

**MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS AND
RURAL DEVELOPMENT
DECISION NOTE**

Date: May 22, 2020

File: 2407759

PREPARED FOR: Dave Southam, District Manager, Sea to Sky Natural Resource District

ISSUE: Proposed Geotechnical Drilling on Squamish Spit Road to design fish passage culvert upgrade to be considered a general permission

BACKGROUND:

The Central Estuary Restoration Project (CERP), led by the Squamish River Watershed Society (SRWS) has funding from the Department of Fisheries and Oceans over multiple years to undertake several phases of Squamish River estuary enhancement projects. In 2020, the CERP had proposed to begin removing the lower two km of the “Squamish Spit”; however, due to the popularity of the Spit as a recreation feature the project has been delayed for more community consultation. As a result, the CERP has quickly changed course to install an additional box culvert for fish passage to effectively implement this year’s funding.

The land in question is a raised roadway on a dyke structure but is not acting as a flood protection dyke in this location. The land has been offered to the District of Squamish as a Sponsored Crown Grant several years ago, but that process has not been completed due to larger complicating issues. Since that time, the District of Squamish has effectively been occupying, managing and maintaining this land parcel.

Appropriate engineering design of this box culvert requires a single geotechnical drill to a depth of 15 metres from the road bed to determine subsurface material. Under the Permission Policy, investigative use licenses (IUL) are required for drilling. The current processing timelines for an IUL is 12-24 months. The installation of the box culvert is considered through a *Water Sustainability Act* process.

DISCUSSION:

The scale of the geotechnical drilling can be considered extremely low risk for impacts due to it being a single hole of minor depth, conducted from an elevated roadway. There is little gained in the way of additional protection for the province in requiring an IUL be reviewed and issued, and permit fees will not offset the resources required to process. A more thorough review of the box culvert installation will be undertaken by Ministry staff under the *Water Sustainability Act* and this is the activity with higher disturbance; the geotechnical drill will inform that process and issuing an IUL for drilling will delay that design and review for an additional year.

It is recommended that the Ministry consider the geotechnical drill activity as a qualifying general permission under the Permission Policy for the following reasons:

- The activity is very low risk of any unintended impacts due to the nature of the ground (roadway) and the limited scope of the testing

- The land is intended to be transferred in fee simple to the District of Squamish and the roadway is maintained by the District. The District is in support of the drilling and has agreements and oversight into the box culvert
- Squamish Nation is a lead member of the CERP team
- Requiring an IUL imposes a detailed, lengthy process for little gain to the Province, and will delay fish habitat improvements for an additional year and possibly reduce funding available

OPTIONS:

Option 1: Consider the geotechnical drill as qualifying under General Permissions for occupancy under the *Land Act*

Implications:

- Reduction in bureaucracy for a habitat improvement project
- Reduced workload for Ministry resources
- Faster improvement to fish habitat
- May have concerns from other private developments will require IULs for larger scale geotechnical drilling projects

Option 2: Require a specific permission for the geotechnical work in the form of an IUL

Implications:

- Imposes a 12-24-month process requiring multiple Ministry resources
- Significant delay in fish habitat improvement works with a possible loss of annual funds
- Could be viewed as an unnecessary bureaucratic barrier to a positive project to the public, stakeholders and elected officials
- Consistent approach to private development projects also requiring geotechnical investigations

RECOMMENDATION:

Option 1: Consider the geotechnical drill as qualifying under General Permissions for occupancy under the *Land Act*



May 25, 2020

Approved / Not Approved

Signature

Date

Dave Southam, District Manager, Sea to Sky District

Attachment(s): SRWS Works description email
Map of location
Email of support from District of Squamish

Prepared by:

Name: Scott Shaw-MacLaren

Branch/Region: Sea to Sky Natural Resource District

Phone: 236-468-3972

Reviewed by	Initials	Date
DM		
Associate DM		
DMO		
ADM		
PRGM Dir./Mgr.		

From: [Kimberly Armour](#)
To: [Shaw-MacLaren, Scott D FLNR:EX](#)
Cc: [Murray Manson \(Murray.Manson@dfo-mpo.gc.ca\)](#); [srws@shaw.ca](#); [Balke, Eric FLNR:EX](#); [Bickerton, Nicola FLNR:EX](#)
Subject: Geotechnical investigation for culvert upgrade
Date: May 20, 2020 1:34:00 PM

Hi Scott,

Nice speaking with you just now. Follow up on our discussion, below is a summary of proposed works for geotechnical investigation at culvert 4 location on the training berm. As discussed and given our tight timeline, we will proceed with our press release to give the community a heads up of proposed works in the coming weeks, though we do have a scheduled date of May 27th that we would like to proceed if permitted.

I will follow this email up, with an email to the District of Squamish so they can confirm with the Province our discussed agreement of support proposed geotechnical and culvert replacement works, and to enter into a 1year maintenance agreement with the DOS in keeping with our process followed last year when we undertook replacement of culvert 3. As mentioned, when it comes time for culvert placement we have filed a notification for culvert replacement under the WSA, and when design plans are finalized we will be seeking authorization under the Wildlife Act for works in the WMA. We very much appreciate that you are able to pursue a permission policy variance to facilitate geotechnical investigation.

Summary of proposed geotechnical works:

- WSP Engineering will oversee geotechnical investigation scheduled for May 27th 8am – 5pm
- Downrite drilling will undertake works
- One sonic test hole with Standard Penetration Testing up to 10m – 15m below grade
- Road will remain open to traffic
- Works are supported by District of Squamish and Squamish Windsport Society per conference call May 11, 2020 and follow up email confirmation from DOS
- No tree removal required for works and are considered to be very low risk, and standards and best practise will be applied to onsite drilling under the oversight of a professional engineer
- Works are to inform design planning for culvert replacement in keeping with Phase 1 of CERP, that is being undertaken in partnership with DFO and Squamish Nation. More info on CERP can be found here: <https://www.squamishwatershed.com/central-estuary-restoration.html>

Except from WSP Engineering proposal:

Subsurface Exploration and Geotechnical Analysis

Similar to at Culvert #3, a subsurface exploration will be required at Culvert #4 location. The new culvert is located approximately 340 m south from the previous culvert where our exploration was carried out. Due to the variable thicknesses and extents of the interbedded sands, silts, organics and gravels in the area, we believe it would be prudent to conduct a site- specific exploration at Culvert #4 to support our foundation design and slope stability analysis. Due to the proximity of

the Squamish River to the west side of the dyke at this location we will need to optimise the slope to reduce the culvert length and minimise impacts to the river.

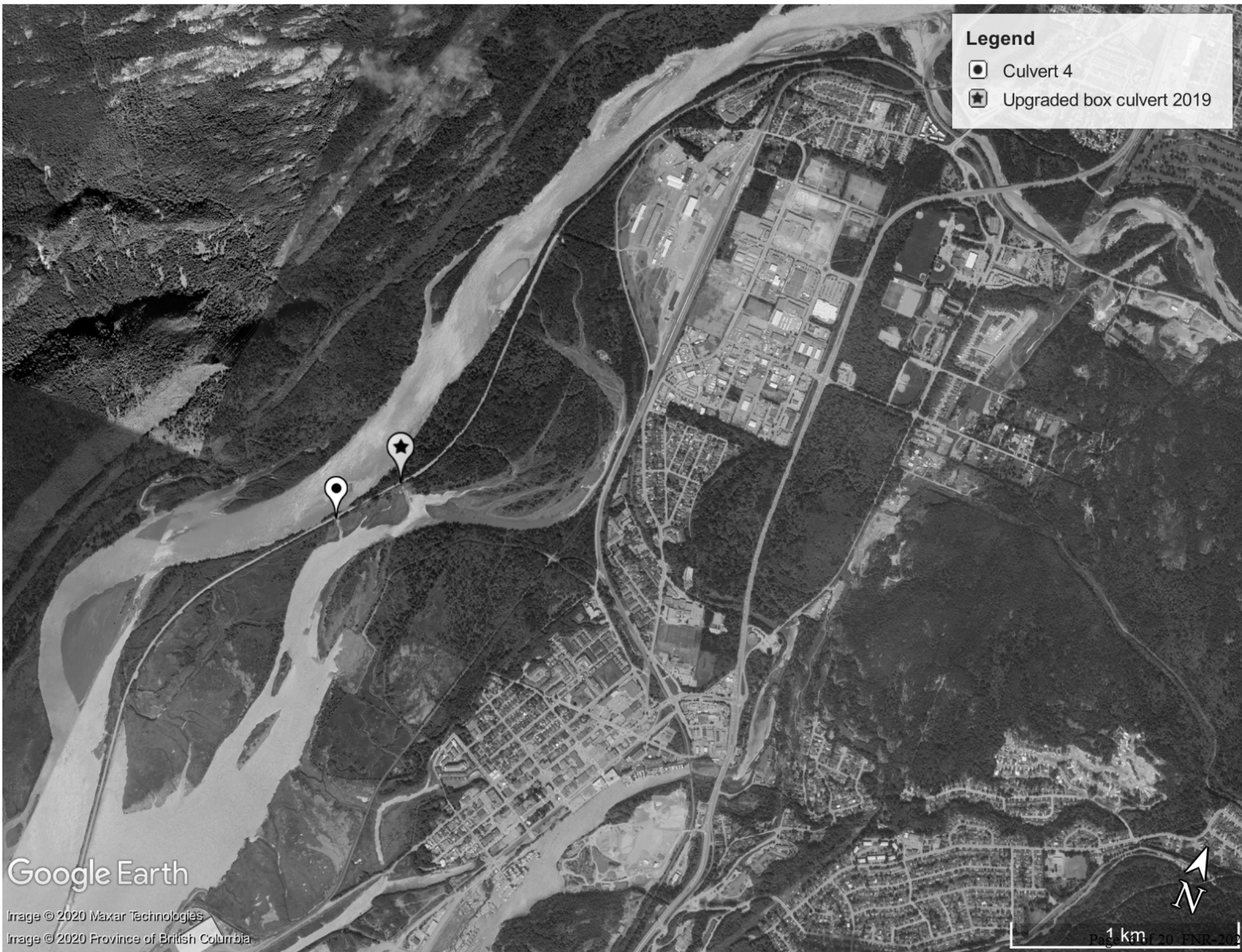
We are proposing one Sonic test hole with Standard Penetration Testing (SPT) up to 10 to 15 m below grade depending on the soil conditions. Disturbed samples will be collected for index laboratory testing, which may include moisture contents, particle size analysis, and Atterberg limit testing to determine soil plasticity.

We understand that this portion of the dike does not require a permit from the Inspector of Dikes to conduct a geotechnical exploration.



Let me know if anymore info is needed. Thanks again for your help!

Kim

Kimberly Armour, R.P.Bio., P.Biol., M.A.
Environmental Consultant & Assistant Project Manager
Connecting Communities Consulting & Squamish River Watershed Society
Karmourc3@outlook.com & Projects@squamishwatershed.com
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(604) 849 - 0676



Legend

-  Culvert 4
-  Upgraded box culvert 2019

Google Earth

Image © 2020 Maxar Technologies
Image © 2020 Province of British Columbia

From: [Chris Wyckham](#)
To: "Kimberly Armour"
Cc: [Caroline Ashekian](#); [srws@shaw.ca](#); [Murray Manson \(Murray.Manson@dfo-mpo.gc.ca\)](#); [Shaw-MacLaren, Scott D](#)
[FLNR:EX](#)
Subject: RE: Geotechnical investigation and culvert replacement
Date: May 20, 2020 5:03:34 PM

Hi Scott,

I'd like to confirm our full support for geotechnical investigations on the spit in support of a potential culvert 4 upgrade.

As Kim notes below, there are still some steps for the District to take in terms of final approval of the culvert itself (design reviews, MOU, etc), but we are in broad philosophical agreement on the location and nature of the upgrade and need the geotechnical data to complete final designs and agreements.

Thank you for your help on shepherding this important project through the provincial approvals. I'm doing the same on the municipal side. Let me know if you need anything else from me.

Chris Wyckham, P.Eng. | Director of Engineering
District of Squamish | *Hardwired for Adventure*
604.815.5021 | cwyckham@squamish.ca | www.squamish.ca
Pronouns: [he](#), [him](#), [his](#)

-



I humbly acknowledge that I work on the traditional territory of the Squamish Nation, Sk̓wx̓wú7mesh Úxwumixw.

 Please consider the environment before printing this e-mail.

From: Kimberly Armour [<mailto:karmourc3@outlook.com>]
Sent: May 20, 2020 1:56 PM
To: Chris Wyckham <cwyckham@squamish.ca>
Cc: Caroline Ashekian <cashekian@squamish.ca>; [srws@shaw.ca](#); Murray Manson (Murray.Manson@dfo-mpo.gc.ca) <Murray.Manson@dfo-mpo.gc.ca>; Scott MacLaren Contact <Scott.ShawMacLaren@gov.bc.ca>
Subject: Geotechnical investigation and culvert replacement

Hi Chris,

I hope this finds you well. Following up on our recent conference call with the DOS and Squamish Windsports Society we have been in touch with the Province regarding approvals for geotechnical investigation on the training berm. To close the loop on this and support the provincial approval

process, can the DOS confirm for the Province (copied) the points outlined below?

1. DOS to confirm their support for proposed culvert replacement at Culvert 4 location in August 2020 as discussed;
2. confirm our discussed agreement that the CERP team would sign a MOU with the District in keeping with the approval process followed in 2019 for culvert 3 replacement that includes a 1 year maintenance commitment assigned to the SRWS;
3. Confirm in keeping with culvert 3 replacement process that the CERP team will ensure that the DOS will have opportunity to review and provide feedback culvert 4 design plans when they are complete in June.

This is somewhat time sensitive as we have just received notice that we have a drilling rig for Geotech available on May 27th, and Provincial approvals need to be in place in advance of this. As discussed in our conference call, I will follow up with Caroline and Geoffery and provide a copy of the press release to share through DOS and SWS communication. If you could respond to this email confirming for the Province the three points outlined above it would be very appreciated and helpful as we move forward. Let me know if I can answer any questions.

Kind regards,
Kim

Kimberly Armour, R.P.Bio., P.Biol., M.A.
Environmental Consultant & Assistant Project Manager
Connecting Communities Consulting & Squamish River Watershed Society
Karmourc3@outlook.com & Projects@squamishwatershed.com
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RE: Spit Bore Hole / Stratigraphy Analysis

From: Balke, Eric FLNR:EX <Eric.Balke@gov.bc.ca>
To: srws@shaw.ca, Shaw-MacLaren, Scott D FLNR:EX
<Scott.ShawMacLaren@gov.bc.ca>
Cc: Cunningham, Danielle FLNR:EX <Danielle.Cunningham@gov.bc.ca>
Sent: March 10, 2021 3:07:15 PM PST
Received: March 10, 2021 3:07:16 PM PST
Attachments: image001.jpg

Hi Edith,

Given that the proposed activities appear to be limited to the Spit, Wildlife Act WMA authorization from FLNRORD Resource Management does not appear to be required.

However, it appears that the proposed core sampling is on Crown land within the tenure area held by the District of Squamish. I am not familiar with the specifics of the District's Crown land tenure, but I anticipate that permission from the District may be required for such sampling, and I do not know if permission from FLNRORD Land Authorizations is required. Scott Shaw-MacLaren or his staff may be able to provide better insight.

Cheers,

Eric

Eric Balke, MSc, RPBio (he/him/his)
Coordinator
South Coast Conservation Land Management Program
200 - 10428 153rd Street, Surrey, BC V3R 1E1
Phone: 778-572-2266

Partners in Conservation



From: srws@shaw.ca <srws@shaw.ca>
Sent: March 10, 2021 12:33 PM
To: Shaw-MacLaren, Scott D FLNR:EX <Scott.ShawMacLaren@gov.bc.ca>; Balke, Eric FLNR:EX <Eric.Balke@gov.bc.ca>
Cc: Barrett, Scott FLNR:EX <Scott.Barrett@gov.bc.ca>
Subject: Spit Bore Hole / Stratigraphy Analysis

[EXTERNAL] This email came from an external source. Only open attachments or links that you are expecting from a known sender.

Please let me know if I need any permits or approvals to do core sampling of the lower 1 km of the Squamish Spit. We would like to take core samples in the next few weeks so that we have a clear understanding of the Spit material composition.

We plan to take 4 core samples at intervals of approximately 250 m to a depth of around 4 m, similar to the core samples we took in advance of the work we did with Culverts #3 and #4.

Thank you very much.

Edith B. Tobe
Executive Director
Squamish River Watershed Society
Box 1791, Squamish, BC, V8B 0B3
604-892-7919
srws@shaw.ca
www.squamishwatershed.com



NATURE TRUST
BRITISH COLUMBIA



Environment and
Climate Change Canada
Canadian Wildlife Service

Environnement et
Changement climatique Canada
Service canadien de la faune

RE: Geotechnical investigation for culvert upgrade

From: srws@shaw.ca
To: Shaw-MacLaren, Scott D FLNR:EX <Scott.ShawMacLaren@gov.bc.ca>
Sent: March 18, 2021 2:29:02 PM PDT
Received: March 18, 2021 2:29:13 PM PDT

[EXTERNAL] This email came from an external source. Only open attachments or links that you are expecting from a known sender.

Thanks Scott. The drilling will be consistent with the manner that was undertaken in the past. We'll provide you with a work plan before we commence drilling next week.

Edith B. Tobe
Executive Director
Squamish River Watershed Society
Box 1791, Squamish, BC, V8B 0B3
604-892-7919
srws@shaw.ca
www.squamishwatershed.com

From: Shaw-MacLaren, Scott D FLNR:EX <Scott.ShawMacLaren@gov.bc.ca>
Sent: March 18, 2021 12:30 PM
To: srws@shaw.ca
Subject: RE: Geotechnical investigation for culvert upgrade

Thanks. So long as it is not materially different from last time, the same determination applies

From: srws@shaw.ca <srws@shaw.ca>
Sent: March 16, 2021 3:35 PM
To: Shaw-MacLaren, Scott D FLNR:EX <Scott.ShawMacLaren@gov.bc.ca>
Subject: FW: Geotechnical investigation for culvert upgrade

[EXTERNAL] This email came from an external source. Only open attachments or links that you are expecting from a known sender.

Scott, below is the e-mail correspondence between yourself and the SRWS around the drilling.

Thanks!

Edith

From: Kimberly Armour <karmourc3@outlook.com>
Sent: May 25, 2020 12:33 PM
To: srws@shaw.ca; Murray Manson (Murray.Manson@dfo-mpo.gc.ca) <Murray.Manson@dfo-mpo.gc.ca>
Subject: FW: Geotechnical investigation for culvert upgrade

Hi All,

We are good to go for geotechnical work this coming Wednesday. The DOS has confirmed in writing that they do not need approvals, and the Province permitted the work per the email below.

The drillers will be onsite on Wednesday May 27th, 8am – 5pm and supervised by WSP. I am getting confirmation of their liability insurance, and understand they will have signage onsite for traffic – the road will remain open. I will attend the site in the morning to meet the crews, and have asked WSP for confirmation that spoils will be disposed of away from the water, the hole will be backfilled with clay, fuels will be stored safely, and a spill kit will be onsite.

We have put out a press release, that I will update today now that we have confirmation of date, and this has been shared by the Squamish Chief, and I will follow up with the DOS and SWS who said they would also share this.

Let me know if you have any questions or if there is more info needed.

Cheers,
Kim

From: Kimberly Armour
Sent: May 25, 2020 12:23 PM
To: Shaw-MacLaren, Scott D FLNR:EX <Scott.ShawMacLaren@gov.bc.ca>
Subject: RE: Geotechnical investigation for culvert upgrade

Hi Scott,

We really appreciate your timely response and support in seeing this variance through with the District Manager. We were not anticipating lands act requirements for culvert works as this is not something the province has required in 20+ years of conservation work in the estuary. From our conversation last week, I understand no further lands act approvals are required for culvert placement, and that WSA notification and Wildlife Act approval are sufficient.

Conservation work in marine jurisdiction is tricky given the complex, overlapping and sometime grey regulatory framework. Often regulations are set up to permit development, and not set up for adaptive conservation works that are built on a collaborative inter-jurisdictional approach to resource stewardship. It is unfortunate that the Province has not had the capacity to provide the same level of partner support to this project that DFO and Squamish Nation are providing, and as the Province has provided through estuary management planning in past. It is understood that the Province is currently set up to operate through a front counter BC process, and we will consider this moving forward, and welcome and appreciate ongoing Provincial support to realize our shared objectives in the WMA.

Thanks again,

Kim

Kimberly Armour, R.P.Bio., P.Biol., M.A.
Environmental Consultant & Assistant Project Manager
Connecting Communities Consulting & Squamish River Watershed Society
karmourc3@outlook.com & Projects@squamishwatershed.com
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(604) 849 - 0676

From: Shaw-MacLaren, Scott D FLNR:EX <Scott.ShawMacLaren@gov.bc.ca>
Sent: May 25, 2020 11:21 AM
To: Kimberly Armour <karmourc3@outlook.com>
Subject: RE: Geotechnical investigation for culvert upgrade

The District Manager has accepted my recommendation and decided that this will be considered a general permission and no IUL will be required for the drill.

I will caution for future that when it comes to projects, FrontCounterBC is always the best source for determining which permits are required across varying pieces of legislation. Senior Staff like Scott B or myself often don't have a full scope of the legislation because the Ministry is so broad now. When a decision maker says "I don't need anything else" they are usually considering only what is within their scope of practice; yes they should be pointing you to FCBC for good client service to be sure you have all that you need, but they may not.

Have fun poking a hole in the ground. I hope this upgrade provides better than expected results.

From: Kimberly Armour <karmourc3@outlook.com>

Sent: May 20, 2020 1:34 PM

To: Shaw-MacLaren, Scott D FLNR:EX <Scott.ShawMacLaren@gov.bc.ca>

Cc: Murray Manson (Murray.Manson@dfo-mpo.gc.ca) <Murray.Manson@dfo-mpo.gc.ca>; srws@shaw.ca; Balke, Eric FLNR:EX <Eric.Balke@gov.bc.ca>; Bickerton, Nicola FLNR:EX <Nicola.Bickerton@gov.bc.ca>

Subject: Geotechnical investigation for culvert upgrade

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Except from WSP Engineering proposal:

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the Squamish River to the west side of the dyke at this location we will need to optimise the slope to reduce the culvert length and minimise impacts to the river.

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We understand that this portion of the dike does not require a permit from the Inspector of Dikes to conduct a geotechnical exploration.

Let me know if anymore info is needed. Thanks again for your help!

Kim

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Spit Drilling and Borehole Analysis

From: srws@shaw.ca
To: Shaw-MacLaren, Scott D FLNR:EX <Scott.ShawMacLaren@gov.bc.ca>, Chris Wyckham <cwychham@squamish.ca>
Cc: Manson, Murray <Murray.Manson@dfo-mpo.gc.ca>
Sent: March 19, 2021 1:39:28 PM PDT
Received: March 19, 2021 1:39:40 PM PDT
Attachments: image003.jpg, image001.png

[EXTERNAL] This email came from an external source. Only open attachments or links that you are expecting from a known sender.

We plan to engage with WSP on Tuesday, March 23 (9 – 5) and Wednesday (9 – noon) to drill at 5 locations along the lower 1 km of the Spit at intervals of approximately 200 m so that we can provide a report on the material composition and ensure there are no deleterious materials within the structure. All holes will be backfilled and capped for safety purposes. Once we receive the report we'll be glad to share the results with the DOS and the Province.

Please don't hesitate to let me know if you have any questions.

Thank you,

Edith B. Tobe
Executive Director
Squamish River Watershed Society
Box 1791, Squamish, BC, V8B 0B3
604-892-7919
srws@shaw.ca
www.squamishwatershed.com

From: Henshaw, Kevin <Kevin.Henshaw@wsp.com>
Sent: March 19, 2021 1:19 PM
To: srws@shaw.ca
Cc: Makovetski, Marina <marina.makovetski@wsp.com>; Plaisant, Alain <Alain.Plaisant@wsp.com>
Subject:

Hi Edith,

Marina has provided the following work plan for the field and testing program next week:

The environmental scope of work for dike material characterization will entail the following steps:

- Collect soil samples from each borehole. Five discrete soil samples will be collected from each borehole: 2 soil samples from top 1m below existing site surface and 3 soil samples at depths greater than 1m below grade.
- Field screen the soil samples collected during test pit excavations using a photoionization detector (PID).
- Submit soil samples to test for regulated potential contaminants of concern associated with fill (polycyclic aromatic hydrocarbons (PAH), salinity and heavy metals). The samples will be submitted to ALS Environmental in Burnaby, BC, which is accredited by Canadian Association for Laboratory Accreditation (CALA) and follows BC ENV recognized procedures for laboratory analyses.

- Upon receipt of final analytical results, compare the results to the applicable standards (BC Contaminated Sites Regulation). To assess reuse or disposal options, WSP will compare the analytical results of soil characterization with CSR Agricultural Land (AL), Residential Use (low and high density), Commercial Land (CL) and Industrial Land (IL) environmental protection standards.
- Prepare a letter pertaining to the results of the soil sampling.

Notes: In the light of recent amendments to soil relocation procedure introduced by BC ENV, there could be additional steps to complete (assessment of soil pH, land use, applicable background standards, etc. at the receiving site) for determining where the soil can be disposed off-site. This additional work was not considered under the scope of work in this proposal.

Analytical Plan:

Based on the recommendations of Contaminated Sites Approved Professionals (CSAP) society guidelines^[1], the potential contaminants of concern (PCOCs) for fill material of unknown quality should be identified during Stage 1 Preliminary Site Investigation (PSI) or Phase I Environmental Site Assessment (ESA). If no PSI or ESA have been completed for the site, the PCOCs should be those of the use. WSP is unaware of any previous environmental investigations completed for the dike. CSAP society suggests that the most common PCOCs in fill are heavy metals and PAHs (polycyclic aromatic hydrocarbons) based on the assumption that no obvious anthropogenic impacts have occurred at the dike site since the dike was constructed, therefore, WSP's analytical plan for the soil characterization is as follows:

- PAH – 10 samples (+ 1 Duplicate);
- Metals (including Na & Cl saturated paste) – 15 samples (+ 2 Duplicates).

The volume of the fill material within the dike will be confirmed during the investigation and sample density will be adjusted based on WSP's observations. Additional analyses for other parameters may be required based on the field observations and PID readings at the discretion of WSP's project manager. WSP understands that hot spots with residual contaminants released during the bunker oil spill (2006) were observed around the estuary side of the dike at the time of a culvert installation in 2020. The regulated contaminants of concern for bunker C oil are heavy extractable petroleum hydrocarbons (HEPH). Based on the field observations during the proposed drilling program, and upon client's authorization, WSP may add HEPH analyses to dike material characterization analytical plan. Work in addition to the agreed upon scope will not proceed without approval from SRWS.

We can commit to writing the recommendations for the report within one week after receiving analytical results from the lab, which means the earliest date the report can be released would be April 9.

Have a good weekend,

Kind Regards,

Kevin Henshaw, P. Eng.
Senior Hydrotechnical Engineer / Team Lead
Transportation - Bridges



T+ 1 604-601-6822

840 Howe Street, Suite 1000
Vancouver, British Columbia
V6Z 2M1 Canada

wsp.com

From: Henshaw, Kevin <Kevin.Henshaw@wsp.com>

Sent: March 12, 2021 9:25 AM

To: srws@shaw.ca

Cc: Plaisant, Alain <Alain.Plaisant@wsp.com>; Murray, Justin <Justin.Murray@wsp.com>

Hi Edith,

See attached and below for WSP's proposal to complete the geotechnical investigation as requested. Please also acknowledge our terms and conditions attached.

It seems like currently there are drillers available fairly quickly.

Let me know if you have questions.

Note that the proposal includes 5 boreholes because 4 would take two days and that an extra would not cost much more and may provide some value. We will forego the additional borehole to keep the drilling program within 2 days if needed.

Proposal from the WSP geotechnical team:

1 – Project understanding

The Squamish River Watershed Society, represented by Mrs. Edith B. Tobe, wishes to characterize the material of the dike situated at the end of Spit Road in Squamish, BC. The section of interest is the order of 800 m.

For this purpose, we have proposed a series of Geotechnical and Environmental tests to characterize the dike material.



The proposed work scope involves:

- 5 Sonic holes to be completed to a maximal depth of 7m or to practical refusal. The sonic drilling is a robust method of drilling through the dense dike material. Our previous investigations at this site also utilize this technique. Due to the dense nature of the dike material, the drilling contractors have estimated 2 days to complete 5 holes;
- Geotechnical laboratory testing will be conducted to determine the granulometry of the material within the dike:
 - 10 grain size tests (2 tests per hole). 5 sieve tests will be conducted on the coarse portion of the material (sand and gravel: between 50mm and 0.08mm) and 5 granulometry tests will be conducted on the coarse and fine portions of the material. The grain size distribution is a critical parameter if the dyke material is reused for engineering applications;
 - Provisional: Atterberg limit determination if cohesive material are encountered;
 - Provisional: Organic content determination if organics are encountered;
- Environmental laboratory testing will be conducted to identify any potential contamination of the dike material:
 - Polycyclic aromatic hydrocarbons (PAH) – 10 samples (+ 1 duplicate);
 - Salinity and Heavy Metals – 15 samples (+ 2 duplicates).

3 – Deliverable

Upon completion of the work and receiving the laboratory test results, a factual data report will be submitted. This report will include the following:

- Site exploration methodology;
- Description of the soil encountered;
- Summary of the Geotechnical and Environmental laboratory testing;
- Comparison of the environmental testing with the applicable standards (BC Contaminated Sites Regulation) as well as, to assess reuse or disposal options, comparison of the analytical results of soil characterization with the CSR Agricultural Land (AL), Residential Use (low and high density), Commercial Land (CL) and Industrial Land (IL) environmental protection standards;
- Sketch presenting approximate borehole location;
- Borehole logs.

Kind Regards,

Kevin Henshaw, P. Eng.
Senior Hydrotechnical Engineer / Team Lead
Transportation - Bridges



T+ 1 604-601-6822

840 Howe Street, Suite 1000
Vancouver, British Columbia
V6Z 2M1 Canada

wsp.com

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^[1] Potential Contaminants of Concern at Commercial and Industrial Land Uses, PCOC Selection and Guidance, Version 1, For CSAP members, June 2018.





August 17, 2020

Job Number: 115355
vFCBC Tracking Number: 100323840

Squamish River Watershed Society
BOX 1791
SQUAMISH BC V0N 3G0

Sent via email to: srws@shaw.ca

Dear Squamish River Watershed Society,

Notice of Authorized Changes - Changes In and About a Stream (Tracking Number 100323840)

Thank you for your Authorized Change Application for changes in and about a stream regarding the culvert works for the project on the Squamish River.

The locations of the works are at the following coordinates, as provided by the applicant:

- 49.7049320, -123.1733030

This letter acknowledges that the proposed activities meet the requirements as identified for Authorized Changes under the *Water Sustainability Act*.

All works shall be completed in accordance with the *Wildlife Act* section 4(4) letter of written permission authorizing the culvert replacement within the Skwelwil'em Squamish Estuary Wildlife Management Area issued.

All work shall be carried out in accordance with the Provincial "Standards and Best Practices for Instream Works 2004"

<http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf> and

"A Users' Guide to Working In and Around Water"

https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/land-water-use/crown-land/working_around_water.pdf.

As the Habitat Officer under the *Water Sustainability Act*, I am requiring that the proposed changes in and about a stream be made in accordance with the following

terms and conditions to protect fish, fish habitat, and/or water quality as per Section 42(2) of the *Water Sustainability Regulation*.

TERMS AND CONDITIONS:

a) THE TIMING WINDOW DURING WHICH THE CHANGE MAY BE MADE

1. As a Habitat Officer I authorize your instream works; permitting works from August 17, 2020 to September 30, 2020 with the conditions listed in the sections below.
2. Minimize the amount of time the work site is in a disturbed state by completing work as quickly as possible, while considering worker safety and minimizing environmental risk.

b) THE MINIMUM INSTREAM FLOW OR THE MINIMUM FLOW OF WATER THAT MUST REMAIN IN THE STREAM WHILE THE CHANGE IS BEING MADE

1. The natural rate of water flow must be maintained upstream and downstream of the worksite during all phases of instream activity.

c) THE REMOVAL OF MATERIAL FROM THE STREAM OR STREAM CHANNEL IN CONNECTION WITH THE CHANGE

1. The removal of material must not lead to stream channel instability or increase the risk of sedimentation into the watercourse.
2. Only remove materials from the channel as required to complete the culvert installation. Retain existing native instream and riparian vegetation, substrates and features surrounding the change.
3. All excavated material removed from the works area must be placed in a location and manner that prevents sediment or debris from entering the watercourse.

d) THE ADDITION OF SUBSTANCE, SEDIMENT, DEBRIS OR MATERIAL TO THE STREAM OR STREAM CHANNEL IN CONNECTION WITH THE CHANGE

1. Instream activities must be conducted in the dry, isolated from water flowing in the stream channel.

2. All equipment must be located and operated from the top of bank.
3. Equipment used in close proximity to the wetted perimeter must be free of deleterious material (e.g. hydrocarbons) and in good mechanical condition (e.g. no fuel or hydraulic leaks). If hydraulic machinery enters a stream, it must use environmentally sensitive hydraulic fluids that are non-toxic to aquatic life and are readily or inherently biodegradable.
4. Fuelling and servicing of vehicles and heavy equipment must occur a minimum of 30 metres away from all streams, lakes and waterbodies. All small equipment shall be equipped with drip trays. Keep a large and fully stocked mobile spill kit on site and train onsite staff in its use. Immediately report any spill of a substance that is toxic, polluting, or deleterious to aquatic life of reportable quantities to the Provincial Emergency Program 24-hour phone line at **1-800-663-3456**.
5. Design, install and maintain stream crossing structures to ensure that the streambed characteristics are retained or replicated and crossings do not restrict the cross-sectional area below the high water mark, change the stream gradient, or reduce or restrict fish passage.
6. All rock used in the works shall be clean and free of sediment producing material, durable, non-acid generating and suitably graded.
7. Ensure that all works involving the use of concrete, cement, mortars, and other Portland cement or lime-containing construction materials will not deposit, directly or indirectly, sediments, debris, concrete, concrete fines, wash or contact water into or about any watercourse. Concrete materials cast in place must remain inside sealed formed structures.
8. Erosion and sediment control structures are to be available onsite and utilized as necessary.
9. Construct any ditches, water bars, or water diversions within the work area so they do not directly discharge sediment-laden surface flows into the stream. Divert such flows to a vegetated area where flows can slowly infiltrate.

e) THE SALVAGE OR PROTECTION OF FISH OR WILDLIFE WHILE THE CHANGE IS BEING MADE OR AFTER THE CHANGE HAS BEEN MADE

1. A QEP is required to determine requirement for, plan, and implement fish and wildlife salvages prior to and during any instream and riparian works. Required permits must be obtained from the Ministry of Forests, Lands, Natural Resource Operations <http://www.env.gov.bc.ca/pasb/>.

2. Measures must be taken to ensure that equipment (e.g. water pumps) does not harm aquatic life (e.g. pump intakes should be appropriately screened).
3. Do not disturb wildlife and/or their residences (e.g. beaver lodges) within the project area without proper authorization.

f) THE PROTECTION OF NATURAL MATERIALS AND VEGETATION THAT CONTRIBUTE TO THE AQUATIC ECOSYSTEM OR STREAM CHANNEL STABILITY

1. Minimize disturbance to natural materials (e.g. embedded logs) and vegetation that contribute to habitat or stream channel stability.
2. Minimize disturbance to existing vegetation on and adjacent to the stream banks.
3. Minimize clearing width at the crossing site, and retain streamside vegetation within the stream crossing right-of-way wherever possible.
4. Minimize or avoid disturbing soil and vegetation above and below the area required for actual construction of the stream crossing.

g) THE RESTORATION OF THE WORKSITE AFTER THE CHANGE HAS BEEN MADE

1. Grade disturbed areas to a stable slope after work is completed.
2. Revegetate any disturbed areas using non-invasive species appropriate for local conditions. Riparian areas which are disturbed by the works shall be restored to their original condition and protected from erosion.
3. Remove sediment and erosion control measures when deemed appropriate by the Qualified Professional following completion of the works.
4. Complete post-construction multi-year monitoring to ensure planted revegetation meets full survival.

h) THE REQUIREMENT TO OBTAIN AN APPROVAL FROM THE FEDERAL DEPARTMENT OF FISHERIES AND OCEANS IN CONNECTION WITH THE CHANGES

1. Proponents are responsible for complying with the federal *Fisheries Act*. No serious harm to fish is authorized by this document, where serious harm is the death of fish or any permanent alteration to, or destruction of, fish habitat.
2. Fisheries and Oceans Canada (FOC) may authorize a net loss of fish habitat, where a mitigation/compensation package can be negotiated between FOC and the proponent.
3. Proponents are responsible for determining whether Fisheries and Oceans Canada (FOC) must be consulted and whether an authorization from FOC is required prior to making the change.

i) OTHER

1. The holder of this Approval must hire an appropriately Qualified Professional to conduct Environmental Monitoring on all in-stream works under this Notification. The Qualified Professional is responsible for observing the methods of construction and preparing information and reports on the compliance of the construction activities.

This document does not supersede the requirements of the *Water Sustainability Act* and Regulations, Federal *Fisheries Act* or any other related legislation. The proponent is obligated to comply with all applicable federal, provincial or municipal enactments. Further information on the *Water Sustainability Act*, Section 11 Change Approval and Authorization for "Changes In and About a Stream" can be found at: <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-licensing-rights/working-around-water> and https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/south_coast_cias_guidance.pdf.

Retain a copy of this document on site during construction of the works.

Sincerely,



Sr. Authorizations Technician / Habitat Officer

Enclosure(s)



April 1, 2019

File: 39580-30/ Skwelwil'em
Squamish Estuary WMA

Edith Tobe
Executive Director
Squamish River Watershed Society
Box 1791, Squamish BC, V8B 0B3

Dear Edith Tobe:

**Re: Authorization to conduct construction works within the Skwelwil'em
Squamish Estuary Wildlife Management Area (WMA)**

This letter constitutes *Wildlife Act* section 4(4) authorization to enter and conduct works related to a box culvert installation within Skwelwil'em Squamish Estuary WMA:

4. Power to designate wildlife management areas

(4) Despite any other enactment, a person may not use land or resources in a wildlife management area without the written permission of the regional manager.

This authorization is subject to the following conditions:

1. Access to the Skwelwil'em Squamish Estuary WMA to conduct works related to a box culvert installation is granted from April 1, 2019 to May 15, 2019.
2. Construction activities will be limited to those described in the attached documents.
3. Any changes to the construction program that will involve the deployment of additional infrastructure, the collection and removal of samples or impacts to habitat will require separate authorization.
4. Please ensure that you and/or any of your staff retain a copy of this authorization when accessing the WMA in support of your construction project.

Sincerely,

Josh Malt, MSc, RPBio
Delegated Authority, B.C. *Wildlife Act*
Terrestrial Wildlife Section Head, South Coast Natural Resource Region
Ministry of Forests, Lands, Natural Resource Operations and Rural Development



April 16, 2019

File: 39580-30/ Skwelwil'em
Squamish Estuary WMA

Edith Tobe
Executive Director
Squamish River Watershed Society
Box 1791, Squamish BC, V8B 0B3

Dear Edith Tobe:

**Re: Authorization to conduct construction works within the Skwelwil'em
Squamish Estuary Wildlife Management Area (WMA)**

This letter constitutes *Wildlife Act* section 4(4) authorization to enter and conduct works related to a box culvert installation within Skwelwil'em Squamish Estuary WMA:

4. Power to designate wildlife management areas

(4) Despite any other enactment, a person may not use land or resources in a wildlife management area without the written permission of the regional manager.

This authorization is subject to the following conditions:

1. Access to the Skwelwil'em Squamish Estuary WMA to conduct works related to a box culvert installation is granted from May 16, 2019 to June 30, 2020.
2. Construction activities will be limited to those described in the attached documents and communications.
3. Any changes to the construction program that will involve the deployment of additional infrastructure, the collection and removal of samples or impacts to habitat will require separate authorization.
4. Please ensure that you and/or any of your staff retain a copy of this authorization when accessing the WMA in support of your construction project.

Sincerely,

Josh Malt, MSc, RPBio
Delegated Authority, B.C. *Wildlife Act*
Terrestrial Wildlife Section Head, South Coast Natural Resource Region
Ministry of Forests, Lands, Natural Resource Operations and Rural Development



August 6, 2020

File: 39580-20/ Skwelwil'em
Squamish Estuary WMA

Edith Tobe
Executive Director
Squamish River Watershed Society
Box 1791, Squamish BC, V8B 0B3

Dear Edith Tobe:

**Re: Authorization to conduct construction works within the Skwelwil'em
Squamish Estuary Wildlife Management Area (WMA)**

This letter constitutes *Wildlife Act* section 4(4) authorization to enter and conduct works related to a box culvert installation within Skwelwil'em Squamish Estuary WMA:

4. Power to designate wildlife management areas

(4) Despite any other enactment, a person may not use land or resources in a wildlife management area without the written permission of the regional manager.

This authorization is subject to the following conditions:

1. Access to the Skwelwil'em Squamish Estuary WMA to conduct works related to a box culvert installation is granted from August 10, 2020 to October 10, 2020.
2. Construction activities will be limited to those described in the attached documents and communications.
3. Any changes to the construction program that will involve the deployment of additional infrastructure, the collection and removal of samples or impacts to habitat will require separate authorization.
4. Please ensure that construction activities minimize impacts to fish, wildlife, and habitat within the WMA.
5. Please ensure that you and/or any of your staff retain a copy of this authorization when accessing the WMA in support of your construction project.

Sincerely,

Scott Barrett, RPBio
Director, Resource Management, South Coast Natural Resource Region
Ministry of Forests, Lands, Natural Resource Operations and Rural Development