

## Project Title: Stave River Spawning Restoration Project: Rewatering Centre-Right (Channel 5) and Addressing Right Bank Erosion

FWCP Project No. COA-F-2851-DCA

March 27, 2019



Prepared for: Fish and Wildlife Compensation Program

Prepared by: Natasha Cox, Fraser Valley Watersheds Coalition

Prepared with financial support of the Fish and Wildlife Compensation Program on behalf of its program partners BC Hydro, the Province of BC, Fisheries and Oceans Canada, First Nations and Public Stakeholders.

## Executive Summary

This project aligns with FWCP Action 2-1 and Action 4-1, habitat based actions for fish and wildlife. Thanks to the support from our partners, our project resulted in the:

1. Re-watering of Centre-Right (Channel 5) in the Lower Stave River. This channel became dewatered by a channel barrier and caused the stranding of adult chum and the desiccation of redds. Restoration resulted in 6,000 m<sup>2</sup> of restored salmon spawning habitat.
2. Stabilization of a section of right bank to benefit salmon and protect sensitive cultural artifacts from further degradation, loss and erosion. The dewatering of Channel 5 led to increased flows in Channel 4 that parallels the right bank. Increased velocities caused significant erosion and loss of cultural artifacts along a section of right bank at a known archaeological site on Kwantlen First Nation IR. A key component in developing the pilot stabilization project was considering previous efforts and results. In particular, previous erosion mitigation efforts unintentionally caused acceleration of bank erosion (versus stabilization and bank protection). It involved the placement of relatively porous wood assemblies that did not shelter the bank from flow, did not retain any sediments and likely created increased scour where flow was deflected around the wood. This pilot reef install is planned to do the opposite (Jonsson DFO 2019) and provide aquatic complexing benefits. As appropriate bioengineering and replanting efforts were completed to help reduce erosion, protect artifacts and enhance the riverine system. Stabilization pilot project resulted in 27 linear meters along the right bank from erosion.
3. Continued collaboration to maintain strong working relationships between project partners and increased awareness about the value of the Stave.

Active and on-going enhancement, monitoring and adaptive management is necessary for water resource management in controlled systems. In doing so, it can result in benefits, especially for salmon (Richter & Thomas, 2007). Given the changes in winter precipitation, duration since last overall evaluation and re-grade of lower riverine channels, anticipated climate change models and the need to continue producing power, it may be a good time to re-evaluate, establish a working group to set medium range objectives for the Lower Stave. The goal is to ensure salmon and ecosystem functions are conserved, archaeological, sensitive IR sites are protected and power can still be produced. As such, we recommend:

- Monitoring the pilot project, upstream and downstream for effectiveness.
- Collaborating with key stakeholders to determine whether to proceed with additional bank works so that cultural and salmon/biodiversity values are mutually achieved especially in light of climate change impacts on water resources (Verschelling, Perk, & Middelkoop, 2018).
- Collaborating with key stakeholders to review all the lower Stave River channels for functionality and opportunity for restructuring (returning spawning gravels upstream) in light of water management and climate change.

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## Introduction

The lower Stave River, between the Ruskin Dam and the Fraser River, consists of numerous channels and gravel bars, with predominantly deciduous vegetation growing on the more established bars and riverbanks.

Located within the traditional territory of the Kwantlen First Nation, the area contains numerous archaeological sites and artifacts of cultural and historical significance, many of which are threatened by the continual erosion of the riverbanks. The erosion of these banks has long been a concern of the Kwantlen First Nation, a concern identified during the past Water Use Planning process (2003).

There are limited areas remaining on the lower Stave River floodplain that support significant populations of coho salmon adults and juveniles and this includes the lower 3 km section of the Stave River. This section provides the only remaining habitat for anadromous salmon within the Stave River Watershed. Up to 500,000 chum salmon and hundreds of coho, pink and chinook salmon spawn in these graveled channels. In 2007, actions to create more complex spawning habitat appropriate for the tail-water release flows of the Ruskin Dam, was completed by FVWRC (now FVWC) in partnership with DFO and FVRD. These channels (1 through 5), were anticipated to require management every ten to twenty years to ensure gravel and bar movement still retained high spawning salmon habitat qualities.

This project represents a collaborative effort involving the Fraser Valley Watersheds Coalition, Fisheries and Oceans Canada, the Fraser Valley Regional District, BC Hydro, and Kwantlen First Nation. Project Objectives included:

- Re-watering of 500 square meters of salmon spawning habitat within the lower Stave River,
- Stabilization of 250 linear meters along the right bank from erosion that is
  - threatening to destroy a Kwantlen First Nation archeological site, and
  - is contributing to fine sediment deposition into the spawning grounds;
- Replanting and bioengineering a minimum of 500 m<sup>2</sup>, designed in collaboration with Kwantlen First Nation and the archaeologists to help reduce erosion and protect artifacts and sites.
- Developing strong working relationships between project partners; and
- Increasing awareness amongst the community about the value of the Stave River system.

## Goals and Objectives

The vision for the Lower Stave River is a river system full of wild Pacific salmon, with robust forests, rivers/streams and wetlands that provides many wildlife values and ensures cultural areas of importance are protected and conserved.

The objectives of this project were to restore salmon spawning grounds, reduce fine sediments into channel from right bank erosion.

**Objective 1. Restoration of Habitat** Restore a minimum of 500 square meters of spawning habitat from being de-watered.

**Objective 2. Restoration of Habitat/ Other** Protection of erosion/shoreline: Protection of an anticipated 250 linear meters of sensitive shoreline habitat (where known archaeological sites exists).

**Objective 3. Community Engagement** Between 10-15 volunteers to assist in replanting and design work.

**Objective 4. Improve Opportunities for Sustainable Use** In partnership with Kwantlen First Nation - impart knowledge about the importance of this site as a salmon and wildlife refuge and provide the developing FN environmental committee with the final reports.

## Study Area

This project is located within the lower 2 km of the Stave River south of the Ruskin Hydro dam, with the municipal boundaries of the District of Mission, IR lands of Kwantlen First Nation, and Fraser Valley Regional District, Map1. Planting and monitoring works focussed on Stave River mainstem and Right bank, IR2.



*Map 1 Overview Map of project scope shown as dashed red line.*

## Methods

**Objective 1. Restoration of Habitat** Restore a minimum of 500 square meters of spawning habitat from being de-watered.

Prior to completing the mainstem works, FVWC met onsite with DFO, BC Hydro, Kwantlen First Nation and representative archaeologists from Cordillera Archaeology, and contract biologists from Greenbank Consulting. The intent was to verify design parameters to satisfy archaeological conditions and hydrological/biological factors.

In September 2018, FVWC contracted engineering expert M.Landiak and Mission Contractors to begin re-grading the dry channel and move the excavated gravels from Channel 5 to Channel 4, which was important in completing first before working on objective 2, Figure 1. The channel was re-graded using large 200-series excavators and articulated Volvos to move the gravels, Figure 2, Figure 3.



*Figure 1. Extracted from Greenback report 2017, red polygon illustrates gravel blockage to channel 5 and significant high-velocity flows down channel 4.*



Figure 2. Mainstem rewatering of channel 5. a) excavating berm to create the access path to cross the Stave River. b) Moving gravels to create the access route. c) Excavator safely crosses upstream of Channel 5. d) Re-grading and surveying of gravels begin (notice the dry Channel 5 in proximity to Channel 4). e) east-view illustrating the height of gravel blockage at the upstream end of Channel 5. f) Almost completed Channel 5 watered, needing to push gravels to Channel 4.



Figure 3. South-view, downstream of project site showing (left) dry channel 5 and channel 4 with the elevation drop, during construction.



Map 2. Actual area 6,000m<sup>2</sup> shown as a blue line excavated and re-graded to restore flows into Channel 5. (Channels illustrated by circled number)

**Objective 2. Restoration of Habitat/ Other** Protection of erosion/shoreline: Protection of an anticipated 250 linear meters of sensitive shoreline habitat (where known archaeological sites exists).

Prior to completing the right bank works, FVWC met onsite with DFO, BC Hydro, Kwantlen First Nation and representative archaeologists from Cordillera Archaeology, and contract biologists from Greenbank Consulting. The intent was to verify existing site conditions, Figure 4 and develop design parameters to satisfy archaeological conditions and hydrological/biological factors. Agreed upon designs included a top-dress capping, no vegetation planting (large shrubs or trees to avoid root penetration into sensitive archaeological site) and a pilot “reef” bank consisting of rock ballasts and large wood, Figure 5. During this time, all agreed to scale back the project scope and complete a pilot to test this methodology and ensure accidental erosion and loss of cultural artifacts was minimized.



Figure 4. Annotated photo of project site. Notice the erosion of the bank and the lack of existing native trees, shrubs in the riparian. Also notice the presence of invasive reed canary grass. High water mark may be related to higher tail-water flows and freshet levels.

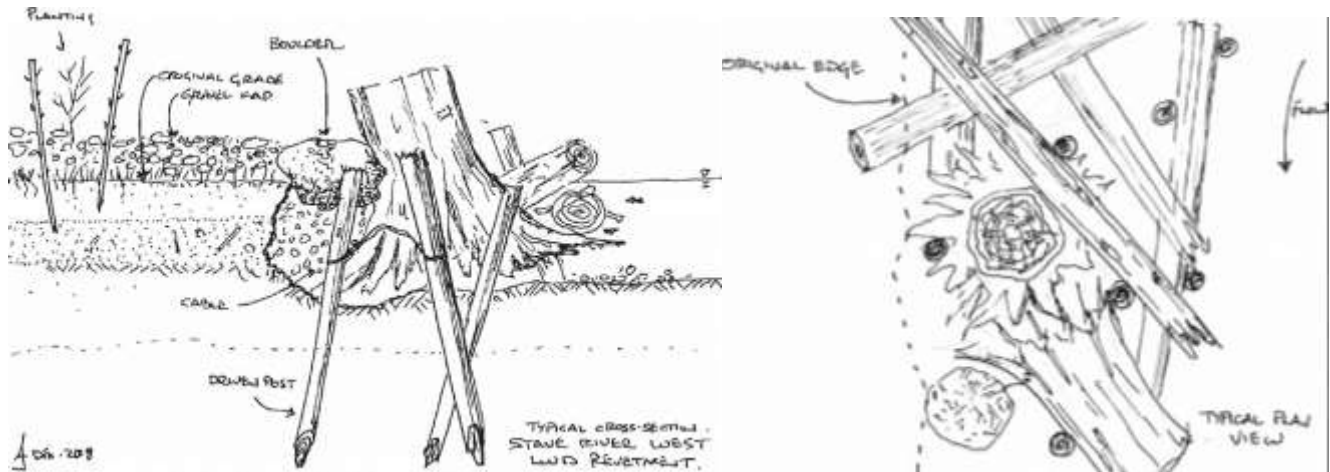


Figure 5. Original conceptual design for river bank works to benefit cultural site and support complex salmon habitat. Copyright DFO AJonsson.

## Results and Outcomes

Prior to the restoration and enhancement of the right bank pilot site, Kwantlen First Nation and the archaeologists prepared the site through the excavation and preservation of sensitive artifacts, Figure 6. Due to the sensitive nature of this site, the works area was isolated with safety fence to keep public and recreation users out in the off-hours of the project.

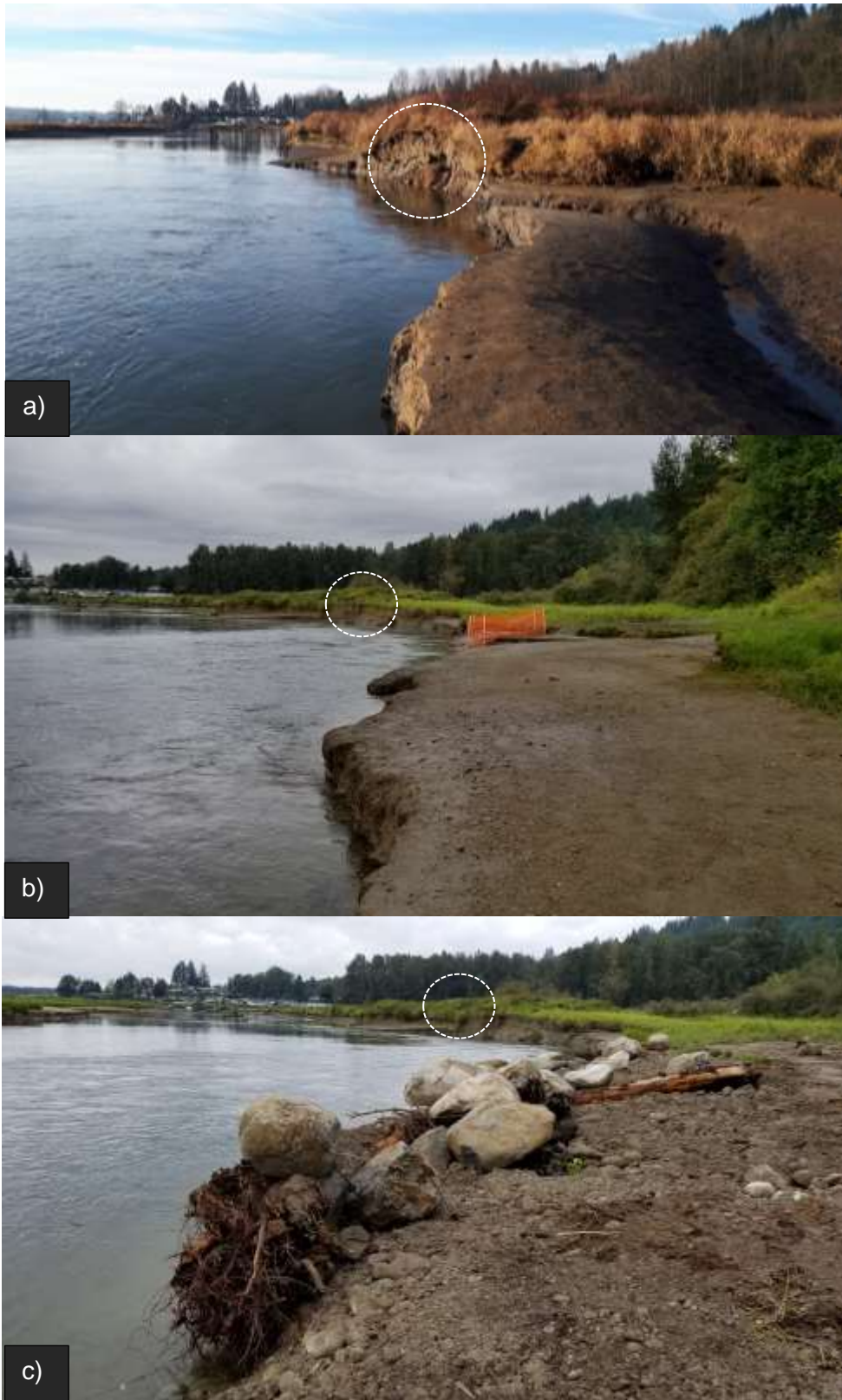
Instream work occurred in September 2018 right after the mainstem work was completed. A temporary municipal road closure was in effect to allow the excavator and dump truck loads of large wood and rock were delivered to the site. Supervised by DFO, the protective capping and pilot reef bank work was completed, Figure 7, Figure 8 and Figure 9. In March 2018 a contractor surveyed the right bank and tied it to downstream area and upstream area – including toe of slope, road and water mark to form the baseline to monitor movement and effectiveness.



*Figure 6. Site preparation and archaeological artifact retrieval by Kwantlen First Nation and Cordillera Archaeology*



*Figure 7. Upstream transition of right bank. a) Before works (May 2018) b) Before works (September 2018) c) after works October 2018. White dashed polygons are location reference points. Yellow dashed lines indicate erosion reference points.*



*Figure 8. Downstream transition of right bank. a) Before works (extracted from Cordillera Archaeology report) b) Before works (September 2018) c) after works October 2018. White dashed polygons are location reference points.*



Figure 9. Eastview of the right bank project. a) before reef installed and after excavation of sensitive cultural artifacts. b) After works March 2018 during tail water release. White dashed line delineates reef location.

**Objective 3. Community Engagement** Between 10-15 volunteers to assist in replanting and design work.

Planting, originally planned for the pilot project, was deemed not appropriate at this time until monitoring is complete, the pilot is assessed and conversations on whether to pursue further work using this or a modified methodology. FVWC partnered with the University of the Fraser Valley – Geography department to have students volunteer their time in planting at Stave Site 2. Students were walked into the project site, participated in hand-clipping invasive reed canary grass around herbivory guards and planting of potted stock.

**Objective 4. Improve Opportunities for Sustainable Use** In partnership with Kwantlen First Nation - impart knowledge about the importance of this site as a salmon and wildlife refuge and provide the developing FN environmental committee with the final reports.

Through the active engagements with Kwantlen First Nation, DFO, BC Hydro and partners on design elements, past actions and understanding flows and water resource considerations, improved communication and collaboration for sustainable use.

## Results

**Objective 1. Restoration of Habitat** Restore a minimum of 500 square meters of spawning habitat from being de-watered.

**Actual result achieved:** 6,000 m<sup>2</sup> spawning mainstem gravels re-watered.

**Details:** The original target of 500 m<sup>2</sup> was estimated as needed to remove a gravel barrier at the top end of the channel 5. This gravel barrier caused the downstream dewatering effect. During the instream works, the actual excavation and regrading of the channel involved removing the 500m<sup>2</sup> gravel barrier at the top end of the channel 5 and the regrading of the entire downstream channel length to restore flows at a suitable spawning gradient for salmon.

**Objective 2. Restoration of Habitat/ Other** Protection of erosion/shoreline: Protection of an anticipated 250 linear meters of sensitive shoreline habitat (where known archaeological sites exists). Modified Goal.

**Actual result achieved:** 27 linear meters of shoreline was protected and enhanced with the pilot reef project. Additional surveying points at the pilot site and upstream ~50m and ~50m downstream was completed to inform future effectiveness assessments of pilot project and ensure any unintentional effects are addressed and adjusted early on to produce greatest fish and streambank benefit.

**Details:** The original goal was to protect 250 linear meters of shoreline, however after stakeholder meetings and learning from past erosion control activities, the stakeholders agreed to scale back the

linear meters of bank protection works and complete a small pilot project that resulted in 27 linear meters of actual “reef” protection. In addition to the actual reef construction, monitoring at the site and approximately 50 m upstream and downstream will be assessed to understand the effectiveness of the project and ensure desired outcomes are achieved before expanding the project scope. Figure 7 and 8 illustrate the upstream and downstream views of the project works.

**Objective 3. Community Engagement** Between 10-15 volunteers to assist in replanting and design work.  
**Actual results achieved:** 10 volunteers engaged with the design and right bank work. A total of 94 volunteers assisted at replanting of Stave River Site 2.

**Objective 4. Improve Opportunities for Sustainable Use** In partnership with Kwantlen First Nation - impart knowledge about the importance of this site as a salmon and wildlife refuge and inform Kwantlen’s environmental committee.

**Actual results achieved:** Improved collaboration and built trust.

## Discussion

The intent behind this project was to achieve three main things:

1. Restore a section of the mainstem river that had become dewatered from a gravel blockage
2. Stop the ongoing erosion of the bank (exposing culturally significant and high value archeological deposits)
3. Create fish habitat improvements in the form of complex and overhanging cover.

Activities on the mainstem resulted in the desired outcome, re-watered channel with supporting flows split between channel 4 and channel 5, which also acted to reduce the erosive properties of the river against the right bank.

The right bank reef pilot project design had to address fluctuating water levels (tide and flow) within fine semi-cohesive bank material with a steep –deep-water drop adjacent to the bank. It appeared that most of the erosion was likely occurring when the water levels dropped and the saturated vertical face of the bank was suddenly left un-supported (Jonsson DFO 2019). Blocks of bank would calve off and tumble into the deep water of the channel. Deep water and sediment mobilizing river currents prevented eroded sediments from staying in place and buttressing the face against further erosion. Although the erosive forces were relatively small, options to address them were limited by site constraints. As such, the design could not involve:

- Sloping the bank back, as this could result in potential damage to the artifacts of the site.
- Reinforcing the bank through bioengineering as this could result in potential damage to the artifacts of the site through root penetration.
- Buttressing it with rock (as had previously been done on the east side), the depth of the channel immediately adjacent to this section of bank was very deep and would require significant volumes of rock to create a stable buttress. This may be a viable future option.

Since the vertical extent of the eroding face was about 60-90cm in the area of works, logs placed horizontally below artifacts depth, would provide support to the face and isolate it from flowing water. The logs were anchored in place through a combination of boulder ballast and vertically driven timber piles. Logs were also lapped such that the downstream end of one always overlapped the upstream end of the log adjacent. River cobble was then placed behind the logs and over-top the native silts as a final cap.

In addition, consideration of previous efforts and their short-comings was an important aspect of this work. In particular, previous efforts caused acceleration of bank erosion (versus stabilization and bank protection) involved the placement of relatively porous wood assemblies that did not shelter the bank from flow, did not retain any sediments and likely created increased scour where flow was deflected around the wood. This pilot reef install is planned to do the opposite (Jonsson DFO 2019).

Active and on-going enhancement, monitoring and adaptive management is necessary for water resource management in controlled systems. In doing so, it can result in benefits, especially for salmon (Richter & Thomas, 2007). Given the changes to winter precipitation, duration since last overall evaluation and re-grade of channel substrate, anticipated climate change models and the need to

continue producing power, it may be a good time to re-evaluate, establish a working group and set medium range objectives for the Lower Stave. With a goal of ensuring salmon and ecosystem functions are conserved, archaeological, sensitive IR sites are protected and power can still be produced.

## Recommendations

- Monitor the pilot project, upstream and downstream for effectiveness
- Collaborate with key stakeholders to determine whether to proceed with additional bank works so that cultural and salmon/biodiversity values are mutually achieved especially in light of climate change impacts to water resources (Verschelling, Perk, & Middelkoop, 2018).
- Collaborate with key stakeholders to review all the lower Stave River channels for functionality and opportunity for restructuring (returning spawning gravels upstream) in light of water management and climate change.

## List of Appendices

- A. Construction As-Built Right Bank
- B. Road Closure Permit

## Acknowledgements

Thank you to our funders:

- Fish & Wildlife Compensation Program
- BC Hydro

Thank you to our partners and team

- Kwantlen First Nation
- DFO Resource Restoration Unit
- BC Hydro
- Cordillera Archaeology
- District of Mission
- Stave Valley Salmonid Enhancement Society
- Fraser Valley Regional District
- Ducks Unlimited Canada
- University of the Fraser Valley

Special thanks to: Dave Nanson, Al Jonsson, Jonathan Bulcock, Matt Foy, Brendan Grey, Duncan McLaren, Mike Landiak, Brent Wilson, Julie Fournier, Kwantlen First Nation Chief and councillors, and FVWC board of directors.

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# SKETCH PLAN SHOWING OF PART OF STAVE RIVER RIGHT BANK SHOWING TOPOGRAPHIC FEATURES AS REQUESTED

CLIENT: FRASER VALLEY WATERSHED COALITION  
 CIVIC ADDRESS: RIGHT BANK OF STAVE RIVER, IR LANGLEY 2, MISSION  
 FB: C378/111-112  
 DATE OF FIELD SURVEY: MARCH 21, 2019

SUBJECT AREA PARTIALLY UNDERWATER DUE TO INCREASE  
 OUTFLOW FROM DAM DURING TIME OF FIELD SURVEY

THE HORIZONTAL COORDINATES REPRESENTED ARE GROUND LEVEL  
 AND DERIVED FROM GNSS OBSERVATIONS TO SMARTNET  
 REFERENCE STATION ABBOTSFORD(BCAB).

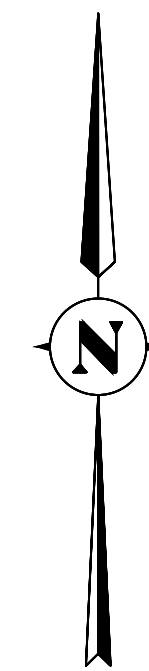
VERTICAL DATUM: CGVD28

SCALE 1:300



ALL DISTANCES ARE IN METRES AND ARE HORIZONTAL GROUND

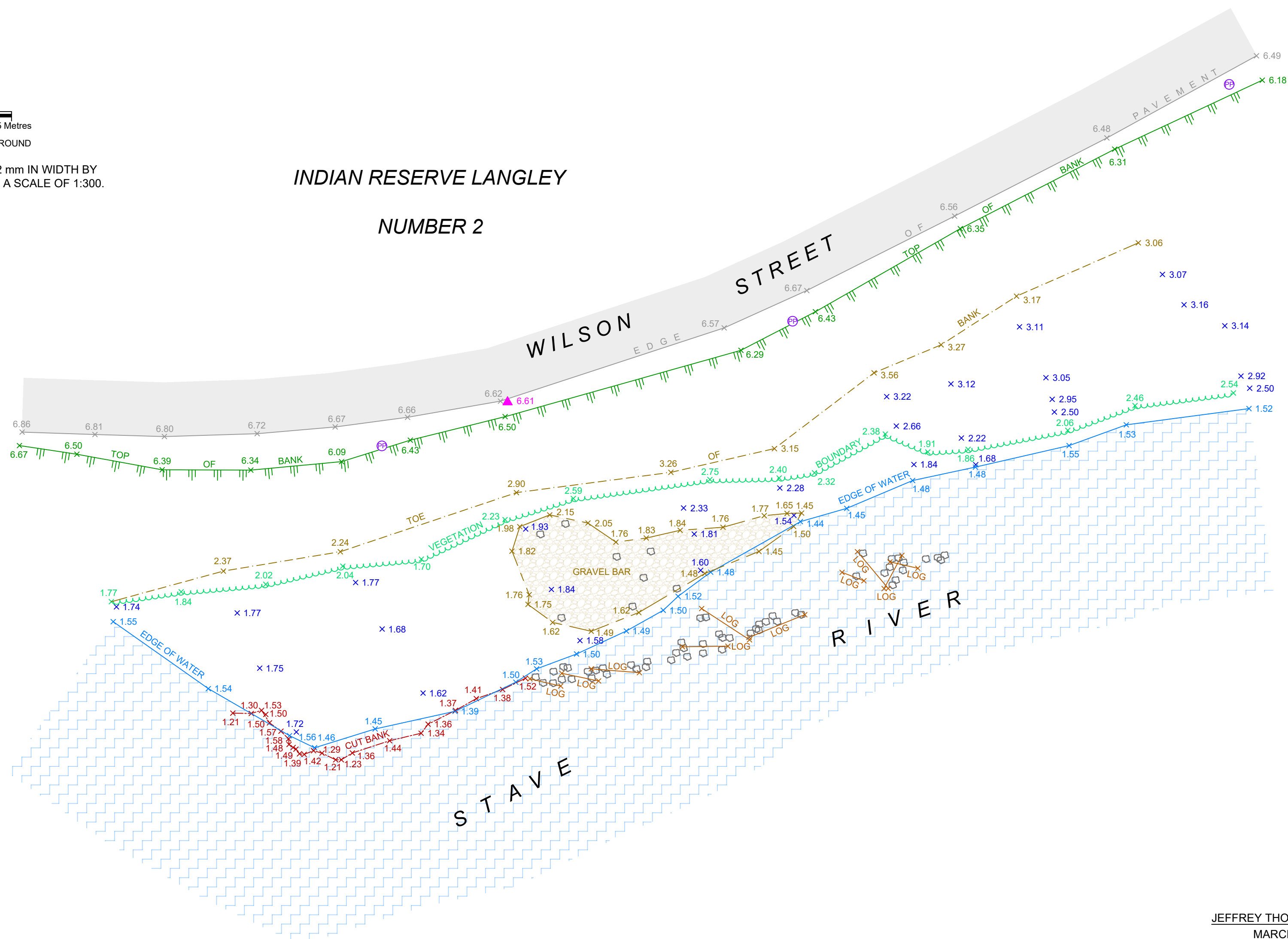
THE INTENDED PLOT SIZE OF THIS PLAN IS 432 mm IN WIDTH BY  
 560 mm IN HEIGHT (C SIZE) WHEN PLOTTED AT A SCALE OF 1:300.



## INDIAN RESERVE LANGLEY NUMBER 2

### LEGEND

- DENOTES POWER POLE
- DENOTES SURVEY CONTROL PLACED
- DENOTES TOP OF ROCK
- DENOTES ELEVATION AT LOCATION



JEFFREY THOMPSON BCLS 922  
 MARCH 27, 2019.

**VECTOR**  
 GEOMATICS LAND SURVEYING LTD.  
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 Chilliwack, B.C. V2R 0K2  
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RESET FORM

TEMPORARY STREET USE PERMIT

WAIVED N.F.P. Application Fee: \$154.50

APPLICANT INFORMATION

Name: Natasha Cox - Program Director
Company: Fraser Valley Watersheds Coalition
Address: #1 45950 Cheam Avenue, Chilliwack BC V2P 1N6
Phone: (604) 855-8274

DATE(S), TIME(S), and LOCATION OF ACTIVITY

Date(s) from Sept. 17 2018 & Sept 18 to Sept 21 2018
Time(s) from 7:30 am to 9:30 pm (intermittent closure only)
Street Name(s)/Location Wilson St. Mission (West side along Stave River, northbound lane only)

INSURANCE POLICY - Permit is not valid without insurance.

The District of Mission must be named as additional insured on policy for minimum \$5,000,000 liability.

Policy 20431 CGL (attached -last page) Expiry 2019-06-01

TRAFFIC MANAGEMENT DETAILS - (activities, obstructions, closure(s) in the road or sidewalk)

The District of Mission reserves the right to require a Traffic Management Plan (TMP) for any Street Use Permit Application.

The northbound lane of Wilson St. will be intermittently closed (with traffic control support from Streetwise) to allow for access to the right bank of stave river -salmon restoration project with FN.

TMP Attached [ ] MoTI Traffic Management Manual for Work on Roadways Figure: 7.9 [x]

The Applicant hereby agrees:

- a) To indemnify and save harmless the District against all claims, liabilities, judgments, costs and expenses which may accrue to or against the District in consequence of granting this permit.
b) To produce this permit for inspection when so requested by any Peace Officer or representative of the Municipal Engineer.
c) Site must be left in the same condition as it existed at the time the permit was issued. All damage to District property shall be restored to the existing condition or better at the expense of the applicant.
d) All signing/delineation must conform to BC Ministry of Transportation and Infrastructure's 2015 Interim Traffic Management Manual for Work on Roadways at the expense of the applicant.

Signature of Applicant [Signature] Date 2018-09-08

Please submit to: District of Mission, 8645 Stave Lake Street, PO Box 20, Mission, BC V2V 4L9
Phone: 604-820-3736; Email: engineering@mission.ca

FOR OFFICE USE ONLY

Date Sept. 10, 2018 Expiry Date 21-SEP-18

Permit No. 2018-73 Receipt No. N/A

Comments SINGLE LANE ALTERNATING REQUIRED WHEN NORTHBOUND LANE BLOCKED. PER TCPS MUST BE CERTIFIED AS SUCH.

M. FERNIE Permit Approved by [Signature] Signature

\*AS THE LANE CLOSURES WILL BE INTERMITTANT, THE "WORK ACTIVITY AREA" IDENTIFIED IN FIG 7.8 IS NOT REQUIRED.

This permit must be carried at all times and be available upon request.

## CERTIFICATE OF INSURANCE

**CERTIFICATE HOLDER:** To whom it may concern

That policies of insurance as herein described have been issued to the Insured named below and are in force at this date.

**NAME OF INSURED:** Fraser Valley Watersheds Coalition Society & Pacific Streamkeepers Federation VIP

**ADDITIONAL INSURED:** Her majesty the Queen in right of Canada as represented by the Minister of Fisheries and Oceans Suite 200-401 Burrard St, Vancouver BC V6C 3S4  
District of Mission  
8645 Stave Lake St. Box 20, Mission, BC, V2V 4L9

**MAILING ADDRESS OF INSURED:** 1-45950 Cheam Ave, Chilliwack, BC, V2P 1N6

**DESCRIPTION OF OPERATIONS:** All operations of the Named Insured

COVERAGE	POLICY NO	LIMITS OF LIABILITY
Commercial General Liability	20431	\$5,000,000 per occurrence \$5,000,000 general aggregate
Including:		
3 <sup>rd</sup> Party Bodily Injury/Property Damage/Personal Injury		\$5,000,000 aggregate
Products and Completed Operations		\$5,000,000 aggregate
Non-Owned Automobile Liability	20431	\$5,000,000
Directors & Officers Liability (D&O)	20135	\$1,000,000 occurrence/aggregate
Accidental D&D	1HW25	

**INSURER:** Certain Underwriters at Lloyd's as Arranged by Guardian Risk Managers  
(100% Liability, 100% D&O)  
SSQ (100% AD&D)

**EFFECTIVE:** June 1, 2018

**EXPIRY:** June 1, 2019

### **Special Conditions and Clauses:**

This certificate is issued as a matter of information only and concerns no rights on the holder and imposes no liability on the insurer.

It is hereby understood and agreed that Her majesty the Queen in right of Canada as represented by the Minister of Fisheries and Oceans & the District of Mission are hereby added as an Additional Insured but only insofar as the legal liability arises out of the operations of the Named Insured.

The Insurance afforded is subject to the terms, conditions and exclusions of the applicable policy.

**E&OE**

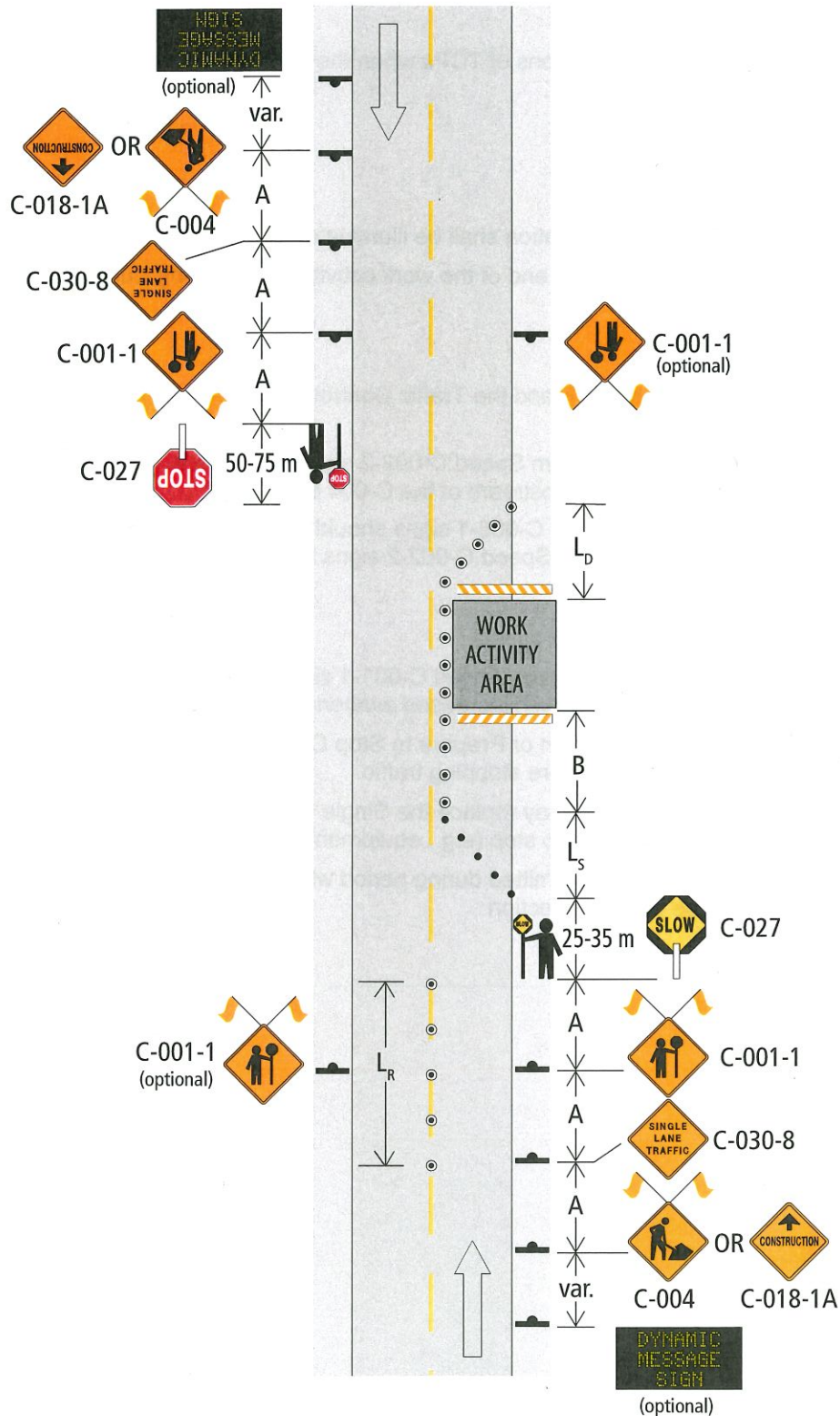
**DATE:** August 28, 2018



**Authorized Representative**

**THIS POLICY(S) CONTAINS A CLAUSE OR CLAUSES WHICH MAY LIMIT THE AMOUNT PAYABLE**

Figure 7.8: Lane Closure with TCPs – Single Lane Alternating – Short and Long Duration



## 7.8 Lane Closure with TCPs – Single Lane Alternating – Short and Long Duration

### Purpose:

This layout shows the appropriate positions of TCPs when they are controlling traffic for a lane closure on a two-lane, two-way roadway.

### Standard:

- When used at night, the TCP station shall be illuminated with overhead lighting.
- Barricades are required at each end of the work activity area for long-duration work.

### Guidance:

- The distance between the TCP and the Traffic Control Person Ahead C-001-1 sign should not exceed 150 metres.
- Where Crew Working – Maximum Speed C-002-2 signs establish a Temporary Speed Zone, the C-002-2 should be placed upstream of the C-004 or C-018-1.
  - Thank You Resume Speed C-086-1 signs should be placed across from the Crew Working – Maximum Speed C-002-2 signs in the opposing lanes.

### Options:

- An additional Traffic Control Person Ahead C-001-1 sign may be added to the far side of the road to provide queued drivers with increased awareness of the TCP position.
- The Flagger Ahead C-001-2 sign or Prepare to Stop C-029 sign may be used for additional advance warning where TCPs are stopping traffic.
- A Prepare to Stop C-029 sign may replace the Single Lane Traffic C-030-8 sign for other applications that require traffic to stop (e.g., equipment crossing road).
- Run-in delineation,  $L_R$  may be omitted during period where queues are low, permitting the full release of the queue in each direction.

Road Closure permit requested for Wilson Street on Sept. 17, 18 and 21<sup>st</sup> – intermittently between the hours of 7:30am and 9:30pm to support restoration activities (transport of equipment, machinery, drop-off of materials). Closures will be no more than 10 minutes in duration, will only affect the northbound lane and will be controlled by Streetwise Traffic – truck, signage and flag staff).



**Orange line**- Intermittent Road Closure section of Wilson Rd (northbound lane) –supported by Streetwise Flagging (Truck, signage and staff)

**Red dashed polygon** – right bank project site (salmon habitat restoration on Kwantlen FN IR land)



Note: Road closures will only be in place when machinery or materials are being loaded or unloaded onto project site (thus, will be intermittent throughout the day and likely only a few closures per day will be necessary). The goal is to ensure that during these times public safety is ensured.

Prepared by Natasha Cox  
Program Director



# ROAD CLOSURE FORM

### ROAD CLOSURE DETAILS

Road Name Wilson St., Mission BC.

### DATE(S) AND TIMES OF ACTIVITY:

Date(s)  From: 2018-09-17 To: 2018-09-21  
Time(s)  From: 7:30 Am To: 9:30 pm  
(yyyy-mm-dd) (yyyy-mm-dd)

### TYPE OF CLOSURE:

Single Lane Closure  Sidewalk Closure  Full Road Closure

REASON FOR CLOSURE: To safely drop-off and retrieve restoration equipment and materials

to support a grant-funded salmon restoration project. (It will be intermittent, single lane closure only when material is being dropped off at the site).

If this is for a full closure, will emergency vehicles have access?  Yes  No

Is the closure along a bus route?  Yes  No

Will the closure affect a bus stop?  Yes  No

### APPLICANT INFORMATION

Name Natashia Cox - Program Director

Company Fraser Valley Watersheds Coalition Email Natashia@fvwc.ca

Address #1 45950 Cheam Avenue, Chilliwack BC V2P 1N6

Phone (604) 855-8274 Fax \_\_\_\_\_

Applicant's Signature *Natashia Cox* Date 2018-09-07

District Contact: \_\_\_\_\_ Phone: \_\_\_\_\_

Please submit to: District of Mission, Engineering & Public Works Department

### FOR OFFICE USE ONLY

District Sign Crew Required OR  Contractor will be Handling Signage

#### Public Works Clerk Notification:

- |   |  |
|---|--|
| <input type="checkbox"/> RCMP..... Fax 9-604-820-3548       | <input type="checkbox"/> 911..... 911dispatch@fvrd.bc.ca                     |
| <input type="checkbox"/> Ambulance ..... Fax 9-604-826-1844 | <input type="checkbox"/> Fire Dispatch..... firedispatch@fvrd.bc.ca          |
| <input type="checkbox"/> Transit ..... Fax 9-604-854-3598   | <input type="checkbox"/> School Bus (Mission)..... jodi.marshall@mpsd.ca     |
|   | <input type="checkbox"/> Garbage Pick Up ..... ernie@rempedisposal.com       |
|   | <input type="checkbox"/> Engineering Department .... engineering@mission.ca  |
|   | <input type="checkbox"/> Fire Shift Captain ..... shiftcaptain@mission.ca    |
|   | <input type="checkbox"/> Mission Duty Chief..... missiondutychief@mission.ca |