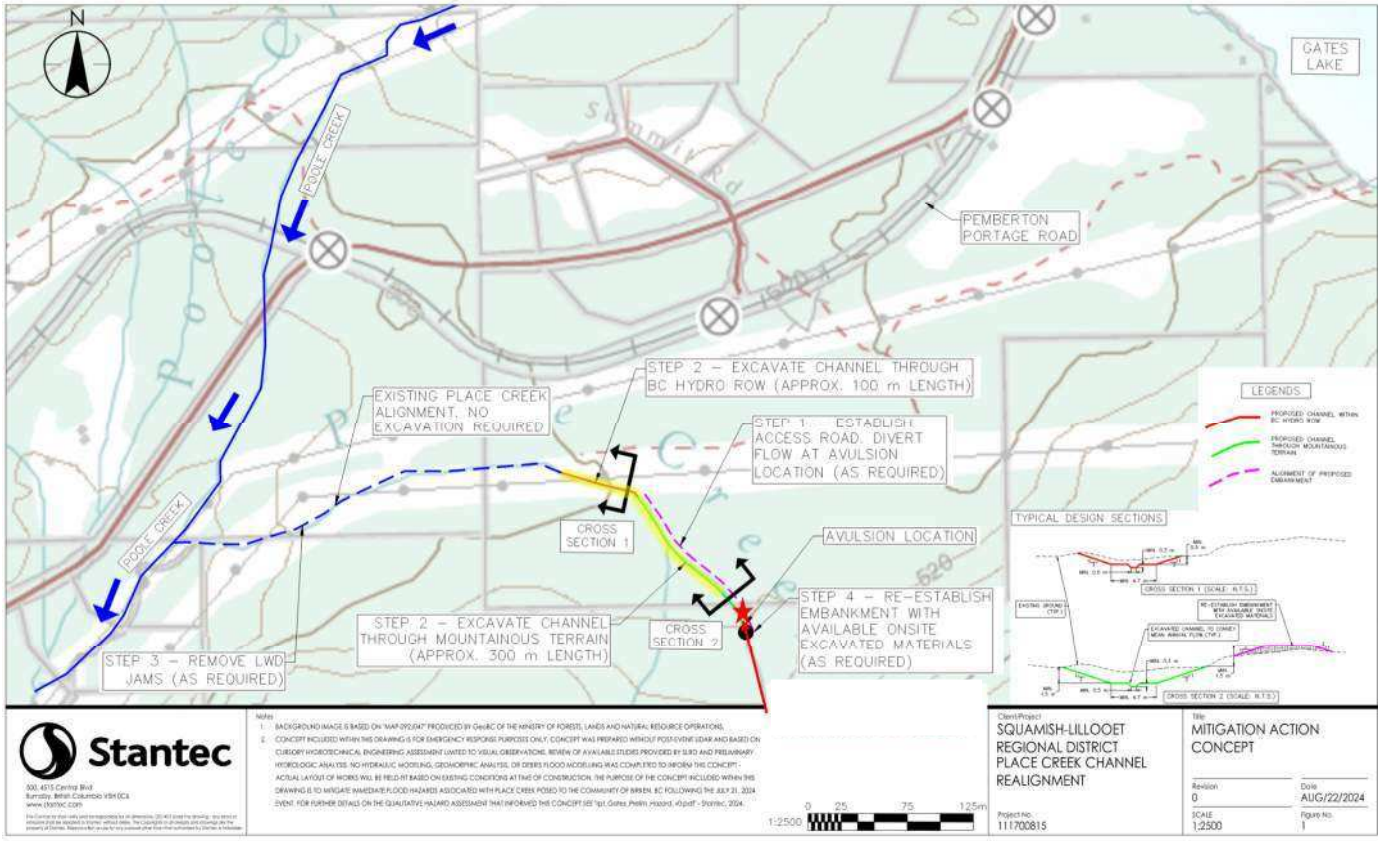


Image 1: Emergency Mitigation Action Concept Plan for the Place Creek Channel Realignment

Image 2: 310 excavator removing material to begin diverting flow into the reestablished channel (2024-09-13 7:45 AM)

Image 3: Water in Place Creek beginning to flow into the reestablished channel (2024-09-13 @ 8:03 AM)

Image 4: water in Place Creek flowing through the notch in the centre of the reestablished channel (2024-09-13 @ 8:08 AM)

Image 5: 350 excavator adding boulders to the channel bank at the diversion point (2024-09-13 @ 8:44 AM)

Image 6: 350 excavator adding boulders to channel bank, while approximately 75% of flow is diverted (2024-09-13 @ 9:16 AM)

Image 7: 350 excavator blocking off the former channel with 100% flow in the reestablished channel (2024-09-13 @ 9:53 AM)

Image 8: Looking upstream at former channel with very little flow after diversion (2024-09-13 @ 9:46 AM)

Image 9: 350 excavator grading the embankment near the diversion point after all flow has been diverted (2024-09-13 @ 12:14 PM)

Image 10: 210 excavator adding boudlers to the channel bank (2024-09-13 @ 2:32 PM)

Image 11: erosion at the toe of the bank causing 1 boulder settle into the channel (2024-09-13 @ 9:59 AM)

Image 10: ditch constructed as part of the early emergency works (2024-09-13 @ 11:59 AM)

Image 11: Flow in the reestablished channel beneath the hydro corridor after diverting flow (2024-09-13 @ 2:49 PM)

Field Review Report Reviewed by:

Signature & Date

Graeme Vass, P.Eng

Name Printed

Field Review

Project:	Place Creek Channel Realignment		
To:	Squamish-Lillooet Regional District (SLRD)		
From:	Graeme Vass (graeme.vass@stantec.com) |Duncan McTaggart (duncan.mctaggart@stantec.com)		
Revision:	0	**Contract:**	111700815
Date:	September 18, 2024	**Stantec No.**	111700815
Client:	Mike Fusca (mfusca@slrd.bc.ca)	**Prime:**	Active Mountain Contracting Ltd.

Conditions:

Review Date:	September 16, 2024	**Time:**	9:00 AM to 16:00 PM PST
Drawing Ref.:	Emergency response – details provided in this report		
Weather:	Mainly sunny, ~17 degrees		
Location:	5590816.10 N, 525160.23 m E along original alignment of Place Creek		

Personnel & Equipment:

- Duncan McTaggart (Stantec)
- 350 excavator and operator
- 210 excavator and operator
- 30 ton rock truck

Observations:

Construction Activity:

Place Creek channel realignment work along the original alignment of Place Creek. Clearing access and constructing embankment upstream of the diversion point. Continuing to construct the embanking downstream of the diversion and adding boulders to the channel bank for erosion protection.

Terminology:

“Proposed Embankment” refers to the proposed earthen berm that will be built parallel to the proposed channel (Dashed purple line in Image 1)

“Proposed Channel” refers to the channel that is being excavated along the original alignment of Place Creek. (Green and red lines in Image 1)

Activities:

- Contractor was already on site at 9:00 AM when Stantec arrived.
- 9:00 – 15:30: the 350 cleared access to reach the upstream end of the proposed embankment (Image 2-3). Once complete, the 350 excavator was used to stockpile material for the embankment upstream of the diversion.
- 9:00 – 15:30: the 210 excavator and rock truck worked in tandem to raise the elevation of the embankment downstream of the diversion point. Stockpiled boulders were also added to the channel bank for erosion protection in locations identified by Stantec (Image 4-5).
- 15:30 – 16:00: equipment mobilized back staging area at hydro corridor for refueling and daily debrief with Stantec.

Observations / Issues Noted:

- Overall construction progress of proposed channel excavation: 100% complete.
- Overall construction progress of embankment re-establishment: 85% complete.
- The region received rainfall on Saturday which increased the discharge in Place Creek. This caused more erosion and downcutting of the channel bed material along the constructed reach. Much of the cobble-sized material on the channel bed was transported out of the steeper areas and deposited downstream in the hydro corridor (Image 6-9). Sediment erosion and deposition of this nature is expected as the channel continues to adjust, especially during higher flows. Several large boulders from the bank armouring were undermined and shifted into the creek. Minor adjustments can be made tomorrow when Cascade Environmental is on site to supervise instream works. Overall the reestablished channel is performing well and as intended.
- Turbidity in the creek was back to baseline conditions (based on visual observations).
- Groundwater is still seeping into the drainage ditch that was constructed as part of the initial emergency response (Image 10). This may create turbidity when backfilling the ditch. Flow management or sediment control measure may need to be considered to complete this work.

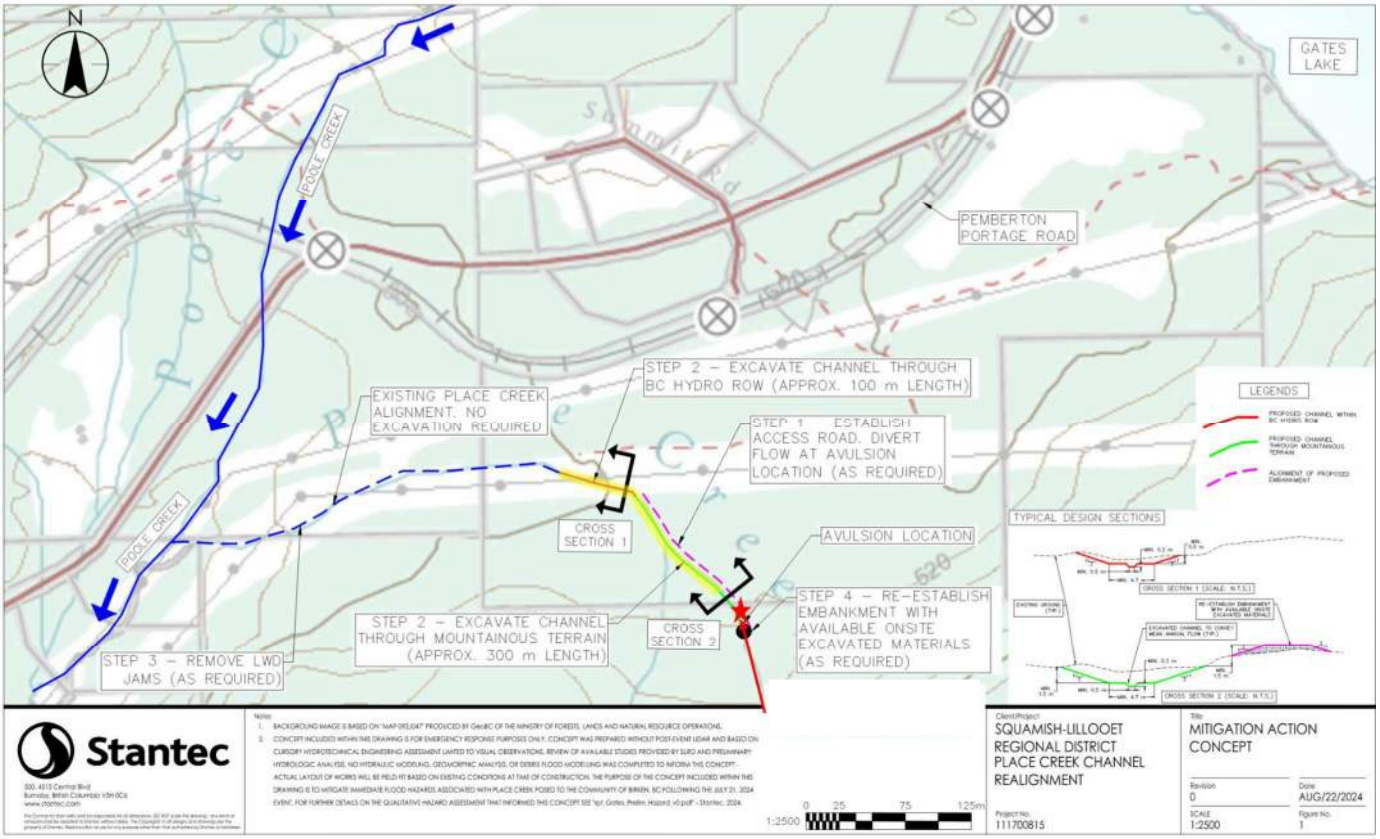


Image 1: Emergency Mitigation Action Concept Plan for the Place Creek Channel Realignment

Image 2: 350 excavator moving fallen trees to establish access to construct the embankment (2024-09-16 9:24 AM)

Image 3: access route to construct embankment upstream of diversion point (2024-09-16 @ 3:56 PM)

Image 4: 210 excavator working on the embankment downstream of the diversion point. (2024-09-16 @ 1:22 PM)

Image 5: 210 excavator adding boulders to the channel bank (2024-09-16 @ 1:45 PM)

Image 6: Channel bank armouring in this area not impacted by higher flows over the weekend (2024-09-13 @ 9:16 AM)

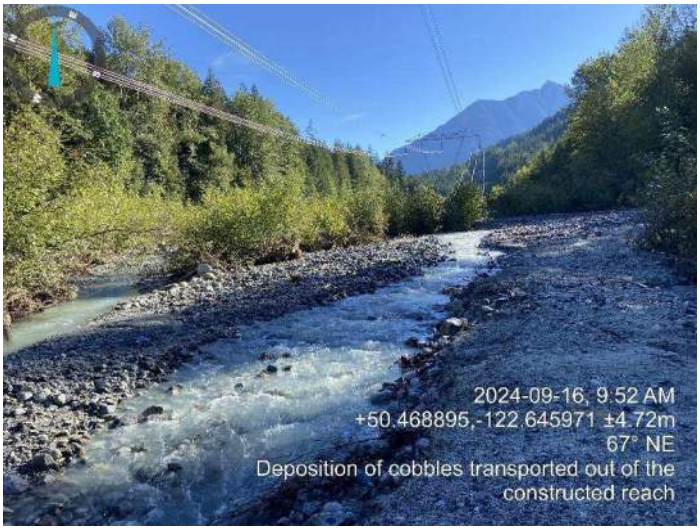


Image 7: deposition of cobble sized material in the hydro corridor (2024-09-16 @ 9:52 AM)

Image 8: Exposed roots and vertical banks are evidence of channel downcutting after higher flows over weekend (2024-09-16 @ 9:08 AM)

Image 9: Exposed roots and vertical banks are evidence of channel downcutting after higher flows over weekend (2024-09-16 @ 3:58 PM)

Image 10: Low flow from groundwater seepage in the diversion ditch (2024-09-16 @ 15:38 AM)

Field Review Report Reviewed by:

_____

Signature & Date

Graeme Vass, P.Eng

Name Printed

Field Review

Project:	Place Creek Channel Realignment		
To:	Squamish-Lillooet Regional District (SLRD)		
From:	Graeme Vass (graeme.vass@stantec.com) |Duncan McTaggart (duncan.mctaggart@stantec.com)		
Revision:	0	**Contract:**	111700815
Date:	October 11, 2024	**Stantec No.**	111700815
Client:	Mike Fusca (mfusca@slrd.bc.ca)	**Prime:**	Active Mountain Contracting Ltd.

Conditions:

Review Date:	September 23, 2024	**Time:**	8:00 AM to 01:00 PM PST
Drawing Ref.:	Emergency response – details provided in this report		
Weather:	Mainly sunny, ~15 degrees		
Location:	5590816.10 N, 525160.23 m E along original alignment of Place Creek		

Personnel & Equipment:

- Graeme Vass (Stantec)
- Vicki Legris (Cascade Environmental Ltd)
- Bobcat and operator
- 210 excavator and operator
- Laborer

Observations:

Construction Activity:

Construction associated with realignment of the Place Creek channel complete. Work to remove the emergency protection works (gabion baskets and berms) ongoing.

Activities:

- Stantec, Contractor, and Cascade arrived onsite for 8:00AM.
- 8:00AM – 10:AM: Contractor filled in the upstream extent of the emergency ditch with emergency berm material (Image 1). The portion of the emergency ditch that extended from the flood channel across the BC Hydro ROW was plugged with emergency berm material (Image 2). Contractor worked their way downstream from this location removing the emergency berm by either backfilling into the emergency ditch (Image 3) (into areas that weren't conveying groundwater flow) or spreading across the access road (Image 4)
- 10:AM – 1:00PM Contractor removed emergency gabions from bank of emergency ditch working their way downstream towards the outlet into Gates Lake (Image 5).
- 01:00PM – Stantec left site

Observations / Issues Noted:

- Overall construction progress of proposed channel excavation: 100% complete.
- Overall construction progress of embankment re-establishment: 100% complete.
- Overall construction progress of emergency works removal: 30%.
- Groundwater is seeping into the emergency drainage ditch. Cascade requested emergency berm material not be placed into the groundwater flow captured within the emergency ditch.

Image 1: Upstream extent of emergency ditch filled in with emergency bank material (looking west)(2024-09-23)

Image 2: upstream extent of emergency ditch that extended across BC Hydro ROW tying into flood channel plugged with emergency bank material (looking south) (2024-09-23)

Image 3: Emergency berm removed with material infilling emergency ditch (looking east) (2024-09-23)

Image 4: Emergency berm removed with material placed over access road (looking west) (2024-09-23)

Image 5: Removing emergency gabion baskets (2024-09-23)

Field Review Report Reviewed by:

2024-10-11

Signature & Date

Graeme Vass, P.Eng

Name Printed

Field Review

Project:	Place Creek Channel Realignment		
To:	Squamish-Lillooet Regional District (SLRD)		
From:	Graeme Vass (graeme.vass@stantec.com) |Duncan McTaggart (duncan.mctaggart@stantec.com)		
Revision:	0	**Contract:**	111700815
Date:	October 11, 2024	**Stantec No.**	111700815
Client:	Mike Fusca (mfusca@slrd.bc.ca)	**Prime:**	Active Mountain Contracting Ltd.

Conditions:

Review Date:	September 25, 2024	**Time:**	11:00 AM to 03:00 PM PST
Drawing Ref.:	Emergency response – details provided in this report		
Weather:	Heavy rain, ~12 degrees		
Location:	5590816.10 N, 525160.23 m E along original alignment of Place Creek		

Personnel & Equipment:

- Graeme Vass (Stantec)
- 210 excavator and operator

Observations:

Construction Activity:

Construction associated with realignment of the Place Creek channel complete. Work to remove the emergency protection works (gabion baskets and berms) ongoing.

Activities:

- Stantec arrived onsite at 11 AM, Contractor not onsite. Contractor arrived onsite 12:30PM.
- 12:30PM – 03:00PM: Emergency gabion baskets had been removed; however, fill material had been left piled along the emergency ditch top of bank (Image 1). Stantec noted to Contractor that the piled fill should be either backfilled into the emergency ditch (along portions that were not conveying groundwater flow) or along the access road. Contractor removed emergency gabion baskets from around the BC Hydro tower (Image 2 and 3).
- 03:00PM – Stantec left site (Image 4). Contractor confirmed to Stantec on Sept 26 that piled fill had been addressed.

Observations / Issues Noted:

- Overall construction progress of proposed channel excavation: 100% complete.
- Overall construction progress of embankment re-establishment: 100% complete.
- Overall construction progress of emergency works removal: 100%.
- Groundwater is seeping into the emergency drainage ditch. Cascade requested emergency berm material not be placed into the groundwater flow captured within the emergency ditch.
- Approx. 50 m long portion of emergency berm left in place as disturbing it would introduce large amounts of sediment into the groundwater flow being conveyed through the drainage ditch (Image 4).

Image 1: Fill from gabion baskets left piled along emergency ditch top of bank (looking west)(2024-09-25)

Image 2: BC Hydro tower prior to gabion basket removal (looking east) (2024-09-25)

Image 3: BC Hydro tower following removal of gabion baskets (looking south) (2024-09-25)

Image 4: Ongoing removal of piled fill at time of Stantec departure from site (looking east) (2024-09-25)

Image 5: Portion of emergency berm left in place (looking west) (2024-09-25)

Field Review Report Reviewed by:

2024-10-11

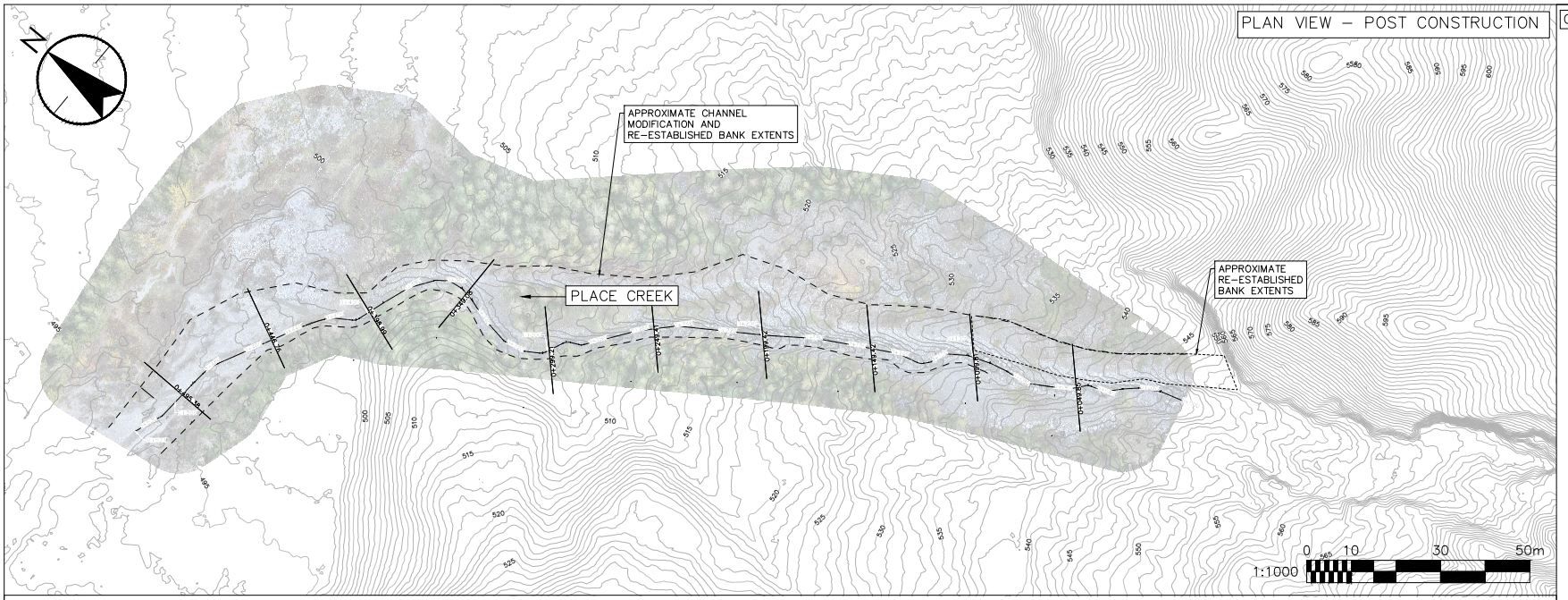
Signature & Date

Graeme Vass, P.Eng

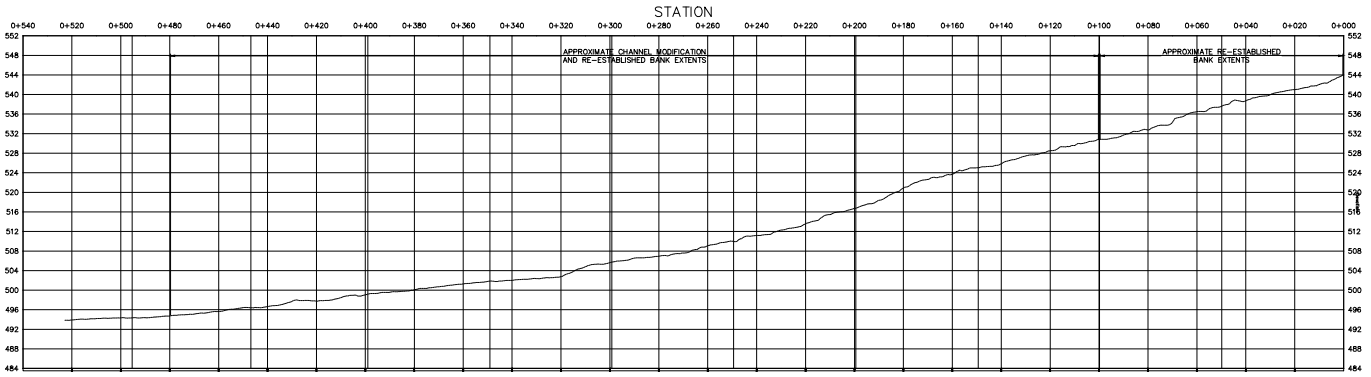
Name Printed

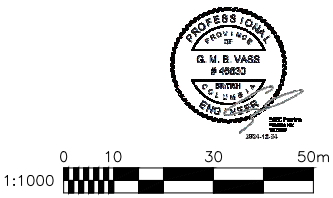
Appendix C Record Drawings

PLAN VIEW – POST CONSTRUCTION



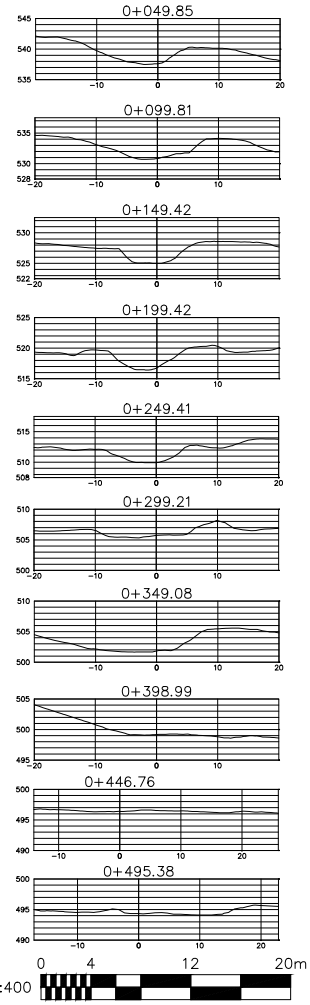
PROFILE VIEW – POST-CONSTRUCTION





0 10 30 50m
1:1000

CROSS SECTIONS – POST-CONSTRUCTION



Stantec

500, 4515 Central Blvd
Burnaby, British Columbia V5H 0C6
www.stantec.com

Notes

1. POST-CONSTRUCTION SURFACE IS BASED ON OCT. 13, 2024 LIDAR COLLECTED BY ALPINE SOLUTIONS AVALANCHE SERVICES. BACKGROUND IMAGE COLLECTED ON NOV. 7, 2024 AND PROVIDED BY ALPINE SOLUTIONS AVALANCHE SERVICES. PRE-CONSTRUCTION AND PRE-DEBRIS FLOOD EVENT SURVEY/SURFACE INFORMATION WAS NOT AVAILABLE.
2. THE PURPOSE OF THE CHANNEL MODIFICATION AND RE-ESTABLISHED EMBANKMENT WAS TO ALLEVIATE THE IMMEDIATE DEBRIS FLOOD AND FLOOD HAZARDS POSED TO THE PROPERTIES AROUND GATES LAKE AND PORTION OF GATES RIVER IMMEDIATELY DOWNSTREAM OF GATES LAKE PRIOR TO THE IMMINENT EXTREME RAINFALL EVENTS GENERALLY EXPERIENCED IN THE FALL.THE CHANNEL MODIFICATIONS ARE DEEMED "EMERGENCY RESPONSE MEASURES"; AS SUCH, NO DESIGN LIFE OR DESIGN FLOW IS ASSOCIATED WITH THE CHANNEL MODIFICATIONS. DUE TO THE LOCATION, PHYSIOGRAPHY, AND GEOGRAPHY PLACE CREEK WILL LIKELY CONTINUE TO BE PRONE TO AVULSION AND LATERAL MIGRATION WITHOUT IMPLEMENTATION OF AN ENGINEER DESIGNED STRUCTURE THAT COULD PROVIDE LONG-TERM PROTECTION FROM DEBRIS FLOOD AND DEBRIS FLOW EVENTS.
3. 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.
4. ALL DIMENSIONS AND ELEVATIONS ARE IN METERS IF NOT OTHERWISE INDICATED. HORIZONTAL DATUM IS NAD83 (CSRS) Zone 10N. VERTICAL DATUM IS CGVD2013 (CGG2013a).

Client/Project
SQUAMISH-LILLOOET REGIONAL DISTRICT
PLACE CREEK CHANNEL REALIGNMENT

Project No.
111700815

Title
MITIGATION ACTION RECORD DRAWINGS

Revision
0

Date
NOV/8/2024

SCALE
SEE DRAWING

Figure No.
1

Stantec

Stantec is a global leader in sustainable architecture, engineering, and environmental consulting. The diverse perspectives of our partners and interested parties drive us to think beyond what's previously been done on critical issues like climate change, digital transformation, and future-proofing our cities and infrastructure. We innovate at the intersection of community, creativity, and client relationships to advance communities everywhere, so that together we can redefine what's possible.