Request for Review

Please note that Guidance on Submitting a Request for Review is available at the end of this form. This guidance explains the requirements for a Request for Review by DFO under the fish and fish habitat protection provisions of the *Fisheries Act*. All information requested must be provided. If you attach documents to your application with additional information, you must still provide appropriate summaries in the spaces provided on the application document or your application will be considered incomplete.

A) Contact information

Name of Business/Company:

Province of British Columbia

Name of Proponent:

Ministry of Transportation and Infrastructure
Krista Englund, MRM, R.P.Bio

Mailing address:

310-1500 Woolridge Street

City/Town:

Coquitlam

Province/Territory:

BC

Postal Code:

V3K0B8

Tel. No. :

236-468-1959

Fax No.:

Email:

Krista.Englund@gov.bc.ca

Is the Proponent the main/primary contact? ○ Yes ◉ No

Select additional contact:
Contractor/Agency/Consultant *(if applicable)*:

ISL Engineering and Land Services Ltd.

Mailing address:

#201-8506 200 Street

City/Town:

Langley

Province/Territory:

BC

Postal Code:

V2Y 0M1

Tel. No. :

604-371-0091

Fax No.:

Email:

ldarc@islengineering.com

**All definitions are provided in Section G of the Guidance on Submitting a Request for Review*

If no, please enter information for the primary contact or any additional contact.

Larissa Darc, M.Sc., B.I.T; ldarc@islengineering.com

David Neufeld, R.P.Bio, B.Sc., Dipl.Tech; dneufeld@islengineering.com

B) Description of Project

If your project has a title, please provide it.

Teapot Hill East Culvert Replacement

Is the project in response to an emergency circumstance*? ○ Yes ◉ No

Does your project involve work in water? ◉ Yes ○ No

If yes, is the work below the High Water Mark*? ◉ Yes ○ No

What are you planning to do? Briefly describe all project components you are proposing in or near water.

Please see Supplemental Report Section 2.0 for further details.

The 'atmospheric river' event November 13 - 15, 2021 damaged the existing culvert along Columbia Valley Road. Damage to the culvert resulted from excessive bedload and debris movement through the culvert. The culvert became blocked with debris, and this caused water to erode around culvert, leading to washouts. Emergency debris clean-out was required to restore the stream crossing to a functioning condition. A temporary steel corrugated pipe has been installed. The culvert replacement is required to provide properly engineered, permanent design solutions for the temporary crossing.

Engineering designs for the stream crossing culvert is provided in Supplemental Report Appendix A. The culvert replacement will consist of a box culvert, pre-cast headwalls and/or lockblocks, and inlet and outlet armouring using riprap.

How are you planning to do it? Briefly describe the construction materials, methods and equipment that you plan to use.

Anticipated construction activities for the culvert replacement are set out in Supplemental Report Table 4.

The project will require the following to be successfully implemented:

- Coffer dam materials;
- Stream bypass pumping equipment;
- Trash pumps;
- Excavators;
- Crane or large excavators for offloading culvert segments;
- Dump trucks for removing road fill and road base, importing fill, rip rap and substrate;
- Non-woven geotextile;
- Pre-cast concrete box culvert, headwalls, and lockblocks;
- Clean riprap and gravel (clear drain rock);
- Hydraulically applied coastal reclamation seed mix;
- Asphalt, crushed base coarse, and granular sub-base;
- Erosion and sediment control materials; including but not limited to, silt fence, erosion control blanket, polyethylene sheeting; and,
- Spill mitigation and control materials.

The project will not include the use of exotic chemicals or blasting.

Include a site plan (figure/drawing) showing all project components in and near water.

Are details attached? ◉ Yes ○ No

Identify which work categories apply to your project.

All definitions are provided in Section G of the Guidance on Submitting a Request for Review

- ☐ Aquaculture Operations
- ☐ Aquatic Vegetation Removal
- ☐ Beaches
- ☐ Berms
- ☐ Blasting / Explosives
- ☐ Boat Houses
- ☐ Boat Launches / Ramps
- ☐ Breakwaters
- ☐ Bridges
- ☐ Cable Crossings
- ☐ Causeways
- ☒ Culverts
- ☐ Dams
- ☐ Dewatering / Pumping
- ☐ Docks
- ☒ Dredging / Excavation
- ☐ Dykes
- ☐ Fishways / Ladders
- ☐ Flow Modification (hydro)
- ☐ Groundwater Extraction
- ☐ Groynes
- ☒ Habitat Restoration
- ☐ Ice Bridges
- ☐ Log Handling / Dumps
- ☐ Log Removal
- ☐ Moorings
- ☐ Open Water Disposal
- ☐ Piers
- ☒ Riparian Vegetation Removal
- ☐ Seismic Work
- ☐ Shoreline Protection
- ☐ Stormwater Management Facilities
- ☐ Surface Water Taking
- ☐ Tailings Impoundment Areas
- ☐ Temporary Structures
- ☐ Turbines
- ☐ Water Control Structures
- ☐ Water Intakes / Fish Screens
- ☐ Water Outfalls
- ☐ Watercourse Realignment
- ☐ Weirs
- ☐ Wharves
- ☐ Wind Power Structures

☐ Other Please Specify

Was your project submitted for review to another federal or provincial department or agency? ◉ Yes ○ No

If yes, indicate to whom and associated file number(s).

BC Ministry of Forests, Water Sustainability Regulation Notification of Authorized Change, Tracking # 100408842

C) Location of the Project

Coordinates of the proposed project Latitude _____ N Longitude _____ W

OR UTM zone 10 ; 574276 Easting

5432653 Northing

Include a map clearly indicating the location of the project as well as surrounding features.

Name of Nearest Community (City, Town, Village): Cultus Lake Provincial Park

Municipality, District, Township, County, Province: Fraser Valley Regional District

Name of watershed (if applicable): N/A

Name of watercourse(s) or waterbody(ies) near the proposed project: Cultus Lake

**All definitions are provided in Section G of the Guidance on Submitting a Request for Review*

Provide detailed directions to access the project site:

See Supplemental Report for project location details. The project site can be accessed from the Teapot Hill trailhead parking lot. The parking lot is located on Columbia Valley Road between the Delta Grove Campground and Honeymoon Bay Campground. From the Vedder Mountain Road Junction, travel south on Columbia Valley road for approximately 7.9 km to the Teapot Hill trailhead parking lot. The culvert is located approximately 30 m from the parking lot.

D) Description of the Aquatic Environment

Identify the predominant type of aquatic habitat where the project will take place.

- ○ Estuary (Estuarine)
- ○ Lake (Lacustrine)
- ○ On the bank/shore at the interface between land and water (Riparian)
- ◉ River or stream (Riverine)
- ○ Salt water (Marine)
- ○ Wetlands (Palustrine)

Provide a detailed description of biological and physical characteristics of the proposed project site. This description should include information on aquatic species at risk* (https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html), their residence* and critical habitat* if found in the area. An overview of the distribution of aquatic species at risk and the presence of their critical habitat within Canadian waters can be found here http://dfo-mpo.gc.ca/species-especes/sara-lep/map-carte/index-eng.html

See Supplemental Report Section 3.0 for further details.

The Teapot Hill East culvert is located an unmapped, unnamed tributary stream which flows from upslope on Teapot Hill and drains to Cultus Lake. Teapot Creek (Watershed Code 100-065700-09700-13300-8440) is mapped 350 m west of the culvert site, however, does not appear to have connectivity to the unnamed stream. There is no recorded fish species presence in Teapot Creek or the unnamed stream (FIDQ, 2022).

There is no mapped Critical Habitat for aquatic (fish) species at risk within the unnamed tributary (DFO, 2022). There is Critical Habitat for Coastrange sculpin (Cottus aleuticus) mapped within Cultus Lake. The Coastrange sculpin (Cultus population; also known as Cultus pygmy sculpin) has a provincial status of Red and is listed as Threatened on Schedule 1 of the federal Species at Risk Act (SARA). However, the mapped Critical Habitat extent is limited to only within Cultus Lake.

The Coastrange sculpin Recovery Strategy indicates there are significant data deficiencies which has prevented identification of specific features or attributes which should be designated as Critical Habitat (DFO, 2007). At the time of writing, the Recovery Strategy only designates general habitat features which are 'likely important' for the species as limnetic and deep benthic areas of Cultus Lake. The residence description for the species indicates that Coastrange sculpin nests are located under stones in deep parts of Cultus Lake (DFO, 2022).
There are no Orders for protection of Coastrange sculpin (Cultus population) Critical Habitat.

The Teapot Hill east culvert is located on a < 1.5 m wide stream which flows into Cultus Lake. There is potential fish access to the outlet of this culvert from Cultus Lake, however, the culvert itself is elevated above the outlet and the plunge pool lacks depth to facilitate upstream fish passage (Figure 3).

The stream was wetted throughout multi-season assessments in April, July, and January. Substrate consisted of road fill with trace cobble which is highly embedded from sediment deposition. No fish were observed.

Three trees downstream of the culvert would potentially need to be removed to facilitate construction of the new culvert. This includes one Western redcedar (Thuja plicata) and two bigleaf maples (Acer macrophyllum) (one of which is a snag).

Upstream of the culvert, there is low gradient sub-reach (Figure 4) that extends for approximately 30 m, at which time the stream bifurcates, and both of these braided channels have gradients of a sustained +25% up Teapot Hill. There is no potential for resident fish

All definitions are provided in Section G of the Guidance on Submitting a Request for Review

habitat on slopes of this kind, in small stream channels of this size.

Include representative photos of affected area (including upstream and downstream area) and clearly identify the location of the project.

E) Potential Effects of the Proposed Project

Have you reviewed the Pathways of Effects (PoE) diagrams (http://www.dfo-mpo.gc.ca/pnw-ppe/pathways-sequences/index-eng.html) that describe the type of cause-effect relationships that apply to your project?

◉ Yes ○ No

If yes, select the PoEs that apply to your project.

- ☐ Addition or removal of aquatic vegetation
- ☐ Change in timing, duration and frequency of flow
- ☐ Cleaning or maintenance of bridges or other structures
- ☐ Dredging
- ☒ Excavation
- ☐ Fish passage issues
- ☐ Grading
- ☐ Marine seismic surveys
- ☐ Organic debris management
- ☐ Placement of marine finfish aquaculture site
- ☒ Placement of material or structures in water
- ☒ Riparian Planting
- ☐ Streamside livestock grazing
- ☒ Structure removal
- ☐ Use of explosives
- ☐ Use of industrial equipment
- ☒ Vegetation Clearing
- ☐ Wastewater management
- ☐ Water extraction

Will there be changes (i.e., alteration) in the fish habitat*? ○ Yes ◉ No ○ Unknown

If yes, provide a description.

See Supplemental Report Section 5.0 for further details.

Is there likely to be a harmful alteration, disruption or destruction of habitat used by fish? ○ Yes ◉ No ○ Unknown

Is there likely to be destruction or loss of habitat used by fish? ○ Yes ◉ No ○ Unknown

What is the footprint (area in square meters) of your project that will take place below the high water mark*?

65 m2

Is your project likely to change water flows or water levels? ○ Yes ◉ No ○ Unknown

If your project includes withdrawing water, provide source, volume, rate and duration.

N/A

If your project includes a water control structure, provide the % of flow reduction.

N/A

If your project includes discharge of water, provide source, volume and rate.

N/A

Will your project cause death of fish? ○ Yes ◉ No ○ Unknown

If yes, how many fish will be killed (for multi-year project, provide average)? What species and lifestages?

All definitions are provided in Section G of the Guidance on Submitting a Request for Review

N/A

What is the time frame of your project?

The construction will start on 09/05/2023 and end by 12/21/2023

If applicable, the operation will start on MM/DD/YYYY and end by MM/DD/YYYY

If applicable, provide schedule for the maintenance

N/A

If applicable, provide schedule for decommissioning

N/A

Are there additional effects to fish and fish habitat that will occur outside of the time periods identified above? ○ Yes ◉ No

(If yes, provide details)

Can you follow appropriate Timing Windows (http://www.dfo-mpo.gc.ca/pnw-ppe/timing-periodes/index-eng.html) for all your project activities below the High Water Mark*? ○ Yes ◉ No

(If no, provide explanations.)

Construction is anticipated to commence September 5, 2023. The Contractor cannot work on Columbia Valley Road in the period of June 26 to September 4 due to heavy recreational traffic on this corridor. BC Parks has requested the construction works do not impact/ block summer campers and recreationalists. Therefore, with the construction starting post Labour Day, the culvert will likely be completed in late fall. The culvert works will be completed outside of the standard South Coast reduced risk instream window (August 1st to September 15th). Completing the culvert replacement outside of the least risk window does not impose a significantly higher risk than work inside the window because:

- There is no fish access upstream of the culvert. Neither the existing nor replacement culvert at this location have fish access requirements.
- There is potential fish access to the culvert outlet. However, substrate at Teapot East does not appear to be suitable for adult salmon spawning, and we have no evidence for this activity in this stream.
- The stream does not provide Critical Habitat for Coastrange sculpin below the culvert outlet.
- Flows within the stream were low to moderate during the same time period in 2022 and are expected to be manageable if fall construction is required.
- The installed temporary culvert which have been left in place are not to a design standard that mitigates risk of another washout and associated environmental consequence (sediment and turbidity discharge to downstream fish habitats).

Have you considered and incorporated all options for redesigning and relocating your project to avoid negative effects to fish and fish habitat?

◉ Yes ○ No

If yes, describe.

The project cannot be relocated due to the existing culvert location.

Have you consulted DFO's Fish and Fish Habitat Protection Measures Habitat (https://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures-eng.html) to determine which measures apply to your project? ◉ Yes ○ No

Will you be incorporating applicable measures into your project? ◉ Yes ○ No

If yes, identify which ones. If No, identify which ones and provide reasons.

Yes: prevent death of fish; ensure proper sediment control; prevent entry of deleterious substances in water; maintain fish passage [existing

All definitions are provided in Section G of the Guidance on Submitting a Request for Review

condition does not have fish passage]

Have you considered whether DFO standards and codes of practice apply to your project? ○ No ◉ Yes

If Yes, include a list.

Interim code of practice: Temporary cofferdams and diversion channels.

Have you considered other avoidance and mitigation measures? ○ No ◉ Yes

If Yes, include a list.

The project cannot be avoided or moved. Environmental Effect Mitigation measures (culvert design mitigation, project timing, and construction impact mitigation) is outlined in Supplemental Report Section 4.0.

Are there any relevant measures that you are unable to incorporate? ◉ Yes ○ No

(If yes, identify which ones.)

Maintain riparian vegetation; carry out works, undertakings, and activities on land.

The detailed Footprint Impact Analysis and Mitigation Plans can be found in Supplemental Report Appendix C.
Three trees which conflict with the culvert footprint have been identified at the culvert site. These trees will potentially need to be removed to complete the project. The trees provide limited shading and allochthonous inputs.

What harmful effects to fish and fish habitat do you foresee after taking into account the avoidance and mitigation measures described above?

None.

Do these include effects on aquatic species at risk*? ○ Yes ◉ No

If yes, please describe, including how many individuals will be harmed, harassed, or otherwise affected by the project, and how?

N/A

Do these include effects on areas identified as their residence or critical habitat? ○ Yes ◉ No

If yes, please describe

N/A

Are there any aquatic invasive species in the vicinity of your project area? ○ Yes ◉ No

(If yes, identify which ones.)

Does your project aim to, or will it be likely to, effect any of these aquatic invasive species? ○ Yes ◉ No

If yes, how?

All definitions are provided in Section G of the Guidance on Submitting a Request for Review

F) Signature

I, Larissa Darc (print name) certify that the information given on this form is to the best of my knowledge, correct and completed.

Signature

21/02/2023

Date

Information about the above-noted proposed work or undertaking is collected by DFO under the authority of the *Fisheries Act* for the purpose of administering the Fish and Fish Habitat protection provisions of the *Fisheries Act*. Personal information will be protected under the provisions of the *Privacy Act* and will be stored in the Personal Information Bank DFO-PPU-680. Under the *Privacy Act*, Individuals have a right to, and on request shall be given access to any personal information about them contained in a personal information bank. Instructions for obtaining personal information are contained in the Government of Canada's Info Source publications available at www.infosource.gc.ca or in Government of Canada offices. Information other than "personal" information may be accessible or protected as required by the provision of the *Access to Information Act*.

**All definitions are provided in Section G of the Guidance on Submitting a Request for Review*

TEAPOT HILL EAST CULVERT REPLACEMENT

Ministry of Transportation and Infrastructure

REQUEST FOR PROJECT REVIEW

SUPPLEMENTAL PROJECT INFORMATION REPORT

February 2023

ISL Engineering and Land Services Ltd. Is an award-winning full-service consulting firm dedicated to working with all levels of government and the private sector to deliver planning and design solutions for transportation, water, and land projects.

Proudly certified as a leader in quality management under Engineers and Geoscientists BC's OQM Program from 2014 to 2021.

islengineering.com

Follow us on:

Suite 201, 8506 200 Street, Langley, BC V2Y 0M1 T: 604.371.0091 F: 604.371.0098

February 21, 2023

Our Reference: 33118

Fish and Fish Habitat Protection Program
Ecosystems Management Branch
Fisheries and Oceans Canada
200-401 Burrard Street
Vancouver, BC V6C 3S4

Attention: Referrals Technician

Dear Sir/Madam:

Reference: Supplemental Project Information Report to Support the Teapot Hill East Culvert Replacement Request for Review, Cultus Lake, BC

The Ministry of Transportation and Infrastructure (MoTI) undertook emergency repairs of multiple stream crossings along the Columbia Valley Road damaged by the atmospheric river' event in November 2021. This event caused well-known and widespread flood damage to homes, businesses, and highway infrastructure. While temporary repairs sufficed at that time, there is a need to implement permanent culvert replacements to maintain access for residents of the Columbia Valley.

ISL Engineering and Land Services Ltd. (ISL) has prepared a design for a culvert replacement on Columbia Valley Road, east of Teapot Hill. The design includes replacement of the existing corrugated streel pipe (CSP) crossing with a pre-cast concrete box culvert, and channel armouring to provide increased erosion protection and protection of the infrastructure during future storm events.

The existing culvert is elevated and is a barrier to upstream fish passage. There is potential for fish access up to the existing outlet, however substrate at this location does not appear to be suitable for adult salmon spawning, and we have no evidence for spawning activity in this stream.

The following Supplemental Project Information Report has been prepared to assist in DFO's project review process and provides comprehensive information on environmental management measures that have been considered in the design of this crossing, and also sets out mitigation measures to address construction related effects. The enclosed supplemental report is formatted into the following key sections:

- Project Background - including location information, setting and project contacts.
- Description of Project -including rationale, work activities, materials, equipment, personnel, and schedule.
- Environmental Assessment - including desktop and field assessment of aquatic and terrestrial areas.
- Environmental Effects Mitigation -including measures to design and construct to minimize effects.
- Environmental Impact Assessment - including effects assessment and effects statement.

This small project has a total footprint of 65 m^2. This project requires removal of 3 trees which provide limited shading and allochthonous inputs. We do not see how this culvert replacement could constitute a harmful alteration disruption or destruction of fish habitat (HADD). We see this repair as being wholly beneficial from an environmental perspective and a risk management perspective

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APPENDICES

TABLES

FIGURES

1.0 PROJECT BACKGROUND, SETTING, AND CONTACTS

The Ministry of Transportation and Infrastructure (MoTI) retained ISL Engineering and Land Services Ltd. (ISL) to undertake design for permanent stream crossing repairs along the Columbia Valley Road. Stream crossing repairs and culvert replacements were required due to stream crossing damage, flooding, and channel bed displacement that occurred concurrent with the 'atmospheric river' event of November 13 to 15, 2021. In addition, ISL was retained to complete Environmental Assessment, Impact Assessment and to assist in satisfying environmental regulatory review and approval processes for the project.

A culvert east of Teapot Hill was affected by the atmospheric river event and will require works to repair and replace the crossing. The location of the culvert is outlined in **Figure 1**.

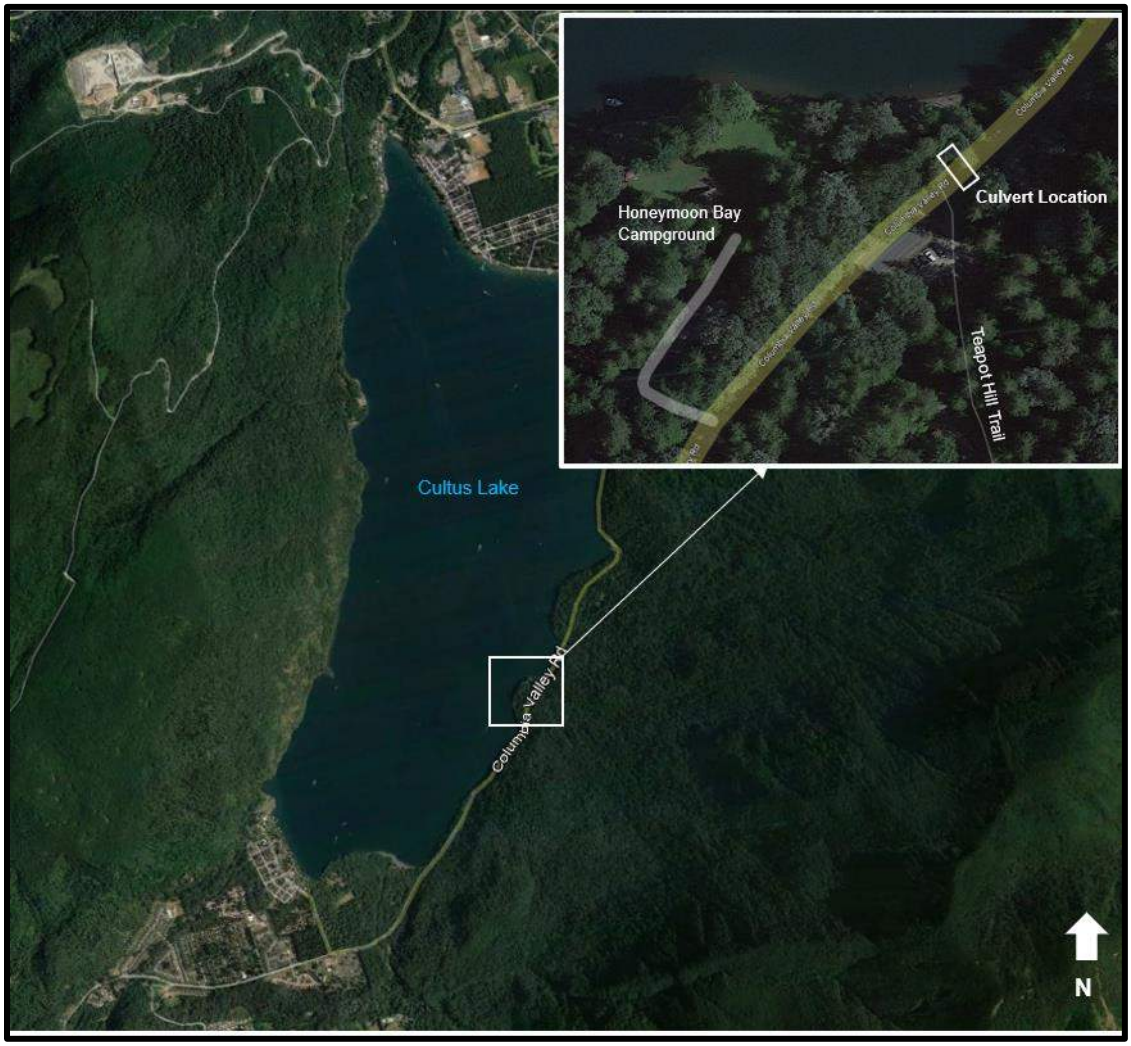


Figure 1. Key map of the culvert replacement location (NTS; source: Google Earth, 2023).

The following report has been prepared as a supplement to the Teapot Hill East Culvert Replacement Request for Project Review to assist in DFO's project review processes.

1.1 Project Location Information

Location and setting information for the culvert replacement is provided in **Table 1**.

Table 1. Project location, setting and stream information for the Teapot Hill East culvert replacement.

Primary Region	Cultus Lake, Fraser Valley Regional District, BC
General Location	Cultus Lake Provincial Park; on Columbia Valley Road between Delta Grove Campground and Honeymoon Bay Group Campground. The culvert location is below the Teapot Hill Trailhead, approximately 30 m northeast of the Teapot Hill trail parking area.
UTM	10 574276 m E 5432653 m N
Latitude/Longitude	49.042288 º, -121.984937º
Land Ownership at the works	Works are within MoTI's road ROW
Legal description of the lands	Cultus Lake Provincial Park
Stream Name	Unnamed Stream
Watershed Code	None
Fish Classification	Fish bearing; potential for anadromous fish access
Source Flows Into	Cultus Lake

1.2 Contact Information

ISL is acting as agent and consultant to MoTI. Contact information for the applicant (Owner) is provided in **Table 2**. The Owner's agent (consultant) information is provided in **Table 3**.

Table 2. Applicant's contact information.

Business Name	Ministry of Transportation and Infrastructure
Doing Business As	Provincial Government
Contact Name	Krista Englund, MRM, R.P.Bio.
Phone	236-468-1959
Email	Krista.Englund@gov.bc.ca
Mailing Address	310-1500 Woolridge Street Coquitlam V3K 0B8

Table 3. Consultant contact information.

Business Name	ISL Engineering and Land Services Ltd.
Doing Business As	Consultant
Contact name	Larissa Darc, M.Sc., B.I.T, Environmental Scientist
Phone	604-371-0091
Email	ldarc@islengineering.com
Mailing Address	#201 8506 200 Street, Langley BC, V2Y 0M1

2.0 PROJECT DESCRIPTION

2.1 Rationale/Justification for the Proposed Projects

The 'atmospheric river' event November 13 - 15, 2021 damaged the existing culvert along Columbia Valley Road. Damage to the culvert resulted from excessive bedload and debris movement through the culvert. The culvert became blocked with debris, and this caused water to erode around culvert,

leading to washouts. Emergency debris clean-out was required to restore the stream crossing to a functioning condition. A temporary steel corrugated pipe has been installed. The culvert replacement is required to provide properly engineered, permanent design solutions for the temporary crossing.

2.2 Description of Project Activities

Engineering designs for the stream crossing culvert is provided in **Appendix A**. The culvert replacement will consist of a box culvert, pre-cast headwalls and/or lockblocks, and inlet and outlet armouring using riprap.

2.2.1 Construction Activities

Anticipated construction activities for the culvert replacement are set out in **Table 4**. Fish salvage will only be required in the pool below the existing outlet as the existing culvert is a barrier to upstream fish passage.

Table 4. Construction activities for the Teapot Hill East culvert replacement.

Activity	Description
Fish exclusion	Temporary fish isolation fencing is to be installed upstream and downstream of the site area. The fish isolation fencing prevents fish from accessing the site during the construction period.
Fish salvage	After fish exclusion fencing is installed, fish will be removed from the isolated area using gee traps, seine nets, dip nets and backpack electrofishers under fish sampling/salvage permits issued by the Ministry of Forests, and where applicable, Fisheries and Oceans Canada (DFO). Fish salvaged are immediately released downstream of the work site.
Site isolation	Coffer dams will need to will be installed upstream and downstream of the existing crossings to prevent water entry into the worksite. The coffer dam selection will be by Contractor but are typically comprised of sandbags wrapped in plastic, megabags, aqua-dams, or steel plates.
Stream bypass	The Contractor will have to establish a pump bypass or gravity bypass or a combination thereof to complete the install (and removal of old culvert) “in the dry”, that is, in isolation from the stream flow.
Trash pumping	Turbid water will accumulate in the excavation for the new culvert, and significant amounts of this water may be from flow beneath the surface of the streambed gravel. Water that accumulates in the excavation must be pumped away ('trash pumped') so that the worksite does not become flooded with turbid water. This turbid water must be controlled, managed and/or treated so that it is not returned to the stream or to ditches draining to streams. Typical treatments for turbid water are to pump this water to vegetated areas well away from fish habitat, pumping to a vacuum truck, pumping to a flocculant bag, use of portable sediment treatment systems, or to Baker style tanks. In all cases it will be the Contractor's responsibility to obtain landowner permission to access and use non-MoTI lands for the discharge, control, and management of sediment laden water.
Culvert replacement	Once isolated, the old culvert is excavated and removed. At the design depth, geotextile is laid down and backfilled with subgrade material. The subgrade is wrapped with the geotextile. The culvert segments are laid sequentially, and each segment has a gasket to prevent leakage. Culvert inlet and outlet headwalls are then installed. Lastly, inlets and outlets are armoured with riprap. The culvert excavation is then backfilled up to the desired road grade elevation in preparation for asphalt.
Reintroduction of flow to new culvert	Upon completion of the new culvert and armouring to and from that culvert, stream flow is slowly reintroduced to the new culvert by removing a portion of the isolation wall. This allows water to slowly begin to enter the culvert. Once turbidity meets appropriate thresholds in the new culvert the first isolation wall is fully removed as the second isolation wall is built up.
Remove fish isolation	Fish isolation fences are removed.
Paving	The existing asphalt roadway overtop of the culvert will be restored. All disturbed areas which are not re-paved or armoured with riprap will be topped with erosion control blanket and hydraulic seed (riparian area mix) to mitigate riparian disturbance. Mitigation measures pertaining to site restoration are further outlined in Section 4.0.

2.2.2 Construction Schedule

The anticipated construction window for the Teapot Hill East culvert replacement is September 5 to December 21, 2023. A wide window has been requested due to assessment and design requirements combined with a lengthy lead time necessary to fabricate the concrete box culvert segments, coordinate amongst various stakeholders, environmental regulatory permitting processes, and project Tender.

2.2.3 Equipment and Materials

The project will require the following to be successfully implemented:

- Coffer dam materials;
- Stream bypass pumping equipment;
- Trash pumps;
- Excavators;
- Crane or large excavators for offloading culvert segments;
- Dump trucks for removing road fill and road base, importing fill, rip rap and substrate;
- Non-woven geotextile;
- Pre-cast concrete box culvert, headwalls, and lockblocks;
- Clean riprap and gravel (clear drain rock);
- Hydraulically applied coastal reclamation seed mix;
- Asphalt, crushed base coarse, and granular sub-base;
- Erosion and sediment control materials; including but not limited to, silt fence, erosion control blanket, polyethylene sheeting; and,
- Spill mitigation and control materials.

The project will not include the use of exotic chemicals or blasting.

2.2.4 Project Personnel

We would anticipate the work for each culvert to be completed by a crew of approximately 6-8 persons, although the amount of construction personnel onsite at a time may vary depending on the Contractor's methodology. Crews would include labourers and a site foreman.

There will be a requirement for QP (Qualified Professionals) to provide monitoring for the culvert replacements. QP's on this project would include an engineering inspector, Environmental Monitor (EM) and Qualified Environmental Professionals (QEP) to undertake species removal (salvage) prior to construction.

3.0 ENVIRONMENTAL ASSESSMENT

An Environmental Assessment (EA) was undertaken at the culvert site to assess environmental risks associated with the culvert replacement. Both desktop and field methods were used to assess risks to fish, wildlife, and vegetation resources.

Desktop information included:

- Provincial Internet Mapping Services, iMapBC, and Habitat Wizard.
- Provincial Conservation Data Centre (BC CDC) databases.
- Google Maps and Google Earth Pro (2022).
- Fish Inventories Data Queries (FIDQ).
- Wildlife Tree Stewardship Atlas (WiTS).
- Great Blue Heron Atlas (BC GBHA).
- Fraser Valley Regional District GIS (FVRD Web Map).
- DFO Aquatic species at risk map.
- Species at Risk Act (SARA) public registry.

David Neufeld, R.P.Bio. completed field reconnaissance at the crossing site on April 20, 2022. Fish and fish habitat reconnaissance inventory was completed by Nathan Discusso, B.Sc., B.I.T, and Mackaylen Bickle, B.Sc. of ISL on July 4, 2022. Watercourse assessment of reaches downstream and upstream of the culvert was carried out following Resource Inventory Standards Committee (RISC) 1:20,000 Fish and Fish Habitat Reconnaissance methods. Fish sampling was carried out by electrofishing under provincial and federal permits.

Wildlife and Species at Risk assessment was conducted by Larissa Darc, M.Sc., B.I.T of ISL on July 13, 2022. The Species at Risk survey was carried out by walking the project sections on foot and evaluating upstream and downstream areas of each watercourse for potential Species at Risk habitat attributes.

A tree survey confirming extents of anticipated tree removal was completed with project engineer's and construction management specialists on January 17, 2023.

3.1 Desktop Results

Our desktop investigation mapped Critical Habitat polygons for aquatic and terrestrial Species at Risk in proximity to the culvert replacement site.

3.1.1 Fish and Fish Habitat

The Teapot Hill East culvert is located an unmapped, unnamed tributary stream which flows from upslope on Teapot Hill and drains to Cultus Lake. Teapot Creek (Watershed Code 100-065700-09700-13300-8440) is mapped 350 m west of the culvert site, however, does not appear to have connectivity to the unnamed stream. There is no recorded fish species presence in Teapot Creek or the unnamed stream (FIDQ, 2022).

Aquatic Species at Risk

There is no mapped Critical Habitat for aquatic (fish) species at risk within the unnamed tributary (DFO, 2022). There is Critical Habitat for Coastrange sculpin (*Cottus aleuticus*) mapped within Cultus Lake. The Coastrange sculpin (Cultus population; also known as Cultus pygmy sculpin) has a provincial status of Red and is listed as Threatened on Schedule 1 of the federal *Species at Risk Act* (SARA). However, the mapped Critical Habitat extent is limited to only within Cultus Lake.

The Coastrange sculpin Recovery Strategy indicates there are significant data deficiencies which has prevented identification of specific features or attributes which should be designated as Critical Habitat (DFO, 2007). At the time of writing, the Recovery Strategy only designates general habitat features which are 'likely important' for the species as limnetic and deep benthic areas of Cultus Lake. The residence description for the species indicates that Coastrange sculpin nests are located under stones in deep parts of Cultus Lake (DFO, 2022).

There are no Orders for protection of Coastrange sculpin (Cultus population) Critical Habitat.

3.1.2 Wildlife and Terrestrial Species at Risk

The culvert is located in the Coastal Western Hemlock dry maritime (CWHdm) biogeoclimatic subzone which is characterized by highly productive and structurally complex coniferous forests (in undisturbed conditions) with high amounts of precipitation (BC Geographic Ecosystem Classification, 2022). The existing culvert is located within a cleared road corridor, along which shrubs and young forest are established and maintained as a young forest.

No wildlife trees, Bald Eagle (*Haliaeetus leucocephalus*), Great Blue Heron (*Ardea Herodias*), or Osprey (*Pandion haliaetus)* nests are mapped within 1 km of any culvert location (BC GBHA, 2022; WiTS, 2022).

Recent survey detections of wildlife species within Columbia Valley include Common Gartersnake (*Thamnophis sirtalis*), Ensatina (*Ensatina eschscholtzii*), Northern Alligator Lizard (*Elgaria coerulea*), Pacific Treefrog (*Pseudacris regilla*), and Western Red-backed Salamander (*Plethodon vehiculum*) (iMapBC, 2022).

Columbia Valley contains mapped historical occurrences and mapped Critical Habitat polygons for Species at Risk within 500 m of the culvert location (CDC iMap, 2022) (**Table 5; Figure 2**).

Table 5. Species at Risk polygons within 500 m of the culvert locations.

Species	Polygon Type	Provincial Status	Federal Status
Coastal Giant Salamander (*Dicamptodon tenebrosus*)	Occurrence and Critical Habitat	Blue	Threatened (SARA Schedule 1)
Trowbridge's Shrew (*Sorex bendirii*)	Occurrence	Blue	None

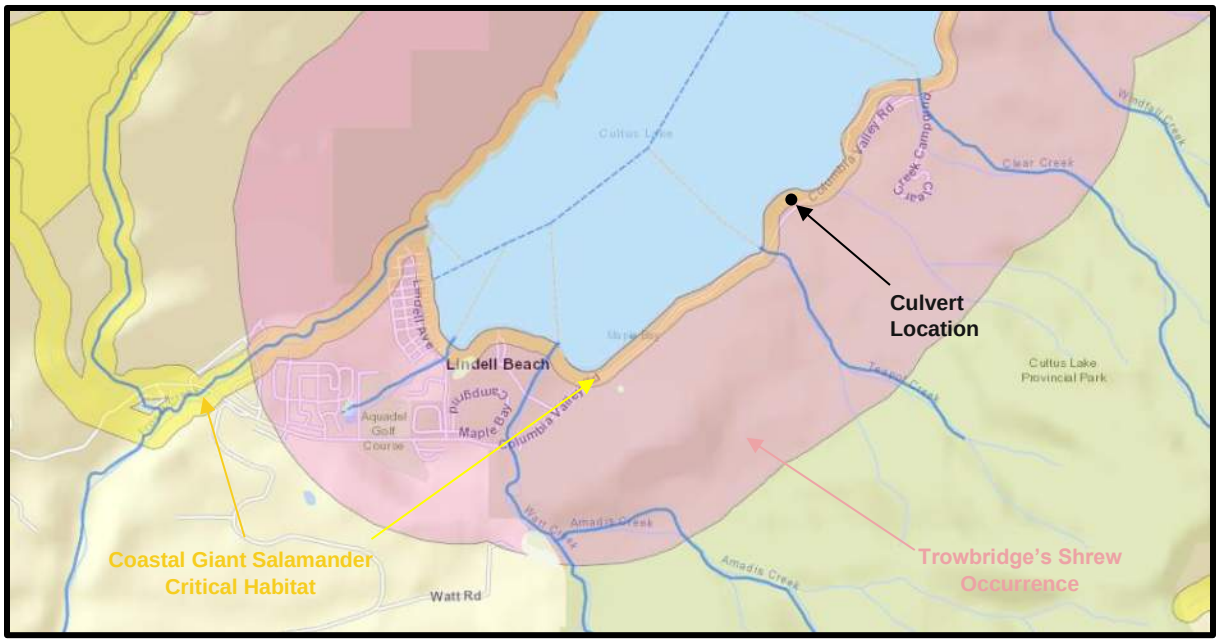


Figure 2. Critical Habitat and Occurrence polygons for Species at Risk in Columbia Valley within 500 m of the culvert location (NTS; source: iMapBC, 2023).

SARA prohibitions protect species listed as 'Threatened' or 'Endangered' on Schedule 1 and their Critical Habitat where that habitat is located on federal lands (i.e. that are a national park, First Nations Reserve Lands, marine protected area, migratory bird sanctuary, or a national wildlife area). On private lands, CH would only be regulated by application of a ministerial Order.

The provincial *Wildlife Act* provides habitat protection to species provincially listed as threatened or endangered (i.e. those species with a provincial status of 'Red'), but only when lands for these species has been designated as a Critical Wildlife Area or Wildlife Sanctuary within a Wildlife Management Area (WMA). Habitats for provincially listed species whose habitats may be impacted by forest or range practices are also managed through established Wildlife Habitat Areas (WHAs) under the *Forest Range Practices Act*.

Coastal Giant Salamander

The culvert replacement site is within mapped Critical Habitat for the Coastal Giant Salamander (*Dicamptodon tenebrosus*) (iMap BC, 2022). Coastal Giant Salamander (CGS) is a non-aquatic Species at Risk (SAR), This species has a provincial status of 'Blue' and is federally listed as Threatened on Schedule 1 of the *Species at Risk Act* (SARA).

Critical Habitat (CH) for CGS is designated based on verified occurrence records for the species upstream and downstream of the site, and then inferences on potential upland use and dispersal of individuals. CH polygons have been applied to any streams which have connectivity to and are within 500 m of where CGS has been detected, regardless of whether the stream has been sampled more than once or along the entire length (ECCC, 2017). CGS has historically been detected in drainages originating from Vedder Mountain and flowing into Cultus Lake, including Sweltzer River, Hatchery Creek, Fin Creek, Ascaphus Ceek, Laurel Creek, and other small unnamed tributaries draining from Vedder Mountain (BC CDC, 2023). Although the culvert location is mapped within CH which is around

the perimeter of Cultus Lake, there are no occurrence or survey records for CGS within drainages on the eastern side of Cultus Lake (Clear Creek, Teapot Creek, Frosst Creek, Windfall Creek).

CGS inhabit closed canopy streams in Douglas-fir and Bigleaf Maple forests (RISC, 2000). Pools (with transitioning tail-out glide habitat or “pocket” pools), riffles, overhanging banks, and abundant downed woody debris and other cover objects are important habitat elements for adult salamanders and larvae. Both larvae and adults are known to move very little from their habitats (maximum of 50 m, with 80% of adult individuals remaining within 20 m and 73% of larvae within 10 m) and may spend their entire life cycle in one stream.

CGS requires both aquatic and terrestrial habitat for breeding, larval development, foraging, and overwintering. To be clear, there is a difference between mapped CH polygon delineation and the site-specific attributes needed to support the species within a CH polygon. Site-specific attributes this species requires to complete its life history include:

- Cool (threshold ranging from 5-20°C), well-oxygenated water with low levels of suspended sediments.
- Permanent streams (year-round flow) with a stable channel.
- Coarse bottom substrate with grain size > 2 mm.
- Cover objects: substrate crevices, coarse woody debris, rocks, and overhanging banks.
- Old-growth and mature second-growth forest (> 60 years) and associated understory.
- Terrestrial refuges and overwintering areas including coarse woody debris, underground burrows, root channels, rocks.

There are currently no Orders for protection of CGS on any private lands. CGS has a provincial status of ‘Blue’ and therefore does not have any provincially designated lands where it has habitat protections.

Trowbridge’s Shew

Trowbridge’s Shrew has a provincial status of ‘Blue’ and is not a federally listed species on SARA. Although a broadly applied occurrence polygon is overlapping all of Cultus Lake, the last observation date for this species was in 1951, with only one juvenile male specimen collected (BC CDC, 2023).

Trowbridge’s Shrew is found in mature forest (dry or moist) with abundant ground litter, riparian fringe areas (but not streamside), forested canyons and ravines, and swampy woods (BC, CDC, 2023). There are significant data deficiencies for habitat attributes for Trowbridge’s Shrew as it is an inconspicuous species that is restricted to a small area of BC with a declining and fragmented ecosystem (BC CDC, 2023).

Trowbridge’s Shrew has a provincial status of ‘Blue’ and therefore does not have any provincially designated lands where it has habitat protections.

3.2 Field Results

The field assessment included evaluation of aquatic and terrestrial ecosystem components within the culvert replacement site.

3.2.1 Fish and Fish Habitat

The Teapot Hill east culvert is located on a < 1.5 m wide stream which flows into Cultus Lake. There is potential fish access to the outlet of this culvert from Cultus Lake, however, the culvert itself is elevated above the outlet and the plunge pool lacks depth to facilitate upstream fish passage (**Figure 3**).

Figure 3. Culvert outlet is elevated at Teapot Hill east culvert.

The stream was wetted throughout multi-season assessments in April, July, and January. Substrate consisted of road fill with trace cobble which is highly embedded from sediment deposition. No fish were observed.

Three trees downstream of the culvert would potentially need to be removed to facilitate construction of the new culvert. This includes one Western redcedar (*Thuja plicata*) and two bigleaf maples (*Acer macrophyllum*) (one of which is a snag).

Upstream of the culvert, there is low gradient sub-reach (**Figure 4**) that extends for approximately 30 m, at which time the stream bifurcates, and both of these braided channels have gradients of a sustained +25% up Teapot Hill. There is no potential for resident fish habitat on slopes of this kind, in small stream channels of this size.

Figure 4. Low-gradient stream channel at the inlet to Teapot Hill east culvert, upstream of Columbia Valley Road.

3.3 Wildlife and Species at Risk

Steller's jays (*Cyanocitta stelleri*) were observed at the Teapot Hill east site. No other wildlife was observed. No wildlife habitation areas, denning sites, or nests were observed.

One Class 5 Wildlife tree was observed at Teapot Hill east. This wildlife tree appears to be a bigleaf maple snag. No root buttresses were visible. Diameter at breast height (DBH) of the tree was 85 cm. 5. The tree has heart decay close to the base, and foraging cavities were evident. No nests or nesting activity were observed during the assessment (the assessment was undertaken outside of the bird nesting season), however 2 potential dormant nest cavities (> 5 cm diameter; approximate 7 m height) are present in the tree.

3.3.1 Coastal Giant Salamander

There are no known records for CGS within the tributary where the culvert is located. Our field assessment did not observe any CGS individuals or habitat attributes directly at the any of the culvert location. The streams lacked the essential step-pool morphology, 'pocket-pools', and cover objects to support CGS.

CGS require permanent streams with a stable channel and coarse-bottomed substrate. Existing substrate at the culvert is roadside fill and trace amounts of cobbles which have become embedded from sediment deposition. This road culvert has been highly disturbed and daylighted to facilitate emergency dredging and maintenance access; there are no cover objects or heterogenous stream morphology. It is unlikely CGS is present at the culvert location as the culvert and streams do not provide the appropriate site-specific habitat for this species.

3.3.2 Trowbridge's Shrew

The culvert site lacks habitat attributes for Trowbridge's Shrew. Similar to other prey species, the main habitat requirement for Trowbridge's Shrew is cover objects for protection from predators. The culvert site lacks cover objects and ground litter. Further, this species requires mature forest, and the forest surrounding the culvert replacement site is young forest.

4.0 ENVIRONMENTAL EFFECT MITIGATION

The project has considered mitigation throughout the planning, design, and future construction phases. ISL has considered best management practices which were appropriate for implementation during the planning, design, and future construction of the culvert. The following sections outline mitigation considered and implemented for the project.

4.1 Culvert Design Mitigation

The culvert has been designed to minimize and mitigate potential environmental effects. The design includes the following mitigation to ensure environmental effects are minimized:

- The culvert has adequate hydraulic capacity. The culvert inlet capacity exceeds both the 1:100 year maximum instantaneous flow and the 1:200 year maximum daily flow.
- The concrete box culvert is more stable and is to current design standards compared to the existing CSP temporary culvert;
- The culvert will be installed deeper than the existing culvert and embedded to reduce crossing gradient and minimize outlet scour;
- Inlet/Outlet erosion protection in the form of riprap armouring to prevent scour, undermining, and formation of a culvert outlet drop;
- The crossing has not historically and does not currently have fish passage due to obvious gradient barriers, fish passage was not considered to be a design feature for these crossings.

4.2 Project Timing

Construction is anticipated to commence September 5, 2023. The Contractor cannot work on Columbia Valley Road in the period of June 26 to September 4 due to heavy recreational traffic on this corridor. BC Parks has requested the construction works do not impact/block summer campers and recreationalists. Therefore, with the construction starting post Labour Day, the culvert will likely be completed in late fall. The culvert works will be completed outside of the standard South Coast reduced risk instream window (August 1st to September 15th). Completing the culvert replacement

outside of the least risk window does not impose a significantly higher risk than work inside the window because:

- There is no fish access upstream of the culvert. Neither the existing nor replacement culvert at this location have fish access requirements.
- There is potential fish access to the culvert outlet. However, substrate at Teapot East does not appear to be suitable for adult salmon spawning, and we have no evidence for this activity in this stream.
- The stream does not provide Critical Habitat for Coastrange sculpin below the culvert outlet.
- Flows within the stream were low to moderate during the same time period in 2022 and are expected to be manageable if fall construction is required.
- The installed temporary culverts which have been left in place are not to a design standard that mitigates risk of another washout and associated environmental consequence (sediment and turbidity discharge to downstream fish habitats).

4.3 Construction Impact Mitigation

It is important that the following mitigation approaches are implemented at construction to complete the work in a manner which limits environmental risk. The following sections outline specific measures to be implemented prior to, during, and after construction.

4.3.1 Environmental Monitoring

The culvert replacement will require services of appropriately qualified environmental professional onsite during construction to monitor the culvert works. An Environmental Monitor (EM) will be onsite to provide monitoring during construction to ensure compliance with provincial and federal legislation and to confirm and additional regulatory conditions are met.

4.3.2 Construction Environmental Management Plan

A Construction Environmental Management Plan (CEMP) has been prepared by ISL for use during the project (**Appendix B**). The CEMP lists mitigation measures for the project and includes:

- Environmental monitoring requirements and schedule;
- Working in the dry, including site isolation, stream bypass, trash pumping, and fish salvage requirements
- Water quality management;
- Erosion and sediment control;
- Deleterious substances control and hydrocarbon spill management;
- Vegetation management, including tree and shrub protection and invasive species management;
- Wildlife and Species at Risk Protection;
- Wildlife passage;
- Heritage resources chance find protocol; and,
- Post-construction site restoration.

Otherwise, Environmental Protection will be governed using MoTI Supplemental Specification 165 Protection of the Environment.

4.3.3 Best Practices for Construction

Tender specifications for Environmental Protection will follow 2020 Standard Specifications for Highway Construction Section 165 Protection of the Environment. A non-exclusive outline of key best practices which are covered by Section 165 (and supplementary specifications prepared by the design team) are outlined below.

Requirements for Deleterious Substances and Spill Management

- Equipment must operate from outside the stream channel, wherever possible. Mechanized equipment and machinery must not be operated within the water without appropriate mitigation measures prescribed by a qualified professional.
- Equipment and machinery must be clean and in good operating condition (e.g., power washed and free of leaks or excess oil and grease). No heavy equipment refueling or servicing within thirty (30.0) metres of any stream or surface water drainage.
- Steps must be taken to prevent the introduction of silt, debris, refuse, sediment or sediment-laden water, raw concrete or concrete leachate, or any other deleterious substances into the wetted perimeter of streams, ditches and storm sewer systems so that the quality of water is not adversely affected.
- A spill response plan and spill kit suitable for all substances on-site must be readily accessible on-site in the event of a release of a deleterious substance to the environment.
- Immediately report any spill of a substance that is toxic, polluting or deleterious to aquatic life of reportable quantities to the Dangerous Goods Incident Report 24-hour phone line at 1-800-663-3456.

Requirements for Erosion and Sediment Control

- Sediment, runoff and erosion control measures must be developed and implemented before instream activities and works begin, including details on the steps that will be taken to reduce sedimentation when significant precipitation, as defined in the EMPs, or overland flow events occur.
- Trash pumps will be deployed to dewater excavations. Trash pumps must not discharge sediment laden water to streams, ditches or catchbasins that drain to fish habitat.
- Sandbags or plates will be used to isolate the work site from the existing stream and crossing, which will operate as the gravity bypass.
- Efficacy of these measures is monitored during construction and adjustments are made, if needed.
- Fill, excavated material, debris or other erodible materials must be contained and placed at least thirty (30.0) metres outside of the bank of the stream and to an area where the material will not result in sediment run-off into the stream or another stream.
- Materials that are placed on the stream banks or within the active stream channel or floodplain (such as rock or riprap) must be free of fine particulates, overburden, debris and/or other substances that are potentially harmful to aquatic life and water quality.

- Rock riprap used to protect against erosion, will be clean of any substances deleterious to aquatic life, and durable, angular and suitably graded to resist movement by freshet flows.
- Fill, road crush, riprap or other materials used in or about the stream must be inert, clean and free of contaminants. Processed rock must not be acid generating or metal leaching.
- Ditches or water diversions in the work area must be constructed so they do not directly discharge sediment-laden surface run-off into the stream unless the discharge is authorized (e.g., waste discharge permit).

Requirements for Site Preparation, Restoration and Maintenance

- Site preparation and construction of the works is to be carried out from the banks of the stream to minimize disturbance to the stream.
- Disturbed areas (including riparian areas) are restored to an augmented ecological state with suitable species to restore the vegetative cover and prevent surface erosion and subsequent siltation of the stream. Mitigation Plans for restoration at the culvert site is included in **Appendix C**.
- Hydraulic seeding of the banks and areas adjacent to the stream with a heavy mulch, tackifier and local, ecologically suitable seed mix is prescribed. The Riparian Area Mix per the MoTI Supplemental Specification 757 will be used at the culvert site (see **Appendix C** for detailed seed specifications).
- Measures have been taken to minimize damage and disturbance on other property.
- The culvert repair will not lead to fish or other aquatic life stranding.

5.0 ENVIRONMENTAL IMPACT ASSESSMENT

Within the following sections, effects to instream and riparian habitat associated with the culvert replacements are outlined.

5.1 Instream and Riparian Footprint Analysis

The culvert will be installed within the majority of the existing culvert footprint. Due to the differing design (box culvert) compared to the existing culvert, replacement culvert is slightly larger than the existing CSP culvert area.

The culvert installation will have an instream footprint and a riparian footprint. For the purposes of our analysis, the instream ‘footprint’ of each culvert is the functioning instream area that is alienated through installation of the longer culvert barrel as well as disturbance associated with culvert inlet and outlet armouring. The riparian footprint is the functioning riparian area which will be disturbed to complete the culvert installation.

The Teapot Hill east culvert replacement will affect 30 m^2 of instream area and 35 m^2 of riparian area (total area 65 m^2). The detailed Footprint Impact Analysis and Mitigation Plans can be found in **Appendix C**.

Several trees which conflict with the culvert footprint have been identified at the culvert site. These trees will potentially need to be removed to complete the project. Tree information for each site is provided in **Table 6**.

Table 6. Trees potentially affected at culvert replacement site.

Site	Total Number of Trees Affected	Tree Data		
		Species	DBH (cm)	Wildlife Tree Classification
Teapot Hill East	3	Western redcedar	92	1
		Bigleaf maple	33	1
		Bigleaf maple	85	5

5.2 Effects Assessment

The following sections details effects of the culvert replacement on aquatic and terrestrial components.

5.2.1 Fish and Fish Habitat

Our site assessments identified that there is anadromous fish access potential to the to toe of road fill at Teapot Creek East.

The outlet of existing culvert at Teapot Hill East is elevated and is a barrier to upstream fish passage. Substrate at this location is road fill. This substrate does not appear to be suitable for adult salmon spawning, and we have no evidence for this activity in this stream The culvert replacement will affect 10 m^2 of marginal rearing habitat.

Critical Habitat (CH) for Coastrange sculpin is present in Cultus Lake. CH for this species has been identified as limnetic and deep benthic areas of Cultus Lake. This shallow, < 1.5 m wide stream lacks the CH attributes for Coastrange sculpin. We do not anticipate the culvert replacement will have an effect on Coastrange sculpin.

5.2.2 Tree Removals and Nesting Birds

All trees (n = 3) which will be potentially affected by the project are young forest age (< 80 years).

There is a Class 5 wildlife tree (snag) at Teapot Hill East. This dead tree with significant rot lacked a root buttress, but the lack of an observed root buttress may also be due to depositional processes in the area. The tree could be artificially installed wildlife tree ('woodhenge'), but due to the high-disturbance location (roadside), this is unlikely. No active nests were observed in this tree during assessment but did show evidence of multiple foraging attempts by woodpeckers and perhaps other species. The tree has heart rot near the base and could pose a hazard to motorists and the newly installed culvert should it be left in place.

5.2.3 Species at Risk

We did not identify habitat attributes for Coastal Giant Salamander at the culvert repair site. The habitat attributes are likely lacking due to the recent debris removal activities and emergency culvert

repair. The site had significant sediment deposition and has been degraded from emergency dredging activities. The stream at Teapot Hill East lacks step-pool morphology and has very limited instream and terrestrial cover elements; two important elements of site-level Critical Habitat.

The main habitat requirements for Trowbridge's Shrew, ground cover and mature forest, was also lacking at all the culvert site.

No individuals of any Species at Risk were identified during field assessment.

5.3 Effects Statement/Conclusions

This culvert replacement is necessary to prevent significant public safety and transportation risks, and to bring the temporary repairs that were implemented after the November 2021 atmospheric river up to current design standards.

Replacement of the existing culvert will offer hydrological, and structural benefits, through the installment of box culverts which meet present-day engineering standards and are less likely to suffer failures resulting in future negative environmental effect. The project design has considered instream and riparian restoration opportunities and have incorporated those into the design.

We trust the information set out in this Supplemental Project Information Report is adequate for DFO to complete a timely project review. Given the benefits of the culvert replacement, the mitigation developed concurrent with the design, the fact that this is replacement of existing failing infrastructure, the small project footprint (65 m^2), we do not see where this project causes harmful alteration disruption or destruction of fish habitat (HADD).

6.0 REFERENCES

B.C. Conservation Data Centre [BC CDC]. (2022). *BC Species and Ecosystems Explorer*. B.C. Ministry of Environment, Victoria B.C. Available: http://a100.gov.bc.ca/pub/eswp/ (Accessed November 17, 2022)

B.C. Conservation Data Centre. 2014. Occurrence Report Summary, Shape ID: 9164, Trowbridge's Shrew. B.C. Ministry of Environment. Available: http://maps.gov.bc.ca/ess/hm/cdc, (accessed Feb 13, 2023).

B.C. Conservation Data Centre. 1989. Species Summary: Sorex trowbridgii. B.C. Minist. of Environment. Available: https://a100.gov.bc.ca/pub/eswp/ (accessed Feb 13, 2023).

B.C. Conservation Data Centre. 2014. Occurrence Report Summary, Shape ID: 10378, Coastal Giant Salamander. B.C. Ministry of Environment. Available: http://maps.gov.bc.ca/ess/hm/cdc, (accessed Feb 13, 2023).

BC Geographic Ecosystem Classification. (2022). Forest Analysis and Inventory Branch. https://catalogue.data.gov.bc.ca/dataset/f358a53b-ffde-4830-a325-a5a03ff672c3 (Accessed November 17, 2022).

British Columbia Great Blue Heron Atlas [BC GBHA]. (2022). *Community Mapping Network.* https://cmnmaps.ca/GBHE/ (Accessed November 17, 2022).

CDC iMap. (2022). *Province of British Columbia.* Victoria, British Columbia, Canada. Available: http://maps.gov.bc.ca/ess/hm/cdc/ (Accessed November 17, 2022).

DFO Aquatic species at risk map. (2022). Fisheries and Oceans Canada [DFO]. https://www.dfo-mpo.gc.ca/species-especes/sara-lep/map-carte/index-eng.html (Accessed November 17, 2022).

Environment and Climate Change Canada [ECCC]. (2017). Recovery Strategy for the Coastal Giant Salamander (*Dicamptodon tenebrosus*) in Canada. Species at Risk Act Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. 2 parts, 34 pp. + 42 pp.

Fisheries and Oceans Canada. 2022. Residence description for Coastrange Sculpin (*Cottus aleuticus*), Cultus population in Canada. Species at Risk Act Residence Description Series. Fisheries and Oceans Canada, Ottawa. 2 pp.

Fisheries Inventory Data Queries [FIDQ]. (2022). FIDQ Summary Report: Teapot Creek (watershed code 100-065700-09700-13300-2930). http://a100.gov.bc.ca/pub/fidq/welcome.do. BC Ministry of Environment, Victoria, BC. (Accessed November 17, 2022).

FVRD Web Map. (2022). *Fraser Valley Regional District.* https://maps.fvrd.ca/portal/apps/webappviewer/index.html?id=eae55e6da5f14e11a9a5e07a78f339c5 (Accessed November 17, 2022).

Habitat Wizard. (2022). *Province of British Columbia.* Victoria, British Columbia, Canada. Available: https://maps.gov.bc.ca/ess/hm/habwiz/ (Accessed November 17, 2022).

iMapBC. (2022). *Province of British Columbia.* Victoria, British Columbia, Canada. Available: https://maps.gov.bc.ca/ess/hm/imap4m/ (Accessed November 17, 2022).

Ministry of Environment, Lands, and Parks, Resources Inventory Branch [RISC]. (2000). *Inventory methods for tailed frog and pacific giant salamander* (Version 2.0). Standards for Components of British Columbia's Biodiversity No. 39. Prepared for the Terrestrial Ecosystems Task Force Resources Inventory Committee. Available: https://wildlife-species.canada.ca/species-risk-registry/virtual_sara/files/plans/rs_coastal_giant_salamander_e_final.pdf

National Recovery Team for Cultus Pygmy Sculpin. (2007). Recovery Strategy for Cultus Pygmy Sculpin (Cottus sp.) in Canada. Species at Risk Act Recovery Strategy Series, Fisheries and Oceans Canada, Ottawa, v + 21 pp.

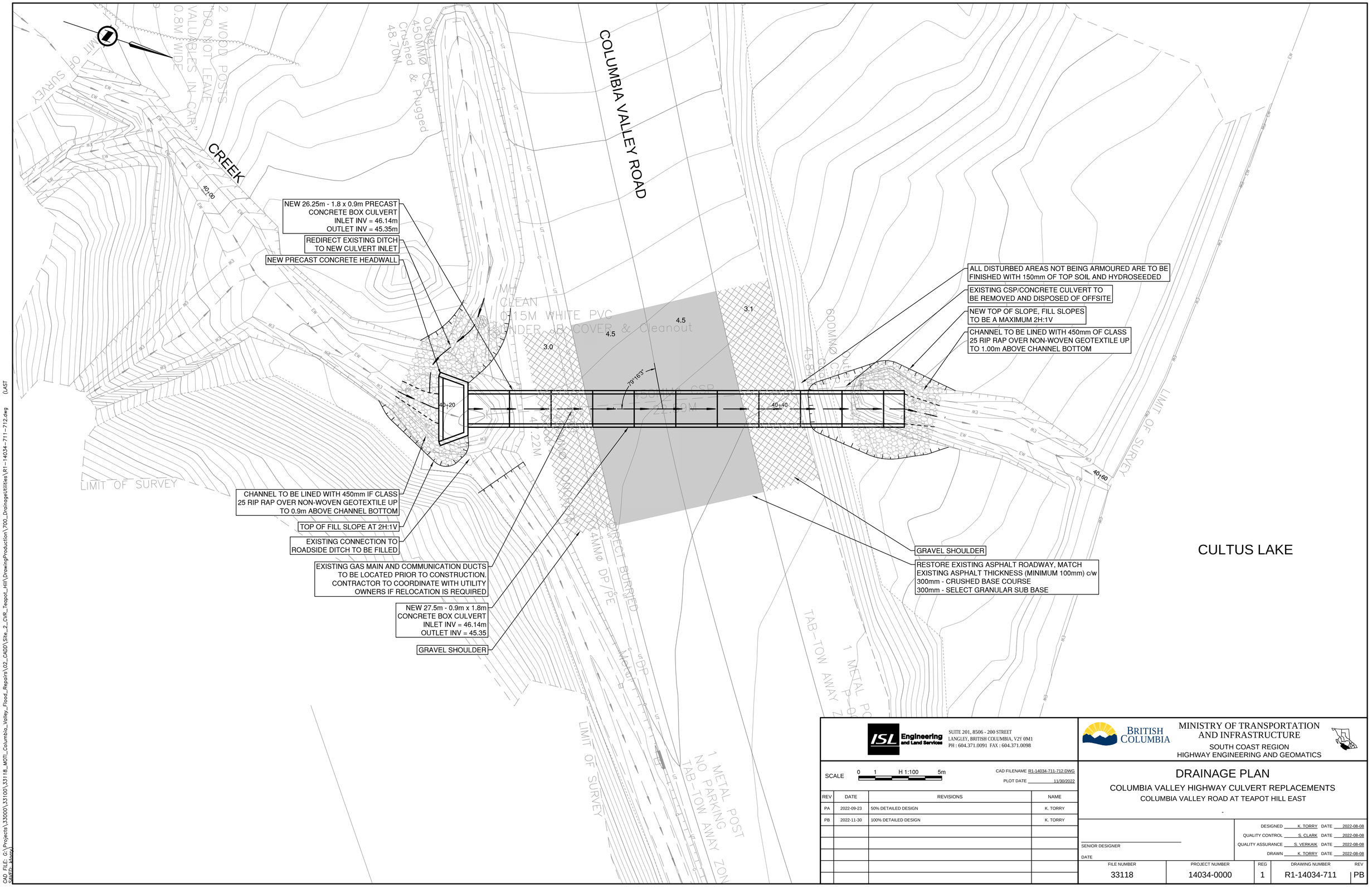
Species at Risk Act (S.C. 2002, c. 29). https://laws.justice.gc.ca/eng/acts/S-15.3/

Species at risk public registry. (2022). Government of Canada. https://species-registry.canada.ca/index-en.html#/species?sortBy=commonNameSort&sortDirection=asc&pageSize=10 (Accessed November 17, 2022).

Wildlife Tree Stewardship Atlas [WiTS]. (2022). *Community Mapping Network*. 2022. http://cmnmaps.ca/WITS_gomap/ (Accessed November 17, 2022).

APPENDIX A

ENGINEERING DESIGN DRAWINGS



CULTUS LAKE

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BRITISH COLUMBIA

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTH COAST REGION
HIGHWAY ENGINEERING AND GEOMATICS

SCALE 0 1 H 1:100 5m

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PLOT DATE 11/30/2022

REV	DATE	REVISIONS	NAME
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PB	2022-11-30	100% DETAILED DESIGN	K. TORRY

DRAINAGE PLAN

COLUMBIA VALLEY HIGHWAY CULVERT REPLACEMENTS

COLUMBIA VALLEY ROAD AT TEAPOT HILL EAST

-

SENIOR DESIGNER

DATE

DESIGNED K. TORRY DATE 2022-08-08
QUALITY CONTROL S. CLARK DATE 2022-08-08
QUALITY ASSURANCE S. VERKAIK DATE 2022-08-08
DRAWN K. TORRY DATE 2022-08-08

FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
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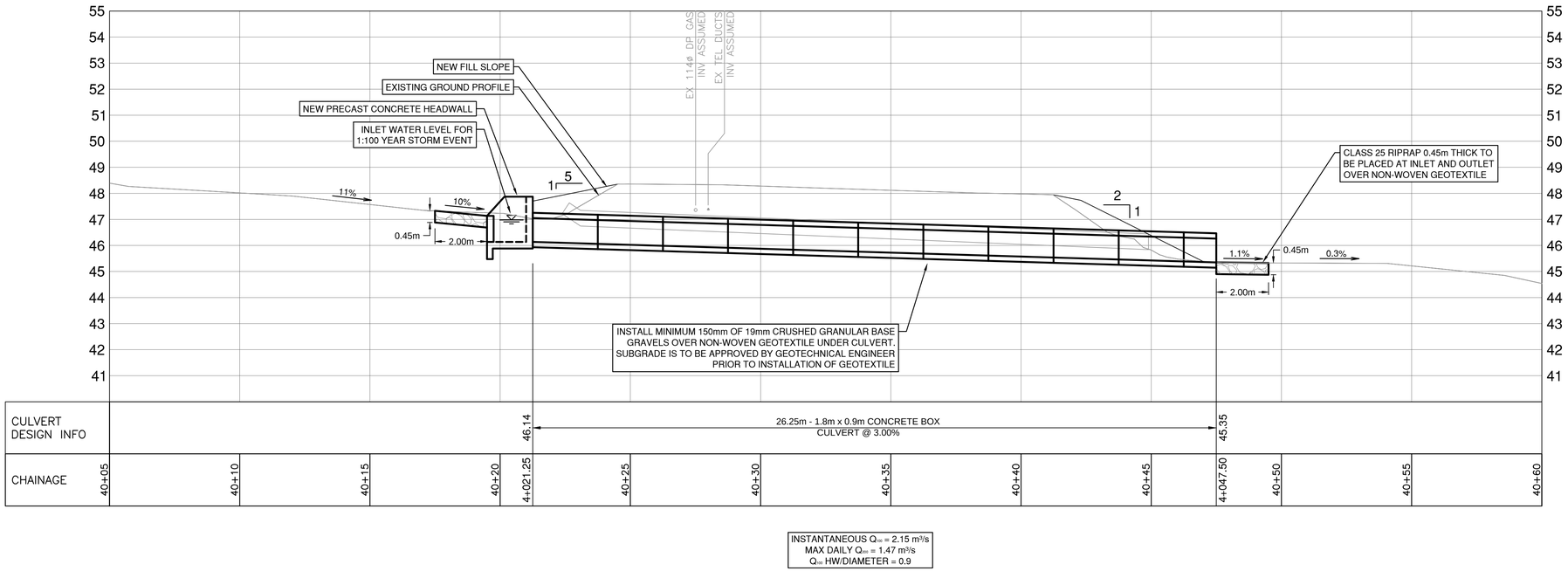

INSTANTANEOUS Q_{∞} = 2.15 m³/s
MAX DAILY Q_{∞} = 1.47 m³/s
Q_{∞} HW/DIAMETER = 0.9

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SUITE 201, 8506 - 200 STREET
LANGLEY, BRITISH COLUMBIA, V2Y 0M1
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CAD FILENAME R1-14034-711-712.DWG

PLOT DATE 11/30/2022

REV	DATE	REVISIONS	NAME
PA	2022-09-23	50% DETAILED DESIGN	K. TORRY
PB	2022-11-30	100% DETAILED DESIGN	K. TORRY

BRITISH COLUMBIA

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTH COAST REGION
HIGHWAY ENGINEERING AND GEOMATICS

DRAINAGE PROFILE

COLUMBIA VALLEY HIGHWAY CULVERT REPLACEMENTS

COLUMBIA VALLEY ROAD AT TEAPOT HILL EAST

-

SENIOR DESIGNER

DATE

DESIGNED K. TORRY DATE 2022-08-08
QUALITY CONTROL S. CLARK DATE 2022-08-08
QUALITY ASSURANCE S. VERKAIK DATE 2022-08-08
DRAWN K. TORRY DATE 2022-08-08

FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
33118	14034-0000	1	R1-14034-712	PB

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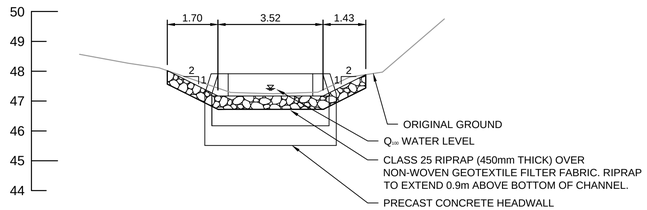

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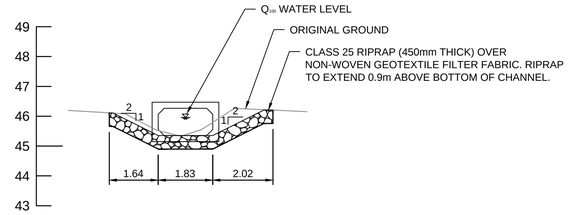

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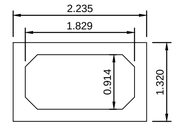

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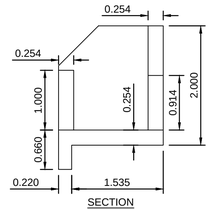

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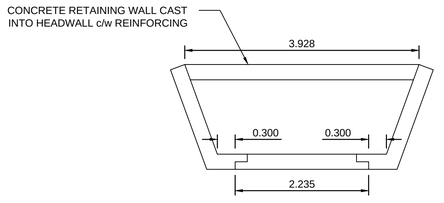

PLAN

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BRITISH COLUMBIA
MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTH COAST REGION
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DRAINAGE DETAILS
COLUMBIA VALLEY HIGHWAY CULVERT REPLACEMENTS
COLUMBIA VALLEY ROAD AT TEAPOT HILL EAST

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APPENDIX B

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

PROVINCE OF BC

COLUMBIA VALLEY HIGHWAY STREAM CROSSING FLOOD REPAIRS

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

Ministry of Transportation and Infrastructure | Final Report

May 2022

Draft Report 33118

Ministry of Transportation and Infrastructure

PROVINCE OF BC
Columbia Valley Highway Stream Crossing Flood Repairs
CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

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ISL Engineering and Land Services Ltd. Is an award-winning full-service consulting firm dedicated to working with all levels of government and the private sector to deliver planning and design solutions for transportation, water, and land projects.

Proudly certified as a leader in quality management under Engineers and Geoscientists BC's OQM Program from 2014 to 2021.

INDIGENOUS
ACKNOWLEDGEMENT

We acknowledge we are undertaking stream crossing repair work on tributaries to Sxótsaqel (Cultus Lake) within the traditional and unceded territory of the S'ólh Téméxw (Stó:lō), Nuxwsa'7aq (Nooksack), and Coast Salish peoples. We come with respect for this land, and for the people who have and do reside here.

TABLE OF CONTENTS

1.0 Purpose of this Plan

The enclosed 'Construction Environmental Management Plan' (CEMP) has been prepared by ISL Engineering and Land Services Ltd. (ISL) for the use by the Ministry of Transportation and Infrastructure concurrent with the planning, design and regulatory permitting processes associated with seven stream crossing repairs along the Columbia Valley Highway, Sxótsaqel (Cultus Lake), BC.

Stream crossing repairs and culvert replacements are required due to flooding and channel bed displacement concurrent with the 'atmospheric river' event that occurred November 13 to 15, 2021.

This CEMP represents MOTI's commitments to plan, design, and implement construction of these repairs in a manner that minimizes footprint effects and limits effects upon the productive capacity of watercourses that provide fish habitat and may provide habitat for species at risk.

This EMP establishes the framework for planning and design that will consider site specific requirements and also cites well-known applicable Best Management Practices (BMPs) that will assist in planning, designing and implementing the project we for mitigation of environmental effects.

2.0 Setting

Seven sites along the Columbia Valley Highway were identified as having been affected by the atmospheric river event. A key map showing the general locations is provided in Figure 1. Table 1 provides location information. At six of the seven sites there is evidence of emergency channel dredging to address bedload build-up at the stream crossings and at three of the seven sites temporary corrugated steel pipe culverts have been installed. At two sites (Site 1, and Site 6) existing culverts remain in place and are these culverts are in failing condition.

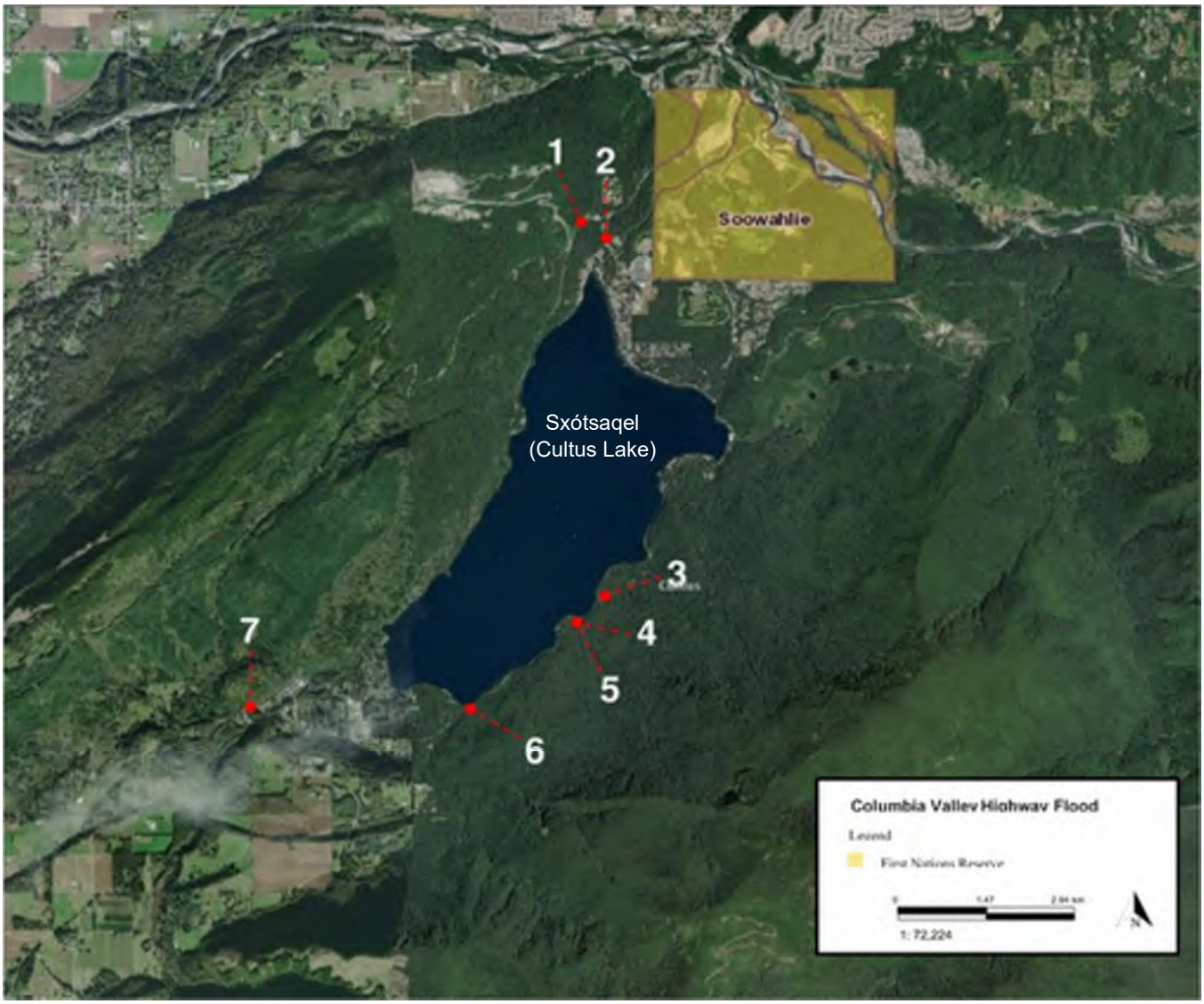


Figure 1. Key map showing the general location of the seven sites.

Table 1. Location of the six stream crossing repair locations.

#	Site	Approx. Coordinates LAT/LONG UTM	Nearest Stream/River/ Body of Water
1	Columbia Valley Rd Culvert at DFO Research Laboratory	49.078697 N / 121.979838 W 10 574499 m E 5436705 m N	Hatchery Creek (Sweltzer Creek Tributary)
2	Parmenter Road over Hatchery Creek (Sweltzer Creek Tributary)	49.080779 N / 121.982887 W 10 574273 m E 5436933 m N	Hatchery Creek (Sweltzer Creek Tributary)
3	Columbia Valley Road Culvert at Delta Grove	49.045108 N / 121.980111 W 10 574568 m E 5433025 m N	Tributary to Sxótsaqel (Cultus Lake)
4	Columbia Valley Road Culvert at Teapot Hill Parking Area West	49.042288 N / 121.984937 W 10 574276 m E 5432653 m N	Tributary to Sxótsaqel (Cultus Lake)
5	Columbia Valley Road Culvert at Teapot Hill Honeymoon Bay Group Camping (East)	49.042816 N / 121.983627 W 10 574181 m E 5432653 m N	Tributary to Sxótsaqel (Cultus Lake)
6	Columbia Valley Road Culvert at Maple Bay	49.034397 N / 121.998997 W 10 573165 m E 5431962 m N	Tributary to Sxótsaqel (Cultus Lake)
7	Columbia Valley Road Culvert at Leisure Valley	49.033951 N / 122.030476 W 10 570865 m E 5431983 m N	Tributary to Frosst Creek

3.0 Regulatory Overview

The CEMP primarily considers applicable provincial and federal legislation pertaining to the management of streams, fish habitat, and wildlife habitats. Including:

- Fisheries Act managed by Fisheries and Oceans Canada (DFO)
- Species at Risk Act (SARA) managed by Fisheries and Oceans Canada (aquatic SAR) or Environment Canada (Terrestrial SAR)
- Migratory Birds Convention Act (MBCA);
- Water Sustainability Act (WSA);
- Water Sustainability Regulation (WSR) and,
- Wildlife Act.

The Ministry will continue to work closely with regulatory partners in order to obtain all necessary authorizations and continues to follow all applicable best management practices to complete the stream crossing repair work.

Fisheries and Oceans Canada (DFO)

- Fisheries Act Review, and if required, Authorization for work around fish habitat or aquatic species at risk habitats.
- SARA Section 73 Permit for salvage of aquatic Species at Risk, and possible Critical Habitat disruption

BC Ministry of Forests

- Water Sustainability Act Section 91 Order or Change Approval or Notice per Authorized Change Section 39(1) per the Water Sustainability Regulation for Changes in and about Streams.
- Requirements and Best Management Practices for Making Changes in and About A Stream in British Columbia (Jan 2022).
- Adheres to the Requirements and Best Management Practices for Making Changes in and About A Stream in British Columbia provided by the Ministry of Forests, Water Management Branch.
- Fish Collection Permit – for fish salvage
- Wildlife Collection Permit – for handling vertebrates (amphibians)
- Comply with the Heritage Conservation Act

BC Ministry of Transportation and Infrastructure

- 2020 Standard Specifications for Highway Construction Section 165 Protection of the Environment

Partner Engagement

- Frequent meetings amongst provincial and federal regulatory staff to evaluate environmental assessment findings, design and tender and modify work procedures as necessary.

4.0 Fish and Aquatic Habitat Information

Reconnaissance level investigations have been completed (April 25), with detailed site investigation to follow. The following fish species are known to be present within Sxótsaqel (Cultus Lake), Sweltzer Creek and Frosst Creek:

- Bull trout *(Salvelinus confluentus)*
- Dolly Varden (Salvelinus malma)
- Coastal cutthroat trout *(Oncorhynchus clarki clarki)*
- Rainbow trout *(Oncorhynchus mykiss)*
- Steelhead *(Oncorhynchus mykiss)*
- Cultus Lake pygmy sculpin *(Cottus aleuticus)*
- Chinook salmon *(Oncorhynchus tshawytscha);*
- Chum salmon *(Oncorhynchus keta);*
- Coho salmon *(Oncorhynchus kisutch)*
- Pink salmon *(Oncorhynchus gorbuscha)*
- Sockeye salmon *(Oncorhynchus nerka)*
- Kokanee *(Oncorhynchus nerka)*

There is potential for some of these species to utilize tributaries to these systems. That potential is defined by habitat conditions within the tributaries as well as the presence of barriers to fish passage.

ADULT STEELHEAD TROUT

SPAWNED CHUM SALMON

MATURE COHO SALMON

5.0 Site Reconnaissance Information

5.1 Site 1 – Hatchery Creek (Sweltzer Creek Tributary) at Lakeshore Drive

Site 1 is located on Hatchery Creek below Lakeshore Drive with emergent fish present during investigation. The assessed section is a low gradient reach that flows into Sweltzer Creek with no permanent barriers observed downstream. The culvert bottom has collapsed on itself and is currently operating at reduced capacity. Flows were moderate and water was clear, however substrate was packed with fine silts and organic composite indicative of recent disturbance.

Key Observations:

- Sediment release downstream during flood event
- Fish presence and potential habitat for Species at Risk (SAR): Coastal Giant Salamander, Coastal Tailed Frog
- Dredged channel
- Culvert is collapsing, with rusted out bottom

Key Design Elements:

- Q200 flow design
- Culvert fish passage considerations
- Culvert embedment with weirs
- Inlet/Outlet erosion protection
- Restoration of channelized riffle downstream of crossing
- Invasive plant species management
- Riparian restoration planting

Key Construction Mitigation:

- Site isolation
- Bypass
- Working in the dry
- Trash pumping
- Fish salvage
- Environmental monitoring
- Wildlife and Species at Risk Protection
- Wildlife passage

5.2 Site 2 – Sweltzer Tributary at Parmenter Road

Site 2 is located on Hatchery Creek at Parmenter Road. The crossing has been replaced with a temporary CSP, which would appear undersized for Q200 discharge. Both the temporary and existing culvert are well elevated above the channel bed. The site would appear to have been the location of a natural cascade, which would have been a barrier to anadromous fish access. The potential for upstream resident fish presence needs to be investigated. Invasive *Lamium* sp. was observed in the forest immediately adjacent to the temporary crossing.

Key Observations:

- Sediment release downstream during construction to fish habitat and potential SAR (Coastal Giant Salamander, Coastal Tailed Frog, Red-legged Frog, and Trowbridge Shrew) habitat.
- Fish salvage is required (at least at the downstream outlet)
- Resident fish may be present and this needs to be investigated.
- Invasive plant *Lamium sp.*

Design Mitigation:

- Q200 flow design
- Inlet/outlet erosion protection
- Riparian restoration plan

Key Construction Mitigation:

- Site isolation (Working in the dry)
- Bypass
- Trash pumping
- Fish salvage
- Environmental monitoring
- Wildlife and SAR Protection

5.3 Site 3 – Hwy Culvert adjacent to Delta Grove Campground

Site 3 is a moderately sized (3 m wide) seasonal to ephemeral stream that flows into Sxótsaqel (Cultus Lake) through the Deltagrove Campground. The stream was entering its seasonal dry period in April, with reaches downstream of the Columbia Highway exhibiting only intermittent discharge. Upstream from the lake 60 m the stream channel was entirely dry. The potential for this stream to support fish or species at risk is very limited because of the lack of scour at the beach combined with what appears to be extended dry periods (May through to October).

Key Observations:

- Sediment dredging from channel
- Existing or possible partial replacement
- CSP and concrete
- Seasonal to ephemeral discharge
- Access restrictions related to downstream culverts, rip rap and natural dissipation of water volume through the alluvial/colluvial fan

Key Design Mitigation:

- Q200 flow design
- Inlet/Outlet erosion protection
- Riparian planting
- Consider this stream to be insignificant for fish habitation, but some culvert embedment appropriate for small mammal passage

Key Construction Mitigation:

- Work during periods when the stream is naturally dry (May through early October)
- Bypass and trash pumping
- Part-time Environmental Monitoring

5.4 Site 4 – Culvert at Teapot Hill Parking Area

Site 4 is a small <1.5 m wide stream that flows into Sxótsaqel (Cultus Lake). The highway culvert is elevated above the outlet stream and the plunge pool is insufficient in this small stream to facilitate upstream fish passage. Upstream of the highway there is only a short (<20 m long) section of low gradient stream channel. Upstream of this point the stream bifurcates and these two <0.75 m wide channels are on slopes well in excess of 20%.

Key Observations:

- Sediment accumulations dredged from channel.
- No fish passage upstream of existing structure.
- Fish friendly design would not offer significant fish habitat improvements given short length of low gradient channel.
- Sediment release downstream during construction to fish habitat and potential SAR: Oregon Forestsnail, Red-legged Frog, and Trowbridge Shrew habitat.

Key Design Mitigation:

- Q200 flow design
- Inlet/Outlet erosion protection
- Avoid wildlife tree (Class 4) removal.
- Mitigation Class 1 Wildlife Tree root damage.
- Riparian restoration planting

Key Construction Mitigation:

- Site isolation
- Bypass
- Working in the dry
- Trash pumping
- Environmental monitoring

5.5 Site 5 – Culvert at Teapot Hill/Honeymoon Bay Campground

Site 5 is a moderately sized channel that was completely dry during investigation. This ephemerally wetted channel may be an avulsion of another stream channel (wetted at the time of assessment) that is approximately 200 m south of this location. This avulsion channel likely only forms a connection to Sxótsaqel (Cultus Lake) during rare peak flow events, providing no potential use for fish at the elevation of the highway.

Key Observations:

- Appears to have been formed from a partial channel avulsion
- Sediment accumulation and removal during flood event
- Replacement CSP and rock stack headwall
- Dry steep (12%), ephemeral bony channel unsuitable for fish habitation

Key Design Mitigation:

- Q200 flow design for replacement culvert
- No fish passage requirement
- Inlet/Outlet erosion protection
- Riparian restoration planting

Key Construction Mitigation:

- Complete works during periods of no flow (April to October)
- Work in the dry
- Trash pumping as required
- Part-time environmental monitoring

5.6 Site 6 – Culvert at Maple Bay

Site 6 is a very small <1 m wide ditch that collects slope seepage and drains it across the road to a small low gradient stream that has poor connectivity to Sxótsaqel (Cultus Lake). Poor connectivity is due to the observation that the discharge dissipates into the gravel beaches and there is very limited scour that flows into Cultus Lake and provides relief from significant rock seepage upstream. Gradient at the road prism exceeds 35%, so the 'stream' at the level of the road is not one where fish passage is required.

Key Observations:

- Really just shallow ditch relief from east road edge
- Too steep for fish passage

Key Design Mitigation:

- Q200 flow design for replacement culvert
- No fish passage requirement
- Inlet/Outlet erosion protection

Key Construction Mitigation:

- Site isolation if flows are present
- Bypass if flows are present
- Working in the dry
- Trash pumping
- Part time environmental monitoring

5.7 Site 7 – Leisure Valley Trailer Park Frosst Creek Tributary

Site 7 is an unnamed tributary to Frosst Creek that has undergone significant recent channel dredging due to flooding. The existing culvert is elevated well above the channel at the existing culvert outlet. There is no potential for fish passage here given the grade change at the highway. At the time of the assessment there was significant water within the channel and there may be potential for resident fish habitation. This will be investigated, during upcoming environmental assessment.

Key Observations:

- Sediment release downstream during flood event
- Dredged channel
- Fish presence at downstream end of culvert
- Potential for resident fish populations upstream need to be investigated
- Potential SAR habitats
- Invasive English Ivy

Key Design Elements:

- Q200 flow design
- No fish passage considerations natural gradient suggestive of a falls cascade at this location historically
- Culvert embedment with weirs
- Inlet/Outlet erosion protection
- Riparian restoration planting

Key Construction Mitigation:

- Site isolation
- Bypass
- Working in the dry
- Trash pumping
- Fish salvage
- Environmental monitoring
- Potential wildlife and Species at Risk Protection
- Invasive species management considerations

6.0 In-Stream Works Best Practices

A priority for MoTI is to minimize effects to instream fish habitats and aquatic habitats that support Species at Risk. The November 14 -15, 2021 flood events resulted in very significant natural disturbance to stream channels along the Columbia Valley Highway. Most of the damage was the result of bedload mobilization and redistribution causing stream crossings to become plugged and channels to overfill and overflow.

Temporary crossings have been installed in several locations, but ultimate crossing design aims to replace the temporary culverts with permanent structures that will meet the Q200 storm event discharge.

6.1 Instream Work Timing Windows

The standard reduced-risk timing window for instream works for the South Coast region is August 1st to September 15th. Due to the heavy recreational traffic on the Columbia Valley Road in the summer, the flood repair works will be scheduled to commence after the Labour Day long weekend (after September 5, 2022). Crossing repairs will be completed by March 31, 2023.

Of the 7 flood repair sites, only Site 1 (Hatchery Creek) has potential anadromous fish access through the existing crossing. This site will be scheduled for repair on a priority basis after the Labour Day weekend. Site 2 and Site 7 may have no anadromous spawning potential at the upstream end of these boulder dominated reaches. Sites 3, 4, 5, and 6 would either not have fish presence or are only substantially wetted following major rains or rain on snow, or spring snow melt periods. Work in these non-fish bearing reaches can be reasonably scheduled for any period where there is low discharge and no imminent risk of major storms or snowmelt. Work should be timed to avoid significant rain events (>25mm /24 hours) and where there is excessive ground saturation.

6.2 Culvert Fish Passage Best Practices

Of the seven sites investigated only Site 1 requires a fish friendly design. The balance of the stream crossings have identifiable barriers or severe, natural habitat quality limitations (gradient, ephemeral to seasonal discharge on steeper terrain).

Maintaining fish passage in culverts, or re-establishing fish passage where it has been historically cut-off is a priority for MoTI. Selection of the fish friendly approach to fish passage is dependent on channel size, channel gradient, culvert size (capacity) and culvert type.

Key elements for fish friendly culvert fish passage include:

- Sufficient culvert embedment to minimize outlet scour.
- Outlet protection to avoid outlet scour and formation of a culvert outlet drop.
- Downstream weir to facilitate fish passage into the culvert.
- Simulated streambed within the culvert or construction of an artificial weir-pool treatment.

6.3 Fish Salvage Best Practices

- A fish salvage crew is to be deployed prior to conducting instream works for Site 1, Site 2 and Site 7.
- The Qualified Environmental Professional (QEP) is responsible for obtaining relevant permits for the salvage operation. The salvage crew must abide by all conditions set out in the permits.
- The QEP will need to install isolation fish fencing upstream and downstream of instream work areas before fish will be removed from the work area. The QEP is also responsible for maintenance and removal of the fencing.
- The fish salvage team must be led by a QEP, and must use gee traps, seine nets, backpack electrofisher or a combination of all three to remove fish from the worksite.
- Fish salvage must be done in a sequential manner and utilize enough passes and techniques to ensure fish have been removed from the worksite.
- Instream works will not start until fish salvage is complete and the EM has issued the Notice to Proceed with site isolation and bypass.
- Isolation fencing is to remain installed for the duration of the project until flows have been established through the worksite.

6.4 Site Isolation Best Practices

- Fully functioning site isolation (coffer dams) are required upstream and downstream of the work site to prevent water flow through the work site during construction. The best form of site isolation is to do the works instream when the streams are naturally dry. Sites 3, 4, 5 and either were dry during reconnaissance inspections in April 2022 or have such low discharge that they are likely to be dry by the late summer early fall construction window.
- Site isolation can be achieved using several methods including sandbags wrapped in polyethylene sheeting or sheet plate installed at the upstream end of the work site.
- The site isolation technique utilized must be “substantially leak free”, that is of sufficient depth and quality to stop most discharge from weeping through the upstream site isolation coffer dam.
- Site isolation and bypass must remain in place throughout all instream works. The sites cannot be allowed to flood when crews stand down for evenings or weekends.
- Even in dry stream channels the Tender specifications should include language requiring provisions for site isolation, in the event of unforeseen rain events.

6.5 Bypass Best Practices

- After establishing site isolation, instream works, are to be completed “in the dry”; that is in isolation from flowing water.
- A full stream bypass needs to be deployed concurrent with site isolation and maintained for the duration of the instream works at each project location.
- Even in dry channels, provisions for bypass should be made part of the environmental specification for the Tender.
- Bypass directs clean water from upstream of the site, around the worksite, discharging this same water to the stream channel immediately downstream of the isolated site.

- Water must be returned to the stream channel immediately downstream of the lowest isolation fence, to prevent dewatering of fish-bearing habitat or species at risk habitat
- Bypass water must be discharged back into the watercourse onto non-erodible surfaces (natural bedrock, temporary rip rap placement, plastic sheeting or diffuser.).

6.6 Trash Pumping Best Practices

- Subsurface water or water that leaks through the isolation wall (coffer dam) will accumulate within the work zone. This water may need to be removed from the worksite before it floods the works. The water accumulating in the work site is usually very turbid and cannot be discharged to streams or ditches that provide fish habitat or habitat for aquatic species at risk.
- A 'trash pump' may need to be deployed to draw this sediment-laden water from the work site and pump it to a location where it will not cause the deposition of a deleterious substance to fish habitat or to species at risk habitat.
- Techniques for the effective control of sediment laden water from a trash-pump system may include:
    - Pumping sediment laden water to dry vegetated areas well away from fish habitat.
    - Pumping water into an onsite baker tank for settlement.
    - Pumping water to a portable treatment system
    - Pumping water to flocculent bags that can weep clean water to vegetated areas
    - Pumping water to constructed soak-away sediment basins
- Trash pump discharge points must be equipped with an energy dissipator to prevent scour of receiving terrain and oversaturation of discharge points leading to overland flow.
- Where trash pumps are discharging to land, frequent movement of the discharge hose is required to avoid excess ground saturation.
- An EM is required to monitor the trash pump discharge point to ensure it is functioning as intended (either dissipating sediment laden water or effectively treating it).

6.7 Water Quality Monitoring Best Practices

As part of the environmental monitoring requirement during construction, water quality data (Turbidity, pH) will be collected during regular inspections upstream and downstream of the worksites. Environmental regulatory permits are put in place outlining term and conditions that need to be followed including water discharge limits.

Monitoring for water quality will be important to address issues relating to sediment release downstream and ensuring that turbid discharge does not occur into downstream fish habitat.

Environmental monitors will be diligent in evaluating the risk to not only mitigating water flowing through the worksite but also to ensure environmental design specifications are followed as to not release sediment laden water downstream (i.e. rip rap is clean of sediment and erosion and sediment control measures are installed).

7.0 Wildlife and Species at Risk

7.1 Listings and Critical Habitat Polygons

Species at Risk (SAR) are Extirpated, Endangered, or Threatened species or a Species of Special Concern. These include species that are 'Red listed' (Extirpated, possibly extirpated, Critically Imperiled, Imperiled) or 'Blue listed' (Special Concern) by the province as well as those species that are Schedule 1 of the Species at Risk Registry of the federal Species at Risk Act. The following SAR and/or SAR habitats have been detected in the Columbia Valley:

- Coastal Giant Salamander *(Dicamptodon tenebrosus)*
- Trowbridge's Shrew *(Sorex trowbridgii)*
- Oregon Forestsnail *(Allogonia townsendia)*
- Marbled Murrelet *(Branchyramphus marmoratus)*
- Coastal Tailed Frog *(Asacphus truei)*
- Red-legged Frog *(Rana aurora)*

Critical Habitat (CH) polygons are established as part of Recovery Plans for SAR. Terrestrial Species at Risk Critical Habitat polygons for Coastal Giant Salamander, Marbled Murrelet, and Trowbridge's Shrew have been identified overlapping Sites 1-7 (Figure 2).

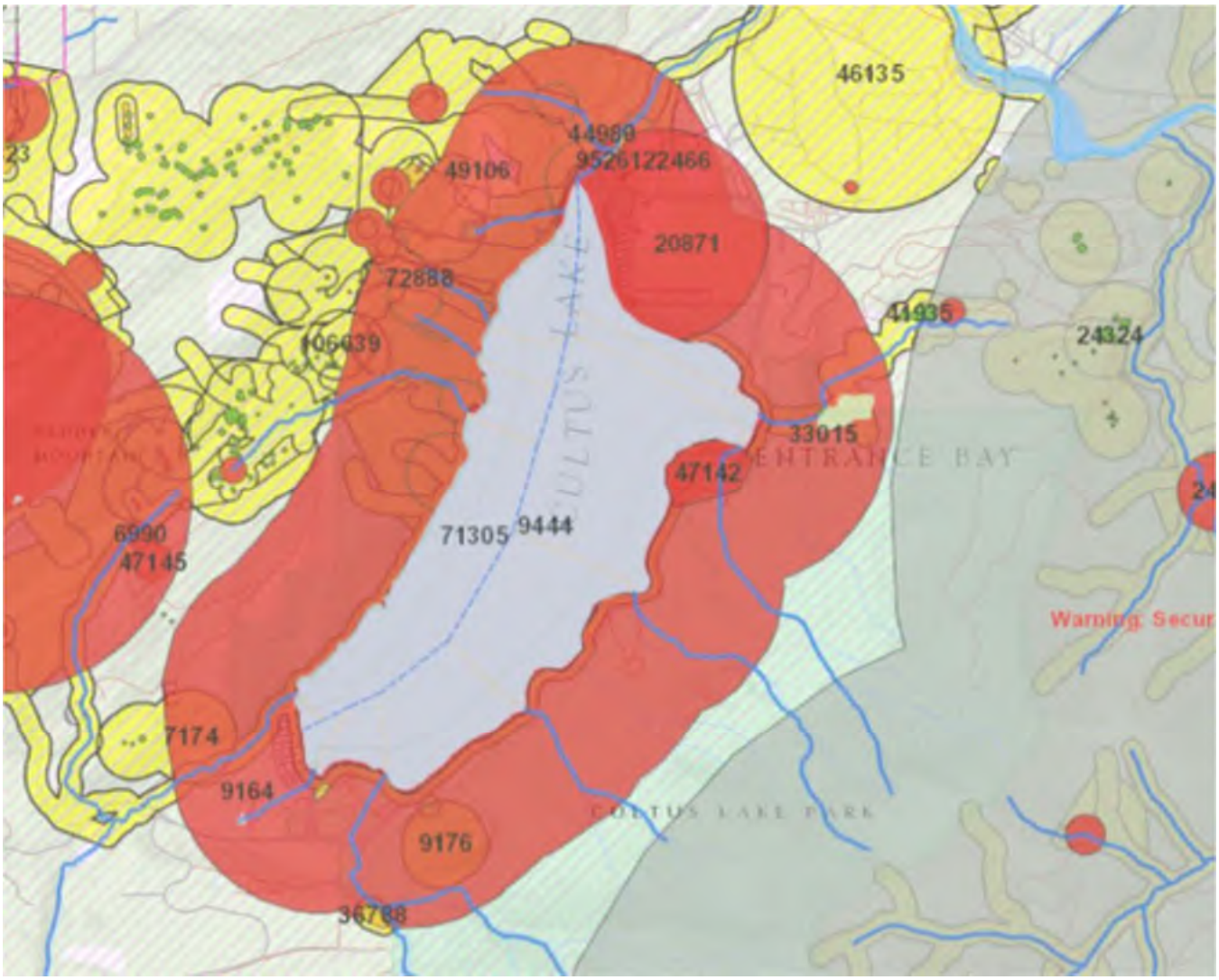


Figure 2. Critical habitat polygons in the southern Columbia Valley.

While CH Polygons are present, these polygons do not always align with the distribution of CH at the site level. For there to be CH at the site level habitat attributes required by the species must be present. A second consideration with respect to CH is that CH is only protected when it is on federal land, lands managed by the federal government, or be protected through a federal Order.

None of the sites are located on federal land. Our preliminary reconnaissance has identified that site specific habitat attributes for SAR are absent at Sites 3, 4, 5 and 6. Largely this is due to site context (edge of highway) and recent site disturbance but also natural conditions (such as seasonal discharge), lack of understory vegetation, steep slopes, lack of pools and ephemeral to short season discharge.

7.2 General Wildlife Protection Best Practices

Our team will take care to protect wildlife in work areas. We are currently surveying where amphibians and vertebrate SAR might be before culvert replacement. No blasting is anticipated to be required for this project. Key wildlife protection measures will be discussed amongst designers, environmental monitors and contractors.

Key wildlife mitigation at design and assessment stages will include:

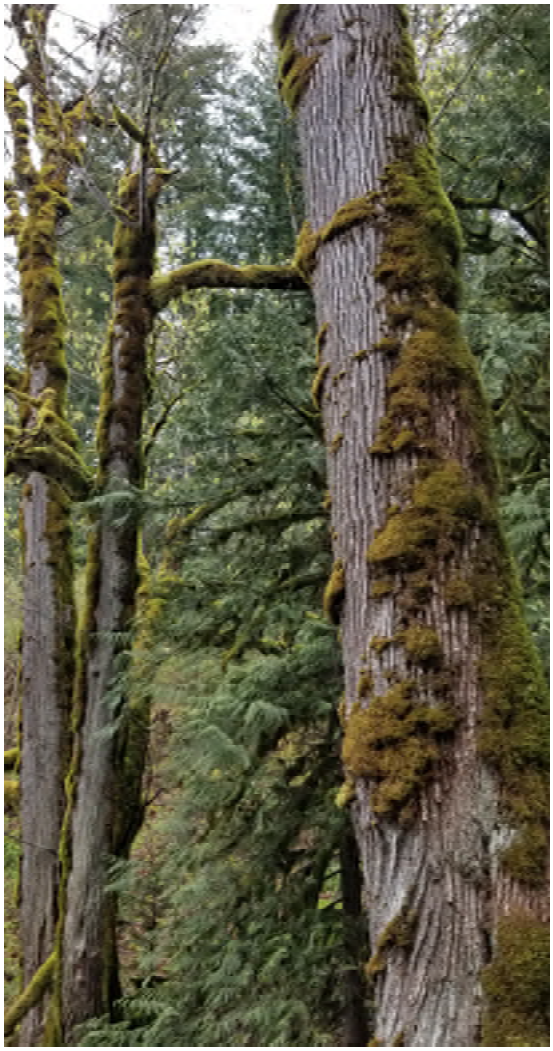
- A detailed site assessment of aquatic and terrestrial areas at each site will be undertaken by ISL to identify any potential wildlife habitat, nesting, denning sites, or other refugia.
- Site assessments will be used to inform and apply for relevant permitting or authorizations for wildlife salvage which may be required during construction.
- Incorporate considerations for small mammal wildlife passage.
- Consideration for coarse woody debris placement and riparian understory planting.

Key wildlife mitigation at construction will include:

- Works will not commence until the EM has completed the pre-construction survey and any wildlife has been removed.
- Wildlife which is required to be relocated/salvaged to avoid construction impacts will only be handled or salvaged by the EM under appropriate permits/authorizations.
- Unauthorized individuals (i.e. persons not named in permits), will not handle wildlife.
- Locking wildlife-proof waste receptacles will be obtained and deployed by the contractor.
- Littering will be prohibited and monitoring for this activity by the EM will be ongoing throughout the project.
- Wildlife feeding by any persons on-site during the project will be prohibited.
- The EM will be notified of any wildlife that is encountered onsite during construction activities. If wildlife is encountered, works shall be suspended to allow for wildlife to safely pass.

8.0 Vegetation Management Best Practices

8.1 Tree and Shrub Protection



Riparian trees provide shade cover, allochthonous inputs, and insect drop to streams. Tree roots aid in soil stabilization.

Existing site disturbance associated with emergency works undertaken to temporarily address November 2021 flooding and install temporary crossings has resulted in the removal of some trees and understory vegetation.

Site 2 (Parmenter Road), Site 3 (Teapot Hill Parking), Site 4 (Honeymoon Bay Group Camping), Site 6 (Maple Bay) and Site 7 (Frosst Tributary) will require work in proximity to existing trees, and that work has the potential to disrupt tree roots or require additional tree removal.

Broad scale tree and vegetation removal associated with implementation of the ultimate design should not be required given site context (edge of existing road prism) and existing disruption.

Measures to protect trees are particularly important in the context of those located in and about provincial parks, and otherwise, to limit indirect effects to tree roots and boles.

At the pre-design and design stage:

- Survey tree bole and drip line and include tree bole and dripline on survey
- Adjust culvert orientation where feasible to avoid tree removal
- Designate clearing limits and tree protection fencing on drawings
- Create a mark-to-leave prescription and flag all trees and vegetation to be conserved with colour coded “NO DISTURBANCE RIBBON”

At Tender:

- Create supplemental environmental specifications that:
  - Create LOCK-OUT provisions for designated trees and vegetation. LOCK-OUT will be designated with NO-DISTURBANCE RIBBON, and only the Project Environmental Monitor may remove locked out trees and vegetation
  - Require, as part of construction contractor responsibilities, the installation of protective fencing, tree guards and or swamp pads to protect tree boles and tree root zones
  - Require sensitive root areas to be excavated with a hydrovac or by hand under the direction of an arborist or forester

At construction:

- Complete a site level Construction Contractor Environmental Orientation (CEOR) prior to commencement of construction activities
- Arborist monitoring of high-risk activities near key trees
- Excavated topsoil will be salvaged for future reclamation works where feasible
- Revegetation of disturbed areas will be achieved through implantation of restoration planting plans as well as hydraulic seeding. Hydraulic seed mix will be in conformance with SS 757 and consist of either of the following (dependent on site conditions, to be determined through detailed environmental assessment
- Disturbed riparian areas will be replanted, in conformance with SP 754-06

8.2 Invasive Plant Management Plan

Several of the assessed project sites are host to invasive plants including Himalayan blackberry *(Rubus armeniacus)* at Site 1, Purple death-nettle *(Lamium purpureum)* at Site 2, and English ivy *(Hedera helix)* at Site 7.

These sites will be managed in accordance with “Best Practices for Managing Invasive Plants on Roadsides” (2019) as well as the provincial Weed Control Act.

Measures to limit the spread of these plants will include, but not be limited to, the following:

- Work crew will be familiarized with species of concern to this project
- All invasive plants to be reported to the Ministry Representative
- All equipment that is being used for the construction of the project are fully pressure washed before deployment to site.
- EM will inspect machinery for conformance
- Any soil and / or plant material containing invasive plant material will be isolated on polyethylene sheeting and covered with polyethylene sheeting that is weighted with sand bags and disposed of at an landfill that accepts invasive plant material
- All parts of equipment (i.e. excavator and trucks) including tracks, undercarriage, cabin, arm and bucket that has contact with noxious weeds, of soil containing noxious weeds, seeds, and stem fragments will be cleaned prior to demobilization off site or being utilized for another activity

9.0 Erosion and Sediment Control

9.1 ESC Plan

- Prior to construction, an erosion and sediment control (ESC) plan will be prepared in accordance with SS 165.04.01 as well as the methodology described in the “National Guide to Erosion and Sediment Control on Roadway Projects”, Transportation Association of Canada 2005.
- The ESC Plan should include provisions for sufficient quantities of materials to stabilize erodible surfaces (for example, silt fence, straw bales, grass seed mix, sandbags, erosion control blanketing, mulch etc.).

9.2 ESC Measures

- Work will be completed during seasons of lowest precipitation (late summer to early fall).
- Ensure ESC measures are installed before starting work and capable of continuously preventing the entry of sediment into the watercourse and/or municipal storm system.
- Stabilize all disturbed slopes, watercourse banks and ground surfaces that may contribute sediment-laden water into watercourses.
- Inspect ESC measures regularly to ensure that they are functioning per the ESC Plan.
- If deficiencies are found, repairs to ESC measures will be completed as directed by the EM.
- Slope protection measures may include silt fencing, mulches erosion mats, geotextiles, filter fabric, erosion control blankets, or hydraulic seed application.
- Material stockpiles will be stabilized to prevent them from entering any watercourse. No debris is to remain below the high-water mark.
- Site work will be ceased, modified, or relocated during Significant Precipitation Events (SPEs) to avoid siltation of watercourses. An SPE is defined as > 25 mm of precipitation in a 24-hour period.
- Sediment tracking to roads will be minimized by daily sweeping.
- Once started, work at each site will be completed as soon as possible.

10.0 Environmental Monitoring

Environmental Monitors (EM's) are appropriately qualified professionals with extensive experience in highway/linear development, instream works, fish salvage, SAR and working on complex construction sites. Indigenous Environmental Monitors will be included where agreements are in place.

The Environmental Monitor role is to:

- Be active in site planning and prescription development.
- Supervise all instream works authorized under the WSA Order.
- Be present on-site during all phases of construction in and around the stream(s).
- Conduct daily sweeps of work sites for presence of wildlife (fish, snakes, birds, bats, etc...) and develop site-specific mitigation measures as required.
- Have the authority to stop works if deemed necessary to prevent or manage a risk to the stream, stream channel, aquatic ecosystem, organisms, habitat, or other environmental resources.
- Compile and summarize daily observations into weekly reports which are issued to MoTI.
- Ensure all best management practices and construction mitigation measures are in place to avoid and minimize environmental impacts.
- Work collaboratively with construction crews to ensure the CEMP is adhered to.
- Provide technical assistance to the teams where appropriate.

- Implement and ensure ESC measures are constructed, installed, and maintained appropriately for the duration of the works.
- Report any spills including detailed information such as time of day, staff involved, nature, cause, and degree of spill, recovery process deployed, and agencies notified.
- Document non-conformance where necessary and improving practices and procedures as needed.
- When the works involve temporary diversions to isolate the worksite:
    - Conduct daily monitoring of diversion works daily to ensure pumps and bypasses are in proper working condition.
    - Ensure diversion works that include pump intakes be screened for fish and aquatic species in accordance with the “Interim code of practice: End-of-pipe fish protection screens for small water intakes in freshwater” (Fisheries and Oceans Canada, 2020).
- When the works involve dewatering or isolation of flow and the stream is known or suspected to contain fish and/or amphibians:
    - Obtain any permits needed prior to undertaking the salvage(s).
    - Ensure fish are prevented from entering the works.
    - Where applicable, assist fish salvage crews in isolation of the stream prior to commencement of works.
    - Attend the site prior to conducting any instream works to complete fish and wildlife search and salvage(s).
    - Inspect the extraction area for fish stranding at least once after water levels have declined.
- In the event of an environmental incident or non-compliance with any of the Terms or Conditions of the WSA Order, the EM must immediately mitigate the situation. Within 48 hours, each incident must be reported to the regional Water Manager. The incident report shall describe mitigation measures employed and a rationale as to why works have resumed, or the next steps required before works may resume.

11.0 Heritage Site Best Practices

Overview

The *Heritage Conservation Act* aims to protect and conserve heritage property in B.C. A heritage site is land (including land covered by water) that has heritage value to B.C., a community, or aboriginal people, whether designated or not. Your work may impact a heritage site.

Consult your cultural advisor/ monitor

First Nations cultural advisors/monitors will have their own recommendations and preferences depending on the site and significance of the area. These can vary from Nation to Nation. Before engaging in work, seek guidance from the First Nations Advisor on your project team or designated to your project site. First Nations may also be able to provide archaeological, environmental or other services, or a cultural monitor for project works.

Adhere to the following principles

- Ensure worker safety is the top priority
- Ensure people on site are aware of the cultural significance of the site and the need to respect protocols
- Ensure all relevant staff on-site are aware of response plans/schedules for the day to help promote responsible decision making
- Be keenly aware of all potential site hazards, including but not limited to fast-flowing water, unstable grounds etc.
- Before conducting response or recovery work in an area, confirm there are no recorded or known archaeological sites present
- Any workers on site should attend all required toolbox/site safety meetings
- Use the chance-find procedures outlined in SS165.20 and Appendix A if suspected cultural materials are identified
- Any archaeological investigation work that is re- quired must be undertaken by qualified personnel and in accordance with the relevant permit requirements
- Any works taking place near or on reserve lands should be reviewed with affected First Nations communities to identify any areas of potential cultural concern
- Any archaeological staff on-site should work closely with cultural advisors or monitors, following their recommendations and preferences that are specific to the site or area

Archaeological Resources: Chance Find Management Guidelines

Chipped stone flakes and core artifacts

Fire altered rock

Waterlogged basket (cleaned)

Shell midden deposits

INTRODUCTION

The BC Ministry of Transportation and Infrastructure (MOTI) is committed to the responsible management of heritage sites within its project sites. The intent of this document is to provide MOTI's Contractors and staff working in the MOTI South Coast Region with guidelines for the appropriate response to the discovery of known or suspected heritage sites during construction activities. The objective for providing this information is to minimize disruption to the activity while promoting the preservation and proper management of heritage sites.
The following sections:

1) Describe the provincial heritage regulatory framework;
2) Present step-by-step guidelines for heritage site chance find management, including a procedure for the identification, treatment and management options for human remains;
3) Identify the limitations of the Chance Find Management Guidelines; and,
4) Provide a list of heritage management contacts to be notified in the event that confirmed or suspected heritage resources are encountered during construction activities.

BC REGULATORY FRAMEWORK

Heritage sites in British Columbia are managed in accordance with the *Heritage Conservation Act* (RSBC 1996, c. 187). Section 12 of *the Heritage Conservation Act* (HCA) specifies that an individual (or corporation) must not damage, excavate, dig in or alter, or remove any heritage object from a heritage site, except in accordance with a permit issued by the Minister. The HCA confers automatic protection upon all heritage sites that pre-date AD 1846, regardless of whether they are recorded in the Provincial Heritage Register, and regardless of whether they are located on Crown land or private property. Certain sites, including human burials and rock art sites with heritage value, are automatically protected, regardless of their antiquity.

It's important to note that all archaeological sites, regardless of their condition, are protected by the HCA and that it does not distinguish between "intact" (i.e., those sites which are in a pristine, or undisturbed state) and "disturbed" (i.e., those sites which have been subject to alteration, permitted or otherwise) sites. Post AD 1846 historical heritage sites can be protected by Provincial Ministerial Order or Designation by an Order-in-Council.

GUIDELINES FOR CHANCE FIND MANAGEMENT

Step 1: If known or suspected archaeological materials or features are encountered, stop activity within 30 m of the find and secure the area. Suspected archaeological material (including excavated materials) should not be moved, removed or altered prior to inspection by a qualified archaeologist (unless necessary to address a site safety risk).
Step 2: Inform the Ministry Representative for your project.
Step 3: Stake or flag the site.
Step 4: The Ministry Representative will seek further direction from the Project Archaeologist. If the Project Archaeologist cannot be reached, the Ministry Representative will call the MOTI Environmental Coordinator. (contacts on next page).

Note: Based on the nature of the incident, it may be determined that there are no further concerns and activities may continue, or further assessment or mitigation may be required. See Management Options.

MANAGEMENT OPTIONS

In the event that an archaeological site is confirmed by the Project Archaeologist, discussions will occur between the Archaeology Branch, the contractor, First Nations, and the MOTI in order to select the appropriate management option*. Options could include:

1) Avoidance through partial activity redesign or relocation. This results in reduced additional impact to the archaeological site and is the preferred option from a cultural resource management perspective and is the least expensive option. An archaeological impact assessment may be required to define site limits.
2) Application of temporary and/or permanent site protection measures as approved by the Archaeology Branch (e.g., fencing off the site, capping with soil). An archaeological impact assessment to identify site boundaries and archaeological monitoring to verify the effectiveness of protective measures may be required;
3) Archaeological mitigation consisting of controlled excavations or archaeological construction monitoring; and,
4) Monitoring of construction activities near the site by a professional archaeologist.

*A Site Alteration Permit under Section 12 of the HCA may be required prior to undertaking any of these options.

Bone and antler artifacts

CHANCE FIND – ANCESTRAL REMAINS

1) If suspected ancestral remains are encountered (either intact or disturbed), immediately stop construction activities, establish a 30m buffer and cover the suspected ancestral remains with a tarp.
2) Inform the Ministry Representative of the discovery;
3) The Ministry Representative will contact the Project Archaeologist; if the Project Archaeologist cannot be reached, the Ministry Representative will contact the MOTI Environmental Coordinator.
4) The Project Archaeologist will contact the Archaeology Branch, as well as First Nations with traditional interests in the areas.
5) While awaiting the Project Archaeologist to attend the site, the suspected ancestral remains must be guarded.
6) Do not undertake further work that could disturb the remains. This includes moving soil and/or spoil (unless necessary to address a safety risk);
7) The Project Archaeologist will visit the site with First Nations representatives;
8) If it is determined that the chance find is not archaeological in nature (i.e., forensic), the local policing authority and Office of the Coroner will be contacted by the Archaeology Branch;
9) If it is determined that the chance find is archaeological in nature (i.e. ancestral remains), discussions between the Archaeology Branch, First Nations, Project Archaeologist, Ministry Rep and the Contractor will identify appropriate follow up procedures including the appropriate treatment of the ancestral remains and reburial procedures.

LIMITATIONS

This document was prepared for the exclusive use of MOTI contractors for the specific application during investigation, construction and maintenance activities in MOTI's South Coast Region. Consistent with the intent of the *Heritage Conservation Act*, contractors are advised that if unanticipated cultural materials or features are encountered during investigation, construction or maintenance activities, all work in the immediate area should cease, and the guidelines for heritage site chance find management, as presented above, should be implemented. Should contractors have any concerns about archaeological deposits or human remains, an archaeologist should be contacted for direction. Note that although the HCA does not apply on federal land, these chance find procedures should be implemented.

CONTACTS:

Ministry Representative/Project Manager: Zach Crippen, 236-521-6238

Project Archaeologist: Heather Pratt, 250-218-4419

Archaeology Branch Reception:
Tel: (250) 953-3334 (daytime)

MOTI Environmental Coordinator: Krista Englund, 236-468-1959
Leigh Holt, 250-870-3251

12.0 Spill Contingency Measures

Overview

All equipment going in-stream should be equipped with bio-oil. The EM needs to check equipment prior to any work commencing and crews have spill kits available at each site. Additionally, qualified professional Environmental Monitors remain on site throughout the duration of the works to ensure that the following best practices are being used:

- The Contractor shall provide onsite, at all times, readily accessible spill response materials such as containment booms, absorbent sweeps, and pads able to handle up to 125% of any potential spill
- Any used spill response and abatement materials must be immediately replaced
- The Contractor shall review the Spill Contingency and Response Plan weekly for its appropriateness, confirm that all required response materials are available and in adequate supply
- In the event of a spill or emergency, the Contractor shall, at their cost, restore the site to the current, applicable standard
- The Contractor will be responsible for removal and appropriate offsite disposal of all waste and clean-up materials, equipment, and goods, including soils and water deemed to be contaminated by the BC Ministry of Environment and Climate Change Strategy (ENV) or Environment and Climate Change Canada
- The Spill Reporting Regulation under the Regulation of the Minister of Environment and Climate Change Strategy, under the Environmental Management Act, defines the information required when reporting a spill

13.0 Reference Documents

Overview

The following documents are used for additional guidance on best practices to be followed:

- **A User's Guide for Changes In and About A Stream in British Columbia**
  https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/wsa-cias-users_guide.pdf

- **Appendix: Scope-specific Best Management Practices for Changes In and About a Stream under the WSA**
  https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/wsa-cias-requirements-bmps_appendix.pdf

- **BC MoTI 2020 Standard Specifications for Highway Construction - SS 165 Protection of the Environment**
  https://www2.gov.bc.ca/assets/gov/driving-and-transportation/transportation-infrastructure/engineering-standards-and-guidelines/highway-specifications/volume_1_ss2020.pdf

- **BC Water Licensing & Rights - Working Around Water**
  https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-licensing-rights/working-around-water

- **Best Practices for Managing Invasive Plants on Roadsides: A Pocket Guide for British Columbia's Maintenance Contractors**
  https://bcinvasives.ca/wp-content/uploads/2021/01/Weeds_Roads_BMP_Guide-2019-web.pdf

- **Land Development Guidelines for the Protection of Aquatic Life**
  http://www.sxd.sala.ubc.ca/9_resources/fed_%20files/fed%20land%20development%20guidelines.pdf

- **Requirements and Best Management Practices for Making Changes In and About A Stream in British Columbia**
  https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/wsa-cias-requirements-bmps.pdf

14.0 Directory/Contacts

Ministry of Forests, Water Management Branch
- http://www.env.gov.bc.ca/wsd
- 778-698-7344

Ministry of Forests, Archaeology Branch
- 250-953-3334

Environmental Emergency Program, Spill Reporting
- 1-800-663-3456

Fisheries and Oceans Canada, Spill Reporting
- 1-800-889-8852

Fisheries and Oceans Canada, Observe, Record, Report Hotline
- 604-607-4186

Indigenous Services Canada (ISC) BC Office
- 604-775-5100 (Monday to Friday 8:00am to 4:30pm)

Emergency Management BC
- 1-833-376-2452 (daily 7:30am to 5:00pm)
- www.emergencyinfobc.gov.bc.ca

Disaster Financial Assistance
- DFA@gov.bc.ca
- 1-888-257-4777
- https://www2.gov.bc.ca

Canadian Red Cross
- 1-888-863-6582 (daily 8:00am to 8:00pm)
- www.registration.redcross.ca

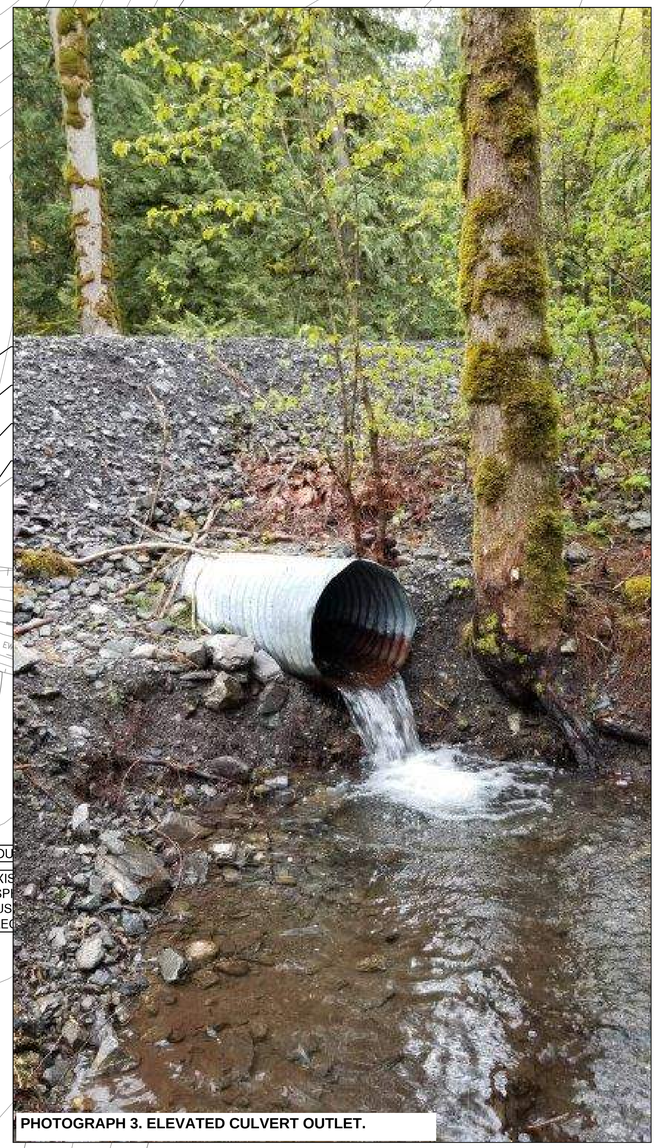
Columbia Valley Key Contacts
- **Zach Crippen**, Binnie Project Manager 236-521-6238
- **Joanne Letkeman**, MOTI Environmental Services Regional Manager 236-468-1984
- **Krista Englund**, MOTI Environmental Coordinator 236-468-1959
- **Kelsi Fraser**, MOTI A/ Project Coordinator, Indigenous Relations 236-468-2104
- **David Neufeld**, ISL Engineering Senior Biologist 604-371-0091

APPENDIX C

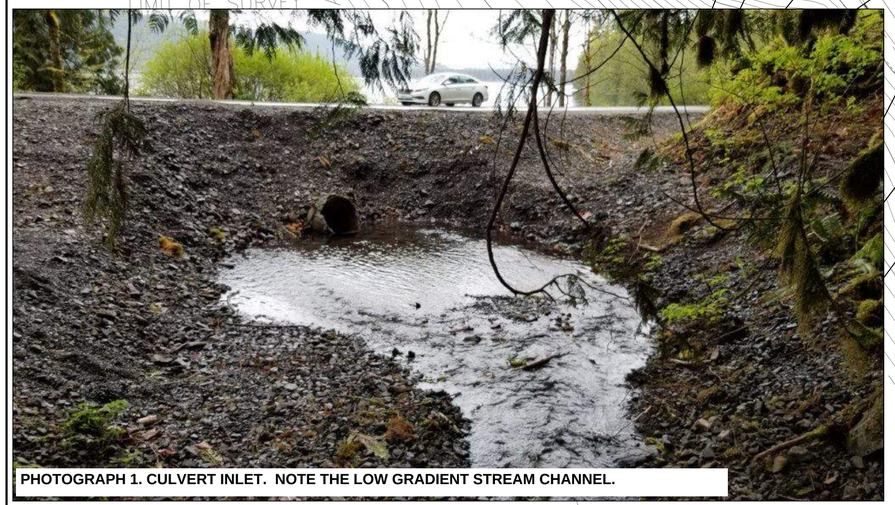
FOOTPRINT IMPACT ANALYSIS AND MITIGATION PLANS

PHOTOGRAPH 4. VIEW FROM ROAD. NOTE THE INLET ON THE RIGHT AND OUTLET ON THE LEFT OF THE ROAD.

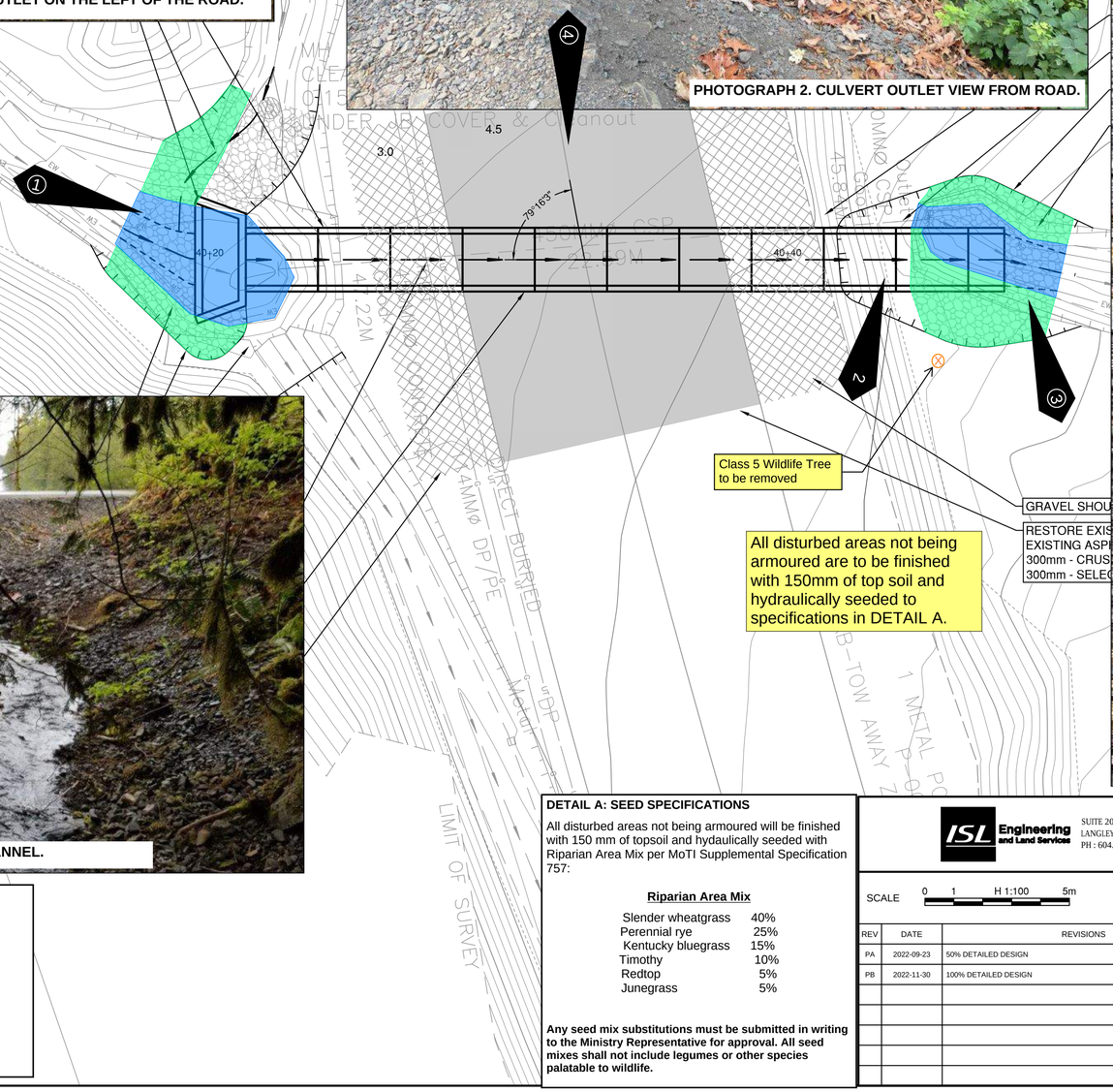
PHOTOGRAPH 2. CULVERT OUTLET VIEW FROM ROAD.



PHOTOGRAPH 3. ELEVATED CULVERT OUTLET.



PHOTOGRAPH 1. CULVERT INLET. NOTE THE LOW GRADIENT STREAM CHANNEL.



DETAIL A: SEED SPECIFICATIONS

All disturbed areas not being armoured will be finished with 150 mm of topsoil and hydaulically seeded with Riparian Area Mix per MoTI Supplemental Specification 757:

Riparian Area Mix

Slender wheatgrass	40%
Perennial rye	25%
Kentucky bluegrass	15%
Timothy	10%
Redtop	5%
Junegrass	5%

Any seed mix substitutions must be submitted in writing to the Ministry Representative for approval. All seed mixes shall not include legumes or other species palatable to wildlife.

ISL Engineering and Land Services
SUITE 201, 8506 - 200 STREET
LANGLEY, BRITISH COLUMBIA, V2Y 0M1
PH : 604.371.0091 FAX : 604.371.0098

BRITISH COLUMBIA
MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTH COAST REGION
HIGHWAY ENGINEERING AND GEOMATICS

SCALE 0 1 H 1:100 5m

CAD FILENAME R1-14034-711-712.DWG
PLOT DATE 11/30/2022

REV	DATE	REVISIONS	NAME
PA	2022-09-23	50% DETAILED DESIGN	K. TORRY
PB	2022-11-30	100% DETAILED DESIGN	K. TORRY

FOOTPRINT IMPACT ANALYSIS AND MITIGATION PLAN

COLUMBIA VALLEY HIGHWAY CULVERT REPLACEMENTS
TEAPOT HILL EAST AT COLUMBIA VALLEY ROAD

-

SENIOR DESIGNER
DATE

DESIGNED K. TORRY DATE 2022-08-08
QUALITY CONTROL S. CLARK DATE 2022-08-08
QUALITY ASSURANCE S. VERKAIK DATE 2022-08-08
DRAWN K. TORRY DATE 2022-08-08

FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
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