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Beaver Coexistence Pilot Project for Disaster Risk Reduction-Climate Adaptation

Case Study: Kw'as Bay Rd, Cortes Island, BC. Project Overview and Construction Environmental Management Plan



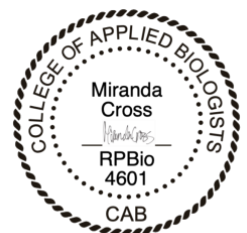
Beaver have blocked the culvert causing water to flood over the road. Beaver coexistence solutions are proposed to reduce disaster risk and safety concerns for the community and provide climate change adaptation and resilience and maintenance of wildlife habitat. Photo: Miranda Cross, May 1st, 2024.

PREPARED FOR: STRATHCONA REGIONAL DISTRICT & BC MINISTRY OF TRANSPORTATION AND TRANSIT & BC MINISTRY OF WATER LAND AND RESOURCE STEWARDSHIP & FISHERIES AND OCEANS CANADA

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1. Executive Summary

This document, prepared by Rewilding Water and Earth Inc. (RWE) provides a project overview, design, and environmental management plan for the Kw'as Bay Beaver Coexistence Pilot Project. The project will require a *BC Water Sustainability Act (WSA)* Notification of Authorized Changes for the proposed activities at Kw'as Bay Rd, Cortes Island, BC (Regional Park Right of Way, and private property at 1135 Kw'as Bay Rd (PID: 023-281-154)). Additional works on the Ministry of Transportation and Transit (MoTT) Right of Way, required internal MoTT authorization, and are not subject to the WSA permitting process.

Project partners and stakeholders include the Strathcona Regional District (SRD), Ministry of Transportation and Transit (MoTT), Private Landowners, Friends of Cortes Island Society (FOCI), Klahoose First Nation, Van Isle Wetlands (VIW), and Rewilding Water and Earth Inc. (RWE).

Implementation of this project, and beaver coexistence, will result in maintenance and conservation of wetland habitat and riparian area of approximately 2.1 hectares, and a reduction in erosion and sedimentation leading to water quality and fish habitat impacts in Hague Lake. The proposed works include the installation of three pond levelers and one culvert protection fence. The structures would require monitoring and minimal maintenance which would be included as part of existing routine maintenance activities in the Regional Park and MoTT Right of Way. The project would include training workshops and the development of an assessment and maintenance plan so staff and contractors are fully trained to maintain this infrastructure. No Beavers would be trapped, re-located, or killed, and no beaver dams removed as part of this project.

The maintenance of the proposed structures is less rigorous and less costly than removing or breaching beaver dams that are causing flooding (which often requires heavy equipment and/or rigorous physical labour). Implementing beaver coexistence has the potential to provide cost-benefit ratio of 8 dollars savings for every dollar spent¹.

The proposed beaver coexistence solutions would support beaver-maintained wetlands on the landscape. Wetlands provide critical ecosystem services for disaster risk reduction climate adaptation such as; cleaning and storing water and ground water recharge; mitigating floods and erosional precipitation events; sequestering and storing carbon; moderating climate extremes (heat waves and droughts); and mitigating wildfire.

Implementing beaver coexistence at this site will serve to save community resources, provide Disaster Risk Reduction and Climate Adaptation, while protecting and conserving aquatic ecosystems and wetland habitat created and maintained by beaver.

¹ 2018 Glynnis A. Hood et al. Mitigating Infrastructure Loss from Beaver Flooding: A Cost-Benefit Analysis

1.1. Introduction, Project Background, and Rationale

Ongoing and long-standing beaver related challenges such as beaver dams and beaver blocked culverts have caused flooding of Kw'as Bay Road and the Kw'as Park trail and parking lot. Residents report this has been an ongoing issue for at least 20 years². This situation poses risks for residents, impacts access/egress in the event of emergency, and impacts the park access right of way for recreational park users. Beaver blocked culverts also obstruct fish passage and impact connectivity for fish and aquatic organisms.

When beaver dams are breached to unblock culverts and mitigate flooding, sediments and nutrients are released to downstream aquatic ecosystems. This has negative impacts for fish and wildlife, and increases the nutrient load to downstream waterbodies, such as Hague Lake which is already impacted by nutrient loading and algal blooms³ (See project map, [Figure 1](#)).

“Road culverts are the most common sites for problematic beaver damming. A blocked culvert can quickly cause dangerous and expensive road safety issues. Fortunately, nearly every road culvert can be protected from beavers in a cost-effective, long-term, environmentally friendly and humane manner.”⁴

The Strathcona Regional District (SRD) was awarded funding from the BC Ministry of Emergency and Climate Readiness (EMCR), Union of BC Municipalities (UBCM), Community Emergency Preparedness Fund, Disaster Risk Reduction-Climate Adaptation Funding (DRR-CA) program, Category 2, for Phase 1 of the project: non-structural projects (Land use planning and delivering community education and awareness projects). Phase 2 (implementation of structural projects) funding has been secured through DRRCA Category 3, to implement the land use plans and risk reduction strategies developed in Phase 1. Phase 2 goals and objectives are listed below, [Section 2](#). Phase 1 of the project has included preliminary design, land use planning, cost estimates, and benefit-cost analysis.

The phase 1 project objectives were to:

- Conduct land use planning at the Kw'as Bay site (site tours, meetings, and field work to design beaver coexistence strategies/prescriptions and recommendations) **(Completed May 2024)**.
- Deliver the *Benefits of Beaver for Disaster Risk Reduction-Climate Adaptation* public workshops on Cortes and Quadra Islands **(Completed May 2024)**.
- Deliver the *Benefits of Beaver for Disaster Risk Reduction-Climate Adaptation* transferrable knowledge internal session at Kw'as road culvert with Ministry of

² Paul Palauk, neighbour, Personal communication, May 1, 2024.

³ Friends of Cortes Island Society, September 29, 2024, <https://www.friendsofcortes.org/love-the-lakes/useful-publications/>.

⁴ Mike Callahan, “Beaver Solutions,” March 3, 2025, <https://www.beaversolutions.com/get-beaver-control-products/fence-and-pipe-devices/>.

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Transportation and Infrastructure (MoTT), SRD, Wetland Restoration Consultant/RPBio, Beaver Coexistence consultant, Klahoose First Nation, and affected neighbouring private landowners **(Completed May 2024)**.

- Produce a transferrable knowledge report: *Beaver Coexistence for disaster risk reduction and climate adaptation case study report*. Report includes: Project overview and construction environmental management plan, beaver coexistence prescriptions for Kw'as Park/Road, design, and recommendations. Report to provide transferable knowledge/communicates beaver coexistence disaster risk reduction and climate change adaptation benefits to government agencies such as MoTT, SRD, City of Campbell River etc. Report will be made available to the public on the SRD website **(In progress; Preliminary Design report completed October 2024; this Draft Project Overview and CEMP, to be completed by June 2025)**.

This project builds on recent local initiatives intended to benefit watershed and ecosystem integrity, improve healthy watershed function for Hague-Gunflint Lakes, mitigate nutrient inputs into the lakes causing algal blooms, and increase ecosystem stewardship and climate adaptation and resilience. The local initiatives include:

- The SRD's installation of pond levelers (2021) and a new bridge (2023) providing access to the Kw'as Park, which has a long history of human-beaver conflict. These first pond levelers were unsuccessful due to improper design and/or low-quality materials.
- The Dillon Creek Wetland Restoration project at Linnaea Farm (2021), a partnership project between Friends of Cortes Island (FOCI) and Linnaea Farm Society. [Replenish Bringing Back the Dillon Creek Wetlands: Documentary Film](#).
- The foundational activities of the Friends of Cortes Island (FOCI); FOCI Report: Climate Change and Drought report (2022)⁵; Hague and Gunflint Lakes: Monitoring Report (2018); Hague and Gunflint Lakes 'Love the Lakes' Stewardship Plan and program (2014-2024). FOCI reports available on the FOCI [website](#).

The authors recommend Beaver Coexistence as the best strategy for risk reduction and climate adaptation. Community support for this project was expressed at the May 2024 public and internal information session. Beaver coexistence techniques such as [pond levelers](#) and [culvert protection fencing](#) or “Keystone Fence”⁶ ([Example Diagrams and Photos](#)) are proposed as non-lethal solutions to beaver management while supporting beaver-maintained wetlands on the landscape.

“The Keystone Fence eliminates beaver damming of culverts. Beaver Solutions LLC has installed hundreds of these devices with a 95% success rate despite the continued

⁵ Berman-Hatch, Forest, “FOCI Report: Climate Change and Drought” (Friends of Cortes Island Society, 2022); Conradi, Sophia, “Risk Assessment Maps and Data. Cortes Climate Action Planning” (Simon Fraser University, Faculty of Health Sciences; Friends of Cortes Island Society, August 2022).

⁶ Mike Callahan, “Self Help Information - Culverts, Drains” (The Beaver Institute Inc., n.d.), <https://www.beaverinstitute.org/wp-content/uploads/2023/03/BI-Self-Help-Culverts-Drains.pdf>.

presence of beavers. This device eliminates the never-ending cost of continued culvert clearing, repairs and trapping.”⁷

“When flooding from a beaver dam threatens human property, health or safety, a Flexible Pond Leveler pipe system can be a very effective solution. This flow device will create a permanent leak through the beaver dam that the beavers cannot stop. This eliminates the need for repeated trapping despite the presence of beavers.”⁸

Implementing beaver coexistence at this site will achieve the project intent:

- Save community resources, mitigate drought and flooding-related problems, and reduce damage to infrastructure and risk to public safety
- Protect and conserve aquatic ecosystems and beaver-created and maintained wetlands
- No beavers would be trapped, re-located, or killed, and no beaver dams removed as part of this project.

2. Project Goals and Objectives

2.1. Goals

1. Installation of beaver coexistence structures at Kw'as Bay Park site (1 culvert exclusion fence, and 3 pond levelers) led by Beaver Coexistence Specialist, to reduce disaster risk caused by beaver dams and beaver blocked culvert at this location.
2. Provide transferrable knowledge of beaver coexistence techniques through;
 - i) a beaver coexistence structure installation and maintenance workshop (for SRD, MoTT, Mainroad, and FOCI contractors, Klahoose First Nation Representatives, and open to the Cortes island community);
 - ii) as-built construction report, monitoring and adaptive management and maintenance plan;
 - iii) development and installation of informational signage at the site describing the benefits of beavers for DRRCA highlighting beaver coexistence strategies.
3. Maintain disaster risk reduction benefits through properly functioning condition of beaver coexistence structures through monitoring and adaptive management.

⁷ Mike Callahan.

⁸ Mike Callahan, “Self Help Information- Pond Leveler” (The Beaver Institute Inc., n.d.), <https://www.beaverinstitute.org/wp-content/uploads/2023/03/BI-Self-Help-Flexible-Pond-Leveler-1.pdf>.

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2.2. Objectives

#	Objective	Target	Time frame	Methods
1	Installation of functioning beaver coexistence structures at Kw'as Bay Park site to reduce disaster risk caused by beaver dams and beaver blocked culvert at this location.	1 culvert exclusion fence, and 3 pond levelers	Fish window 2025 (August 15-September 15 th , 2025)	Implementation documentation with as-built mapping, construction report, and photos & post-construction monitoring and adaptive management
2	Transferrable knowledge workshop for installation and maintenance of beaver coexistence structures	One workshop hosted, attended by representatives/staff from SRD, MoTT, Mainroad, FOCl, Klahoose First Nation, and Cortes island community.	Fish window 2025 (August 15-September 15 th , 2025)	Photo documented workshop for installation of beaver coexistence structures
3	Installation of informational signage at the site describing the benefits of beavers for DRRCA highlighting beaver coexistence strategies.	At least 1 info-graphic sign installed at the site	2025-December 31, 2026	Signage developed and installed
4	Monitor and maintain: post construction monitoring and adaptive management reporting to relevant provincial authorities	Properly functioning structures, flowing freely and maintaining appropriate water elevations. Culvert not blocked and freely flowing.	December 31, 2026 (end of funding) Long term monitoring to continue indefinitely	Effectiveness Monitoring and Adaptive Management Plan and Report

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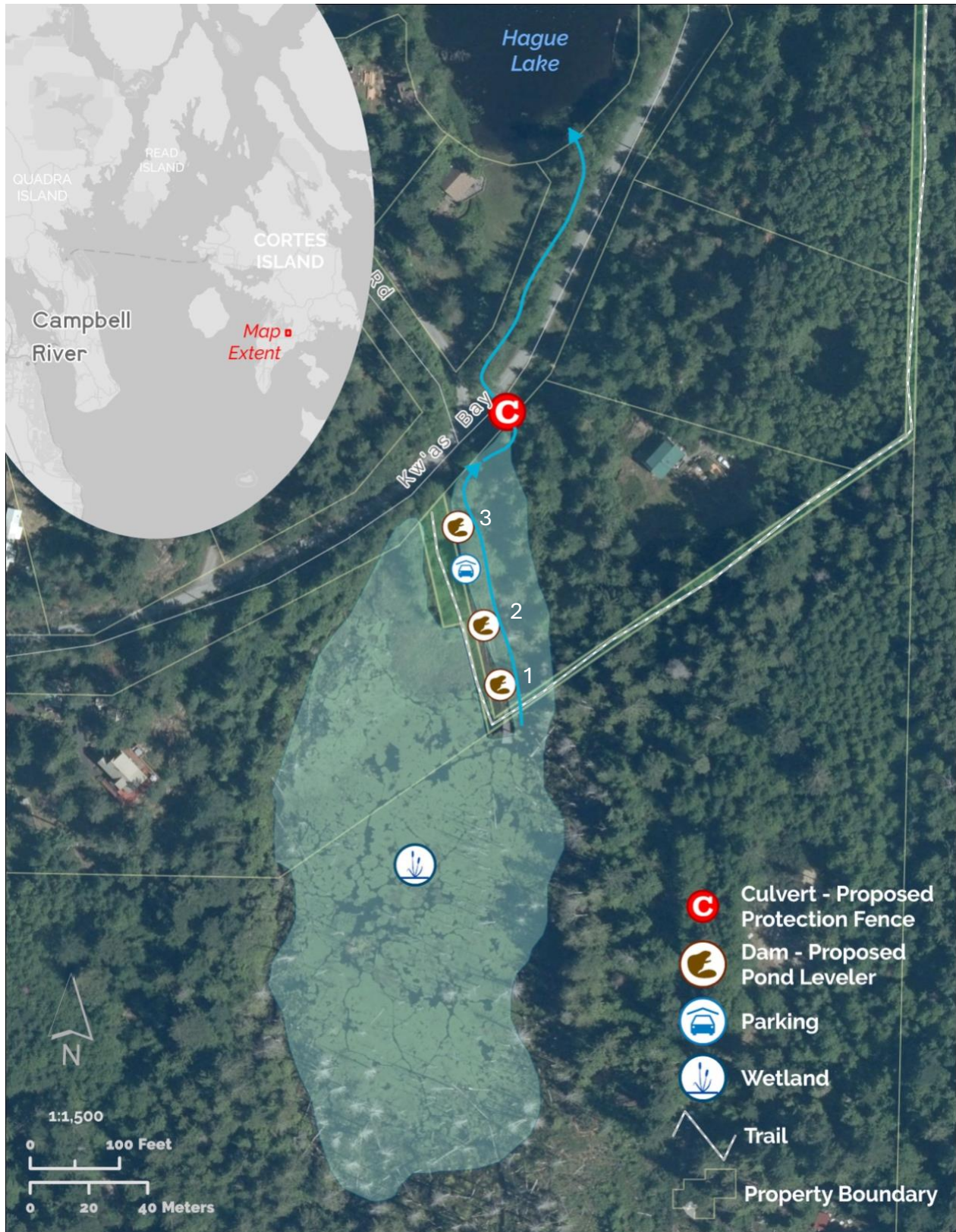


Figure 1. Map of proposed beaver coexistence structures. Three pond levelers (1,2,3) and one culvert protection fence would be installed to reduce disaster risk and maintain access/egress to residents and park users. Map by: Douglas Sauer, SRD, February, 2025 .

3. First Nations Interests, Consultation, and Engagement

The Kw'as Park site is located on Cortes Island, in the consultative areas, and the traditional and ancestral territory of the toq qaymıx^w (Klahoose), ƭəʔamən qaymıx^w (Tla'amin), and ʔop qaymıx^w (Homalco) Nations⁹. Klahoose First Nation have a village (on reserve) site at Squirrel Cove on Cortes Island.

Klahoose First Nation (KFN) has been consulted about this project. A letter sent to Klahoose administration, December 5, 2023, first introduced the project concept. A follow up email April 1, 2024 was sent, and the result was the participation of Klahoose representatives (Guardian, Cultural Consultant, and Elders) at the Internal Stakeholders meeting and site tour held May 2, 2024. Representatives voiced their support for the project during the event. Klahoose Chief Steven Brown provided a letter of support for the project in October 2024. Klahoose will be invited to engage on Phase 2 of the project, with opportunities for Guardian training, and Elder/Cultural Consultant engagement offered. A record of communications and support letters is provided in [Appendix C](#).

4. Project Partners/Stakeholders

Project partners and stakeholders include Ministry of Transportation and Transit (MoTT), Mainroad, Strathcona Regional District (SRD), Friends of Cortes Island Society (FOCI), Rewilding Water and Earth Inc (Wetland Restoration Consultant/RPBio), Van Isle Wetlands (Beaver Coexistence Consultant), Klahoose First Nation and affected neighbouring private landowners.

5. Stakeholders and Community Engagement/Meetings

The *Benefits of Beaver for Disaster Risk Reduction-Climate Adaptation* community and stakeholder engagement and education events were held on Quadra and Cortes Island April 30th to May 2nd, 2024. Two public info presentations were delivered to the Quadra Island community. One public and one internal stakeholders education session and site tour were delivered on Cortes Island, with site tours of the case study site at Kw'as Bay rd. A total of 26 participants attended the public info sessions. The internal stakeholder session was attended by 25 participants, with representatives from MoTT, Mainroad, SRD, FOCI, Wetland Restoration Consultant/RPBio, Beaver Coexistence consultant, Klahoose First Nation representative (Elders, Cultural Consultant, and Guardian), and affected neighbouring private landowners.

The result of the internal transferable knowledge session event was establishing communication between stakeholders and building collaborative partnerships between

⁹ Province of British Columbia, "Contacts for First Nation Consultation Areas," September 26, 2023, <https://maps.gov.bc.ca/ess/hm/cadb/>.

organizations. The project team will work with stakeholders to develop innovative land use planning solutions and implement non-lethal solutions to beaver management that both reduce the risk to the road and public safety and support healthy wetland ecosystems maintained by beavers in the area.

6. Environmental Assessment and Site Analysis

6.1. *General Site Assessment and History*

The ongoing challenges of the blocked culverts and upstream road and trail flooding, resulting in beaver dams being breached and removed has been documented during assessment and monitoring site visits by the author, Wetland Restoration Specialist & Registered Professional Biologist (RP Bio) Miranda Cross since 2020. [See Appendix A: Site Photographs.](#)

The road flooding was documented in May 2022, winter 2023, March - May 2024, and is currently ongoing as of March 2025. Residents report that these challenges have been ongoing for at least 20 years, and when the culvert is unblocked, it has caused flooding on their property in the past¹⁰.

The upstream beaver dams have caused flooding in the parking lot for Kw'as park and impacted park access. Three pond levelers and a new bridge access for Kw'as Park access have been installed in recent years by the SRD. The new bridge and upper most pond leveler are currently functioning as intended and have improved access. Two of the three pond levelers have failed to function due to improper design. The successful pond leveler was managed adaptively and is functioning to maintain water levels appropriately. This functioning pond leveler will need to be replaced in the short term due to the low-quality materials used and some design considerations that will limit its longevity. The pond leveler in the lowest dam (#3) has failed, which is causing flooding in the parking lot.

The blocked culvert at Kw'as Bay Rd has been managed historically by installing a flat metal grate over the culvert inlet and using heavy equipment to remove the beaver dam debris when it becomes blocked. Due to the emergency nature of the works to unblock the culvert, this could fall outside of least risk windows for fish and wildlife. Furthermore, the steel culvert has been damaged by equipment used to unblock it, is bent, and the inlet folded in, therefore this culvert is failed. MoTT plans to replace this culvert with a culvert that is adequately sized for future climactic conditions¹¹.

Each time debris is dug out or a dam is breached, sediments are released to the downstream aquatic ecosystem. Phosphorus bound in the soils can contribute to nutrient

¹⁰ Paul Palauk, neighbour, Personal communication.

¹¹ Ashley Cousens, Area Manager Vancouver Island District, Courtenay Area Office, BC Ministry of Transportation and Infrastructure, Personal communication, May 2, 2024.

loading and algal blooms in Hague lake¹². Furthermore, the wetland habitat is negatively impacted by sudden changes in water elevation when beaver dams are breached. Sudden changes in water elevation can negatively impact fish and wildlife, and when saturated wetland soils are exposed to the air, carbon is released to the atmosphere¹³.

6.2. Methods

Chris Holtslag, [Vanisle Wetlands](#) (ViW), and Miranda Cross, Rewilding Water and Earth Inc (RWE), conducted a site visit to assess the appropriateness of beaver coexistence strategies, and the develop the site specific design details. Site investigation surveys and design of the project area were completed, May 1st, 2024. Additional site visits have been conducted by Miranda Cross over multiple years and dates from 2020-2025. The following information was gathered:

- Spatial data for site features were mapped using Arc GIS Field maps GPS application on an iPhone or iPad
- Photographs including drone imagery were taken
- Water and infrastructure elevations were surveyed using a Trimble Spectra precision LL300S laser level
- Distance and length of features/design was measured using a 50m tape measure and/or a range finder

The following resources were reviewed by the author during background research:

- Species at Risk Act (SARA) Public Registry
- Sensitive Habitat Inventory and Mapping (SHIM)
- Discovery Island Ecosystem Mapping (DIEM)
- E-fauna BC
- iMap BC Fresh Water Atlas (FWA)
- Fisheries Information Summary System (FISS)

¹² Maggie Squires, "Trophic State & Basic Ecology of Hague & Gunflint Lakes, Cortes Island, BC, with Recommendations for Remediation, Sampling, & Reporting." (Friends of Cortes Island Society, April 2019).

¹³ Pascal Badiou et al., "Greenhouse Gas Emissions and Carbon Sequestration Potential in Restored Wetlands of the Canadian Prairie Pothole Region," *Wetlands Ecology and Management* 19, no. 3 (June 2011): 237–56, <https://doi.org/10.1007/s11273-011-9214-6>; Scott D. Bridgman et al., "The Carbon Balance of North American Wetlands," *Wetlands* 26, no. 4 (December 2006): 889–916, [https://doi.org/10.1672/0277-5212\(2006\)26\[889:TCBONA\]2.0.CO;2](https://doi.org/10.1672/0277-5212(2006)26[889:TCBONA]2.0.CO;2); A. M. Nahlik and M. S. Fennessy, "Carbon Storage in US Wetlands," *Nature Communications* 7, no. 1 (December 13, 2016): 13835, <https://doi.org/10.1038/ncomms13835>; Polly C. Buotte et al., "Carbon Sequestration and Biodiversity Co-benefits of Preserving Forests in the Western UNITED STATES," *Ecological Applications* 30, no. 2 (March 2020), <https://doi.org/10.1002/eap.2039>; TA Ontl et al., "Forest Management for Carbon Sequestration and Climate Adaptation.," *Journal of Forestry* 118, no. 1 (January 7, 2020): 86–101.

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- Strathcona Regional District uMapIt
- BC Habitat Wizard GIS mapping database
- Satellite Imagery
- Historical Air Photos

The following criteria guided where beaver coexistence strategies would be implemented:

1. The location would reduce impacts of climate related risks (ie. flooding of the road and trail)
2. Beaver are present at the site, and there have been ongoing conflicts due to their dams. Beavers would not be trapped or killed, and no dams would be removed as part of the project.
3. There would be no conflict with planned development
4. There would be no conflict with current uses of the road, trail, or neighbouring property
5. There would be no conflict with utilities, either above or below the ground
6. The project would enhance the climate resiliency and safety for the community
7. The site is a natural wetland that is impacted by breaching of beaver dams
8. The site is adjacent to a natural forested swamp wetland, and flows into the sensitive ecosystem of Hague Lake
9. The project would mitigate nutrient inputs into Hague lake

6.3. *Biogeoclimactic Zone*

This site is situated on Cortes Island, BC, and lies in the Coastal Western Hemlock, Very Dry Maritime, Eastern (CWHxm1) Biogeoclimactic Ecosystem Classification¹⁴. “The CWHxm has warm, dry summers and moist, mild winters with relatively little snowfall. Growing seasons are long, and feature water deficits on zonal sites”¹⁵. Dominant vegetation in this zone includes Western hemlock, Amabilis fir, and Western red cedar. “Major understory species include Alaskan blueberry, oval-leaved blueberry, false azalea, bunchberry, five-leaved bramble, and a well-developed moss layer”¹⁶.

6.4. *Aquatic Ecosystem Description*

As depicted in [Figure 1](#), the site is a beaver-maintained wetland complex that drains into the freshwater ecosystem of Hague Lake. This site is an environmentally sensitive area that is critical to local biodiversity and ecosystems services provided by wetland ecosystems,

¹⁴ BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development., *Biogeoclimactic Ecosystem Classification Subzone/Variant Map for the Campbell River Resource District, West Coast Region*. (Government of BC, August 2016).

¹⁵ Ministry of Forests, “A Field Guide for Site Identification and Interpretation for the Vancouver Forest Region: Land Management Handbook 28” (Province of British Columbia, 1994), <https://www.for.gov.bc.ca/hfd/pubs/docs/lmh/lmh28.pdf>.

¹⁶ Ministry of Forests.

as documented in the Discovery Island Ecosystem Mapping of sensitive ecosystems, Figure 2 below.

The section of stream connecting the wetland to the lake has been dammed by beaver. Three dams, and the blocked culvert have been established and maintained by beaver. The slope of the stream is 1.8%, buffered by three beaver dams. The stream width is variable from 10 to 21m wide, due to the beaver dams spanning across the riparian area. Beaver dam #1 is 21m wide, beaver dam #2 is 10m wide, and beaver dam #3 is 20 m wide. Depth of water, measured in May 2024 during near high-water conditions (water was not flowing over the tops of any of the dams) was up to 1.5-2m deep in the deepest spot behind dams. The upper most dam (#3) maintains the elevation of water in the lodge pond.

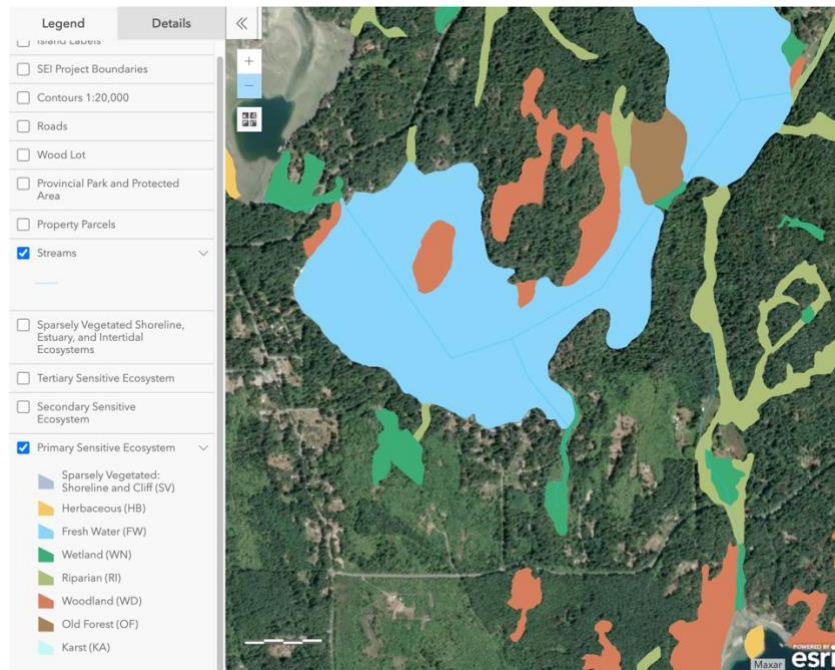


Figure 2. Sensitive Ecosystem Inventory (SEI) Discovery Island Ecosystem Mapping, sensitive ecosystem mapping¹⁷.

6.5. Vegetation Description

Native plants:

Aquatics: *Carex obnupta* (Slough sedge), *Scirpus microcarpus* (Small fruit bullrush), *Juncus effusus* (Common rush), *Lysichiton americanus* (Swamp lattern), *Nuphar lutea subsp. Polysepala* (yellow pond lily), *Brasenia schreberi* (Water shield), *Potamogeton natans* (Potamageton), *Typha latifolia* (Cattails), *Persicaria amphibia var. emersa* (water smart weed).

¹⁷ B.C. Conservation Data Centre, “Discovery Islands Ecosystem Mapping (DIEM),” GIS mapping database (Discovery Islands Ecosystem Mapping, 2024), <https://diemproject.org/>.

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Understory: *Polystichum munitum* (Sword Fern), *Struthiopteris spicant* (Deer fern), *Stachys cooleyae* (hedge nettle), *Gaultheria shallon* (Salal),

Shrub Layer: *Rubus spectabilis* (Salmonberry), *Vaccinium parvifolium* (Red Huckleberry), *Sambucus racemose* (Red elderberry), *Ribes sanguineum* (Red flowering currant).

Trees: *Thuja plicata* (Western red cedar), *Picea sitchensis* (Sitka spruce), *Pseudotsuga menziesii* (Douglas fir), *Abies grandis* (Grand fir), *Prunus pensylvanica* (Pin Cherry), *Tsuga heterophylla* (Western hemlock), *Alnus rubra* (Red alder),).

Invasive species: Himalayan blackberry, Thistles, Scotch broom, Reed canary grass, agronomic grasses, buttercup.

6.6. Wildlife

The following wildlife have been observed at this site: Beaver (*Castor canadensis*), Red Legged frog (*Rana aurora aurora*), Pacific chorus frog (*Pseudacris regilla*), Garter snake (*Thamnophis elegans*), Rough Skinned Newt (*Taricha granulosa*), Coastal Cutthroat Trout (*Oncorhynchus clarkii clarkii*), Blue dasher dragon fly (*Pachydiplax longipennis*), Violet green swallow (*Tachycineta thalassina*), Common night hawk (*Chordeiles minor*), and water fowl (Mallard (*Anas platyrhynchos*), Hooded Merganser (*Lophodytes cucullatus*), Bufflehead (*Bucephala albeola*)).

Based on the habitat and geographic location, the following species are also expected to occur at this site:

Great Blue Heron (*Ardea herodias fannini*), Barn swallow (*Hirundo rustica*), Tree swallow (*Tachycineta bicolor*), Olive sided fly catcher (*Contopus cooperi*), little brown myotis (*Myotis lucifugus*), northwestern salamander (*Ambystoma gracile*), Sculpin, Coastrange Stickleback and various avians and waterfowl.

Of the species listed above the following Species At Risk (SAR) are expected to benefit from this project:

Red legged frog, Coastal cutthroat trout, Blue dasher dragon fly, Barn swallow, Tree swallow, Olive sided fly catcher, Little brown myotis, Great blue heron, Common night hawk.

There are no known wildlife or bald eagle nest trees near the project site as demonstrated in figure 4 below.

No Canadian aquatic species at risk are listed on the DFO Aquatic species risk map¹⁸.

¹⁸ Fisheries and Oceans Canada, *Aquatic Species at Risk Map*, accessed May 28, 2025, <https://www.dfo-mpo.gc.ca/species-especes/sara-lep/map-carte/index-eng.html>.

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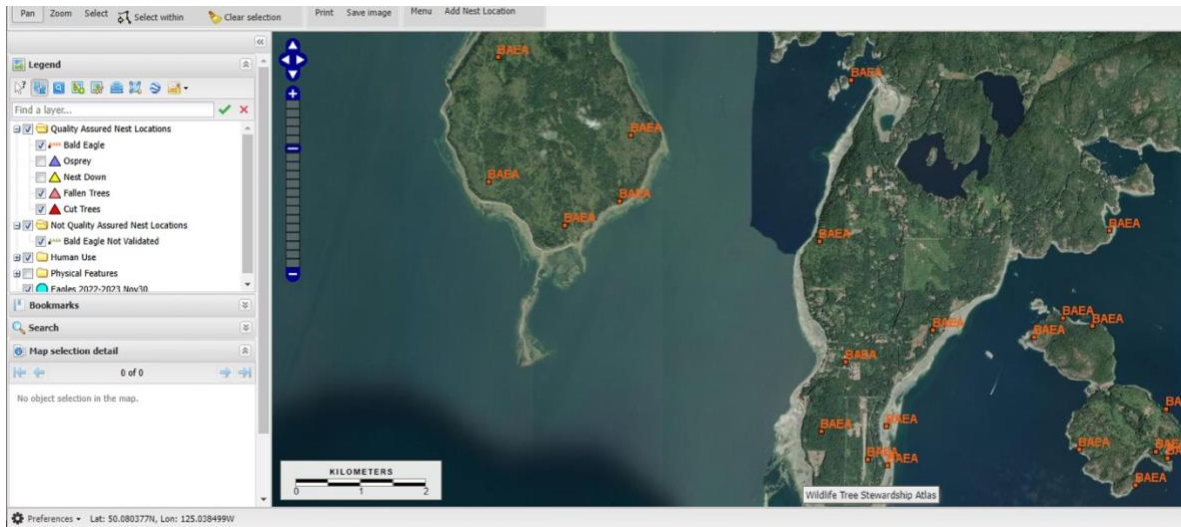


Figure 3. Wildlife Tree Stewardship Atlas showing no bald eagle nests or wildlife trees near the project area¹⁹.

6.7. Fish and Fish Habitat

Review of the FISS, Eco-Cat, DFO aquatic species at risk map, and previous studies and reports of the area, provide context for relevant fish and fish habitat and indicate the presence of provincially blue-listed Coastal Cutthroat Trout (*clarkii* spp.), Stickleback^{20, 21}, and Coastrange Sculpin²². Coho Salmon are also listed on the habitat wizard (Figure 6 below), however the 1989 reconnaissance survey of Hague Lake indicated these were farmed in net pens in the lake²³, and this practice has since been discontinued.

Downstream from Hague Lake, there is a barrier to anadromous fish passage, a bed rock waterfall approximately 3-4m tall, at the upper limit of tidal waters of Manson's Lagoon. This barrier is impassable to the upstream movement of fish, and excludes access for all Pacific Salmon^{24, 25}.

¹⁹ Rob Knight and Brad Mason, "Wildlife Tree Stewardship Atlas" (Government of British Columbia, n.d.), https://cmnmaps.ca/WITS_gomap/.

²⁰ Coombes, D.M.V., "A Reconnaissance Survey of Hague Lake" (South Coast Island (Cortes Island): Recreational Fisheries Branch, Ministry of Environment, 1989).

²¹ Dusty Silvester, "Project and Environmental Management Plan Dillon Creek Wetland Restoration, Linnaea Farms, Cortes Island BC." (Cortes Island BC: Current Environmental, April 20, 2021).

²² Government of British Columbia, "Habitat Wizard," September 6, 2023, <https://maps.gov.bc.ca/ess/hm/habwiz/>.

²³ Coombes, D.M.V., "A Reconnaissance Survey of Hague Lake."

²⁴ Coombes, D.M.V.

²⁵ Dusty Silvester, "Project and Environmental Management Plan Dillon Creek Wetland Restoration, Linnaea Farms, Cortes Island BC."

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Figure 4. The falls at the outlet of Hague Lake into Manson's Lagoon. March 12, 2025.

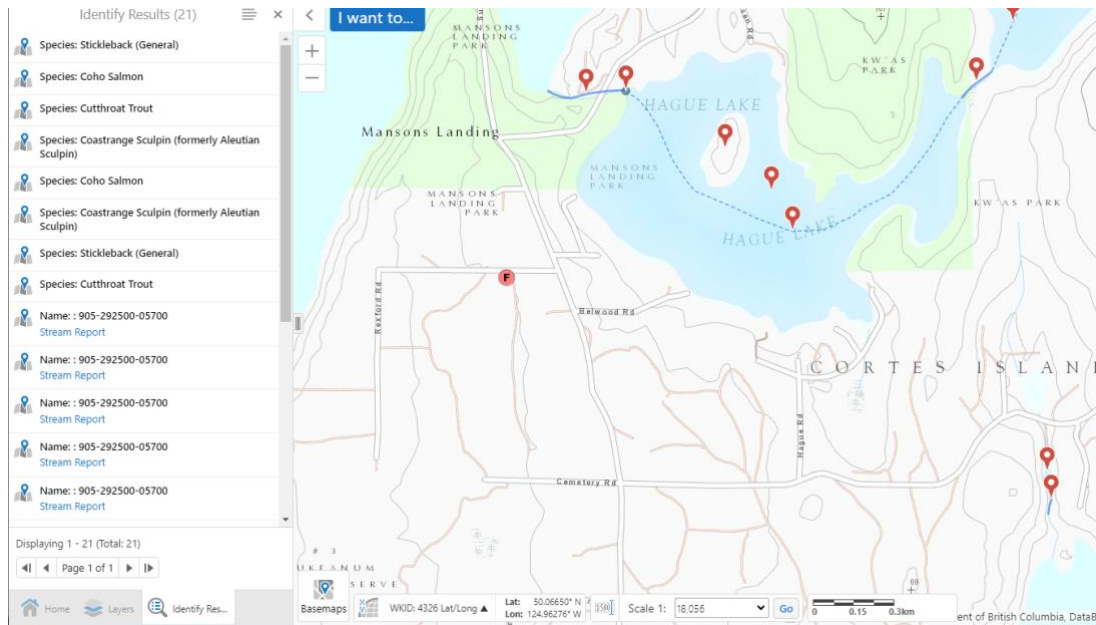


Figure 5. BC Habitat Wizard GIS mapping database viewing the fisheries layers²⁶.

Residents have reported that when the culvert is blocked by beaver and water flows over Kw'as Bay Rd, they have observed fish swimming across the road²⁷. The blocked culvert

²⁶ Government of British Columbia, "Habitat Wizard."

²⁷ Paul Palauk, neighbour, Personal communication.

creates a barrier to fish passage and connectivity. Swimming on the road is an obvious risk to fish, and this risk would be not only mitigated but removed by restoring fish passage to the blocked culvert and maintaining fish passage with the installation of the Beaver exclusion fencing around the culvert.

7. Proposed Works

7.1. *Description of Proposed Works*

The project site is a beaver wetland complex, that intersects with human infrastructure of Kw'as Bay Road and Regional Park Trails as previously described. The proposed works include the installation of three new pond levelers and one culvert protection fence. See [Figure 1](#) for locations of proposed structures, see [Example Diagrams and Photos of pond levelers](#), and [culvert protection fencing](#). The structures would be installed by hand, without the use of heavy equipment. No Beavers would be trapped, re-located, or killed, and no beaver dams removed as part of this project.

Prior to beaver coexistence structure installation, the culvert under Kw'as Bay Rd would need to be replaced by MoTT.

Pond levelers require the installation of a pipe through a beaver dam to maintain water levels in the pond at an appropriate level to satisfy ecological and human infrastructure considerations. All material removed from the beaver dams for the pond leveler installations would be side-cast so that it cannot re-enter the stream²⁸. The works are planned for when water levels are naturally low at the dry time of year. Therefore, dewatering of the dams will not be necessary, as water levels are expected to be below the elevation of the pond leveler pipe (See [Figures 7](#), and [Figures 17, 29, 30, 42, 43](#)).

If it is necessary to breach the beaver dams below the water level at time of construction, best practices for erosion and sediment control will be employed. “ To mitigate sediment during construction beaver dam removal must occur slowly, a bit at a time, in order to minimize scouring and the addition of silt to downstream areas. Water flowing through a dam breach should normally not exceed 0.2 square metres in area (i.e., a typical breach could measure 1.0 metre x 20 centimetres in size) ”²⁹.

Turbidity levels will be monitored to ensure they remain within provincial guidelines, as this will help to mitigate any environmental impacts.

²⁸ BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development, “Terms and Conditions For Changes In And About A Stream Specified By Ministry of Forests, Lands and Natural Resource Operations Habitat Officer, West Coast Region (Vancouver Island & Gulf Islands)” (Government of BC, February 2011), https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/terms_conditions_van_island.pdf.

²⁹ BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development.

Culvert protection fencing involves a small trapezoidal fence installed at a culvert which excludes beaver from the area directly around a culvert and prevents the beaver from being able to plug culverts.

The installation would be led by a beaver coexistence professional, who specializes in beaver coexistence devices and non-lethal solutions to beaver management. The installation of these structures would include a workshop style training event for project stakeholders to build capacity and provide transferrable knowledge supporting long-term disaster risk reduction. SRD, MOTT, Main Road, FOCI, Klahoose Guardians, and the general public will be invited to attend the workshops. The project includes the development of an assessment and maintenance plan, so staff and contractors are fully trained to maintain this infrastructure over the long term.

Site specific design details are as follows:

- **Pond leveler 1:** Upstream beaver dam, close to bridge. Existing pond leveler with cage appears to be functioning but requires replacement as materials of the wire cage are rusting out and becoming hazardous. The pipe diameter is undersized, and the intake cage is placed too close to the dam, which can lead to sediment build up around the intake. **Recommend** 20m 10" pipe and 16' (5m) circumference intake cage. Keep elevation the same as existing pond leveler as trail is currently accessible.
- **Pond leveler 2:** Second beaver dam from upstream end. Keep elevation the same as top of dam, or 20cm below the elevation of the trail, so culvert under trail is submerged, and it doesn't trigger beaver to make a new dam at culvert from under trail. **Recommend** 12m 10" pipe and 16' (5m) circumference intake cage.
- **Pond leveler 3:** Third beaver dam from upstream end. Existing pond leveler attempt failed due to improper installation of structure, large diameter pipe was blocked completely and has since been removed. This dam is causing flooding of the parking lot. Dam is 16cm higher than parking lot, bring elevation of installed pond leveller down to 20cm below parking lot. **Recommend** 12m pipe 10" pipe and 16' (5m) circumference intake cage.
- **Culvert exclusion fencing:** Culvert is completely blocked, water is flowing over the road and eroding the road surface. There is a 1m deep pool on the upstream side of the road that is a hazard. Culvert is undersized and needs to be replaced by MoTT. **Recommend** culvert exclusion fencing with 8' (2.5m) long side walls, and 16' (5m) long across the upstream wall.

Material specifications:

- Pipe, 250mm(10") x 6.1m Solid Wall Polyethylene Pipe
- Wire panels, 5 gauge, 4" x 4" x 5' high x 16' long
- T-Posts 7'
- Cinder Blocks
- hog rings, galvanized
- galvanized wire

The project would include the development of an assessment and maintenance plan, so staff and contractors are fully equipped to maintain this infrastructure as part of existing routine maintenance. Please refer to [Section 18](#), Effectiveness Monitoring and Adaptive Management Plan.

7.2. Equipment and Machinery

All beaver coexistence structures would be installed by hand, without the use of heavy equipment. The culvert replacement would be conducted by MoTT and is not covered in this report. No heavy equipment would be utilized to install beaver coexistence structures. Therefore, “no significant damage is expected to any grassy, upland, wetland or other areas as a result of this manual work.”³⁰

Hand tools such as rakes, shovels, pickax, and a sawsall would be used for installation of Beaver Coexistence Solutions.

7.3. Timing of Proposed Works

All works are planned for least risk work windows for relevant fish and wildlife. To avoid impacts and potential risks to wildlife during construction the proposed instream works are planned between **August 15th to September 15th, 2025**. For details on least risk windows for fish and wildlife on this project, please refer to [Section 12.1](#) of this report.

7.4. Identification of Water Rights and Other Conflicts

The iMapBC tool, with the points of diversion and groundwater wells layers turned on, was accessed on February 21st, 2025, to identify water licences in the vicinity of the proposed works. No current water rights or conflicts were identified.

³⁰ Mike Callahan, “Self Help Information- Pond Leveler.”

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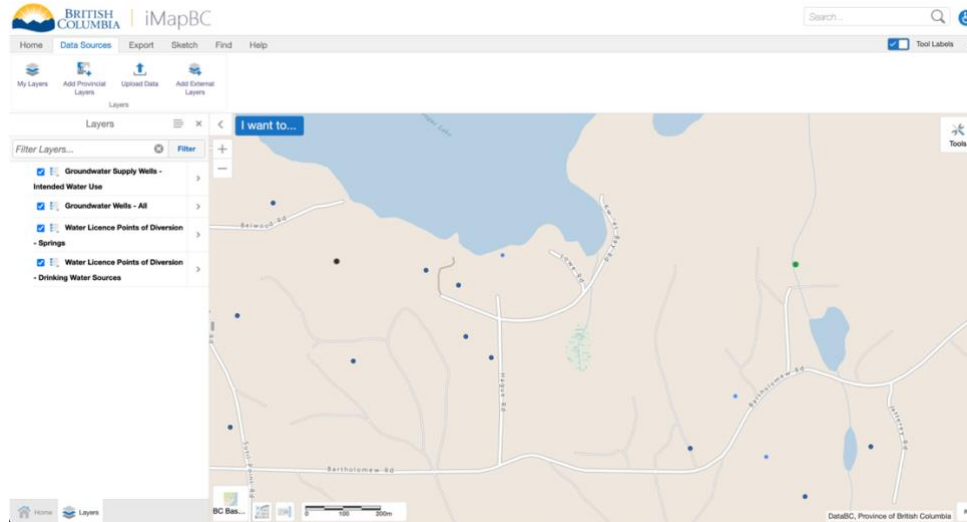


Figure 6. Screen shot of iMapBC showing water license points of diversion and wells³¹.

7.5. Outline of Construction Steps

Funding has been secured by SRD to implement the project. The following is a list of steps for implementation of proposed works:

1. Needed permits and approvals are obtained in advance (see [section 10](#)).
2. Dates for construction are scheduled in advance with consultants and contractors. A contract or agreement is in place with SRD for RWE to manage the project and supervise construction.
3. Vanisle Wetlands is chosen to provide Beaver Coexistence expertise and materials for the project. The contractor is scheduled in advance.
4. A utility check is completed before digging. Any buried utilities are marked on the ground prior to construction (none anticipated).
5. MoTT replaces the culvert under Kw'as Bay rd.
6. All equipment is cleaned by the contractor prior to construction to avoid introducing non-native plants, and carried by hand to the worksite.
7. Exclusion fencing is installed around the culvert by hand.
8. Beaver dams are breached for installation of pond levelers, only to the level required to install the pond leveler.
9. Three pond levelers are installed, one in each of the beaver dams as illustrated in [Figure 1](#).
10. Immediately post-construction, exposed soils are seeded with native grasses and forbs, followed by annual wheat or rye for erosion control.
11. Effectiveness monitoring and adaptive management will be performed by SRD/MoTT contractor maintenance crews as part of their existing routine maintenance

³¹ Province of British Columbia, *iMapBC, Water License Points of Diversion*, 2022, 2022, <https://maps.gov.bc.ca/ess/hm/imap4m/>.

activities. Mainroad monitors Kw'as Bay Road every 21 days as per their Highway Maintenance Contract³².

12. RWE is available to support the project with annual monitoring site visits and to consult with local project stewards for ongoing project maintenance.
13. If erosion is observed, RWE will be contacted, and action taken to repair the erosion and prevent further erosion will be taken as soon as possible.
14. An as-built construction, monitoring, and adaptive management plan report including photographs and GIS mapping will be completed at the end of the project, to satisfy the conditions of the *Water Sustainability Act Section 11 Changes in and About a Stream* Notification, and funding deliverables.

8. Best Management Practices and Sediment and Erosion Control Measures

Best management practices (BMPs) and sediment and erosion control measures will be practised throughout the project to ensure the protection of the environment and Environmentally Sensitive Areas (ESAs). BMPs recommended by Ministry of Water Land and Resource Stewardship (WLRs) (previously FLNRORD)³³ will be used throughout the project as follows:

Summary List of BMPs relevant to this project:

- *Working in favourable weather and low flow conditions;*
- *Comprehensive erosion and sediment control measures;*
- *Removing excavated material from the site or to a location above the high water mark;*
- *Protecting vegetation along access routes and banks of the stream;*
- *Ensuring equipment and imported materials are free of deleterious substances or invasive species fragments or seeds;*
- *Beaver dam removal must occur slowly, a bit at a time, in order to minimize scouring and the addition of silt to downstream areas. Water flowing through a dam breach should normally not exceed 0.2 square metres in area (i.e., a typical breach could measure 1.0 metre x 20 centimetres in size)³⁴.*

³² Ashley Cousens, Area Manager Vancouver Island District, Courtenay Area Office, BC Ministry of Transportation and Infrastructure, "Personal Communication," April 16, 2025.

³³ BC Parks; Invasive Species Council of BC, "Best Management Practices for Invasive Plants in Parks and Protected Areas of British Columbia: A Pocket Guide for BC Parks Staff, Volunteers and Contractors.," 2018.

³⁴ BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development, "Terms and Conditions For Changes In And About A Stream Specified By Ministry of Forests, Lands and Natural Resource Operations Habitat Officer, West Coast Region (Vancouver Island & Gulf Islands)."

Furthermore, the Project Team will adhere to BMPs and sediment and erosion control measures as detailed in the *BC Standards and Best Practices for Instream Works*³⁵. Detailed information regarding the projects construction mitigation measures is summarized in [Section 12](#) of this report, *Construction Environmental Management*.

9. Archaeological Interests

Prior to construction and soil disturbance at any site, The Archaeology Branch of BC, Ministry of Forests, will be contacted with a request for archaeological information concerning the project site. A request can be made by following the instructions on the [Archaeology Branch website](#). At the time of this report a request has not yet been made, however this will be completed prior to permit applications.

10. Permits: Federal, Provincial, and Municipal

Relevant Provincial legislation for the implementation of beaver coexistence structures are the Water Sustainability Act and the Wildlife Act: *“To disturb, molest or destroy a beaver house, den or dam is an offence under Section 9 of the Wildlife Act unless you are a trapper licensed under that Act or otherwise exempt under the Act, the Wildlife Regulation, or possess a permit under the Wildlife Act. Dam alteration or removal is permitted under the Wildlife Act “to provide irrigation or drainage under lawful authority for the protection of property” and under the Water Sustainability Act (WSA) and Water Sustainability Regulation (WSR) for drainage purposes with specific restrictions”*³⁶(p.7).

A Wildlife permit is not required for the installation of pond-leveller devices if a beaver dam is not being removed, beavers are not being trapped or killed, and given the works are completed during the period of least risk to beaver³⁷.

The following permits are required for this project:

Federal: Coastal Cutthroat Trout presence, Department of Fisheries and Oceans (DFO) is being consulted, and have advised a request to review be submitted.

³⁵ BC Ministry of Water, Land and Air Protection, “Standards and Best Practices for Instream Works” (Province of British Columbia, March 2004).

³⁶ Government of British Columbia., “Best Management Practices for Beaver and Beaver Dam Management. Appendix, Requirements and Best Management Practices for Making Changes In and About a Stream in British Columbia. Version 2022.01.,” 2022, https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/wsa-cias-requirements-bmps_appendix.pdf.

³⁷ Shawn Fitzsimons, Authorizations Specialist, BC Ministry of Water Land and Resource Stewardship, ASCR South Coast Region., Personal communication re: Permitting requirements for pond-leveler installation, Phone call, March 10, 2025.

Provincial: BC *Water Sustainability Act*, Section 11 Notification for Changes in and About a Stream (CIAS). Application to be submitted for pond leveler devices. Culvert protection fencing would be permitted through internal MoTT approvals, and not require a WSA Section 11 application.

The following permits have been assessed for relevance and deemed **NOT** necessary for this project:

Provincial: BC *Wildlife Act*, permit to alter a beaver dam **NOT** required.
Fish collection/salvage permit should **NOT** be required due to naturally low water levels during construction, the ponds behind the dams will not need to be dewatered.

Provincial: BC *Wildfire Act* and *Wildfire Regulation* High Risk Activity exemption **NOT** applicable. No high risk activities are planned.

Municipal: No known municipal permits required.

11. Construction Impact/Benefit and Risk Assessment

11.1. Construction Impact/Benefit

Construction has the potential to impact fish and fish habitat through the inadvertent release of sediments during beaver dam modification and beaver coexistence structure installation. These potential impacts will be avoided and mitigated by following best practices detailed in the construction mitigation measures detailed in [Section 12.2](#).

Habitat for fish and wildlife listed by the *Species at Risk Act* would be improved by completing the Project, see [Section 3.6](#). Restoring and maintaining connectivity and allowing fish (and other aquatic organisms) to move between habitats is critical to maintaining populations. Connectivity allows wildlife and particularly fish to move to critical refugia and provides resiliency during critical life history stages (spawning, rearing, and overwintering). The project will also mitigate and reduce risk to fish who are swimming over the road, by providing and maintaining aquatic passage in the new culvert which will be protected from being blocked by the exclusion fencing.

Implementation of this project will result in maintenance and conservation of aquatic habitat and riparian area of approximately 2.1 hectares, and a reduction in erosion and sedimentation leading to water quality impacts in Hague Lake.

The proposed changes to stream flow include the restoration and maintenance of unobstructed flow through the culvert, and regulation of water levels with pond levelers to mitigate the ongoing impacts of beaver dam destruction to maintain water flows.

The ongoing challenges with the beaver blocked culvert flooding the road increases the risk to the road infrastructure, culvert failure, and potential washout. If the road washes out, access/egress for residents and emergency vehicles would be impacted. When the culvert is unblocked with heavy equipment, it has flooded private property downstream in the past, due to a sudden release of water backed up behind the dammed culvert. When the culvert is blocked and water is flowing over the road, the road is still passable, however the blocked culvert creates a 1m deep pool directly adjacent to the road. Residents have expressed concerns over safety, as this road is frequently used by neighbourhood children for bike riding. If a child were to accidentally go off the road on a bike, they would fall in water over their head and could potentially drown³⁸.

Additionally, the Cortes Island Fire Department own and operate the fire hydrant near the Kw'as Road culvert. A flood and road washout at the Kw'as Road culvert will mean that the Cortes Island Fire Department would be unable to access their main water supply on the south-end of Cortes Island. Interim Fire Chief Eli McKenty provided the following statement: "It is our main water supply for the South end of the Island"³⁹.

By implementing beaver coexistence solutions, risks to residents, the environment will be mitigated and maintenance costs reduced.

11.2. *Climate Risks and Benefits*

Two reports have recently assessed climate related risks for Cortes Island, *Risk Assessment Maps and Data*⁴⁰ and *Climate Change and Drought*⁴¹. These foundational reports provide data and knowledge that serve to inform and guide community land use planning decisions. They've detailed the increase of weather-driven natural hazards (including drought, heatwaves, change in temperature and precipitation patterns) leading to ecosystem impacts and flooding. Summer warm spells and highest temperatures are both expected to increase, as well as winter precipitation, leading to ecosystem, economic, and societal implications⁴². Wetland restoration and protection is a nature-based solution that will serve to mitigate these climate related risks, while increasing climate adaptation and resilience.

Conradi, 2022 "*provides a baseline set of data, maps, and graphs to help guide the development of a Cortes Island Climate Action Plan (CAP)...All data included follows a high emissions scenario (RCP 8.5), which represents climate impacts under a "business as usual" scenario*"⁴³ (p.2).

³⁸ Deborah Grey, neighbour, Personal communication, May 2, 2024.

³⁹ Eli McKenty, "Kw'as Rd, Cortes Island. Fire Hall Water Supply.," February 17, 2023.

⁴⁰ Conradi, Sophia, "Risk Assessment Maps and Data. Cortes Climate Action Planning."

⁴¹ Berman-Hatch, Forest, "FOCI Report: Climate Change and Drought."

⁴² Conradi, Sophia, "Risk Assessment Maps and Data. Cortes Climate Action Planning."

⁴³ Conradi, Sophia.

Their analysis demonstrates that “overall, precipitation is expected to increase in the winter months and decrease in the summer months. Increased precipitation in the winter months can contribute to flooding and storm surges. This has implications for the destruction of infrastructure and transportation lines, threatening food and housing security... Regarding environmental risks, flooding can increase the flow barrier for returning salmon, threatening both the species and the fisheries industry. Possible washout, river and stream erosion, and reduced water quality all resulting from flooding can also damage the spawning habitats of various fish species. On the other hand, decreased precipitation and resultant longer dry seasons during the summer months will contribute to an increased incidence of wildfires. Periods of drought also threaten the productivity and viability of crops, which can generate food insecurity.”⁴⁴ (p.4)

In 2022, Cortes Island experienced a level 5 drought⁴⁵. “According to BC’s Drought and Water Scarcity Response Plan, level 5 droughts bring “adverse impacts to socio-economic or ecosystem values” which are “almost certain”⁴⁶(p.16). Impacts can include the drying of shallow wells and wetlands, increased risk of wildfires and drying of streams during salmon spawning season” (p.1). As noted, there is at least one well that depends on water from this wetland complex. “The rain that follows drought brings its own problems. Long dry periods result in parched and compact soils, consequently, when the rain does come it can run off the surface rather than soak into the aquifers below^{47,48}. In this way, droughts increase the chances and damage of floods⁴⁹ (p.5)...IPCC report, which also warns that “Any further delay in concerted anticipatory global action on adaptation and mitigation will miss a brief and rapidly closing window of opportunity to secure a liveable and sustainable future for all.”⁵⁰(p.4)... There are any number of ways our community could take action. We need to begin planning for thresholds to recommend water restrictions, how best to restore wetlands and reinforce the banks of salmon bearing streams”⁵¹(p.5).

⁴⁴ Conradi, Sophia.

⁴⁵ Berman-Hatch, Forest, “FOCI Report: Climate Change and Drought.”

⁴⁶ Ministry of Water, Land, and Resources Stewardship, “British Columbia Drought and Water Scarcity Response Plan,” 2022, https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/drought-info/drought_response_plan_final.pdf.

⁴⁷ Wehner, M.F., J.R. Arnold, T. Knutson, K.E. Kunkel, and A.N. LeGrande, “Droughts, Floods, and Wildfires.,” *Climate Science Special Report: Fourth National Climate Assessment 1* (2017): 231-256, <https://doi.org/doi:10.7930/JOCJ8BNN>.

⁴⁸ Gimbel, K. F., Puhlmann, H., and Weiler, M., “Does Drought Alter Hydrological Functions in Forest Soils?,” no. 20 (2016): 1301–1017, <https://doi.org/10.5194/hess-20-1301-2016>.

⁴⁹ Sunder Katwala, “Responding to Change,” *IPPR Progressive Review 29*, no. 1 (July 2022): 37–44, <https://doi.org/10.1111/newe.12297>.

⁵⁰ Intergovernmental Panel On Climate Change (Ippc), *Climate Change 2022 – Impacts, Adaptation and Vulnerability: Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, 1st ed. (Cambridge University Press, 2023), <https://doi.org/10.1017/9781009325844>.

⁵¹ Berman-Hatch, Forest, “FOCI Report: Climate Change and Drought.”

Intensifying precipitation patterns coupled with erosion and nutrient transport, are disturbances that are functioning to lower the base elevation of water in streams and groundwater in the forest, thus causing the mature forest to be more vulnerable to climate change and natural disasters such as fire, pests, flooding, and intense erosional precipitation events, which leads to carbon emissions⁵².

Wetlands are highly regarded natural infrastructure assets that are known to mitigate climate hazards such as increased rainfall, drought, erosion, flooding, freshwater availability, heatwaves, and wildfires^{53, 54, 55, 56}. Saturated wetland soils and mature forests are known to sequester and store carbon⁵⁷. Prioritizing management for the protection of mature carbon storing landscapes is one of the most effective strategies for optimizing carbon sequestration and storage⁵⁸. Protecting and restoring wetlands and maintaining saturation of wetland soils is also effective to sequester and store carbon⁵⁹.

Beaver coexistence solutions such as pond levelers and culvert protection fencing provide non-lethal beaver management solutions, while supporting beaver-maintained wetlands on the landscape that will provide climate change adaptation and resilience. Wetlands provide critical ecosystem services for disaster risk reduction climate adaptation such as:

- Cleaning and storing water & ground water recharge
- Mitigating floods and erosional precipitation events
- Sequestering and storing carbon
- Moderating climate extremes (heat waves and droughts)
- Mitigating wildfire

⁵² Ontl et al., “Forest Management for Carbon Sequestration and Climate Adaptation.”

⁵³ Gabriela Díaz Musmanni, “5 Ways Wetlands Are Crucial to Climate Change Adaptation,” Global Centre of Adaptation, February 2, 2022, https://gca.org/5-ways-wetlands-are-crucial-to-climate-change-adaptation/?_gl=1*71iqvk*_ga*NjI5NjkwOTU4LjE3MDczNTlyNzY.*_up*MQ..

⁵⁴ Dr. Musonda Mumba, “Human Wellbeing Is Irrevocably Tied to the State of the World’s Wetlands,” Wetlands International, February 1, 2024, <https://www.wetlands.org/blog/human-wellbeing-is-irrevocably-tied-to-the-state-of-the-worlds-wetlands/>.

⁵⁵ C. M. Finlayson et al., “The Second Warning to Humanity – Providing a Context for Wetland Management and Policy,” *Wetlands* 39, no. 1 (February 2019): 1–5, <https://doi.org/10.1007/s13157-018-1064-z>.

⁵⁶ Council of Canadian Academics, “Building a Resilient Canada” (The Expert Panel on Disaster Resilience in a Changing Climate, Council of Canadian Academics, 2022), <https://cca-reports.ca/wp-content/uploads/2022/01/Building-a-Resilient-Canada-EN-Final-for-web.pdf>.

⁵⁷ Buotte et al., “Carbon Sequestration and Biodiversity Co-benefits of Preserving Forests in the Western”

⁵⁸ Ontl et al., “Forest Management for Carbon Sequestration and Climate Adaptation.”

⁵⁹ Buotte et al., “Carbon Sequestration and Biodiversity Co-benefits of Preserving Forests in the Western”; Ontl et al., “Forest Management for Carbon Sequestration and Climate Adaptation.”; Ellen Wohl, “Landscape-Scale Carbon Storage Associated with Beaver Dams,” *Geophysical Research Letters* 40, no. 14 (2013): 3631–36, <https://doi.org/10.1002/grl.50710>.

11.3. Beaver as Solution to Climate Risk

With "wetlands disappearing three times faster than forests, sustainably managing water is crucial to IUCN's Nature 2030 Program"⁶⁰. The number 1 IUCN impact target for 2030 is "The loss of freshwater species and decline of freshwater ecosystem health is halted, and restoration initiated"⁶¹. Using Beaver Coexistence techniques such as pond levelers and/or beaver exclusion fencing will support beaver to manage and maintain existing wetlands that are providing climate change resilience services. "Beavers modify landscape morphology and hydrology, thereby creating habitat for diverse species, enabling many ecological processes, and promoting climate change resiliency"⁶².

*"Regarding reducing greenhouse gas emissions just as forests suck carbon from the atmosphere and sequester it in wood, so do beaver ponds lock it up in buried sediment. According to a 2013 study published by geomorphologist Ellen Wohl, active beaver complexes on twenty-seven streams in Rocky Mountain National Park once stored more than 2.6 million megagrams of carbon, almost the equivalent of 37,000 acres of average American forest. Active colonies store about three times more than derelict ones, and up to fourteen times more than dry grasslands. Forget trees: if you want to fight climate change it's entirely possible you're better off planting beavers"*⁶³.

"Beaver activity has a wide range of ecosystem impacts including increased avian and amphibian species diversity and abundance, stream temperature buffering that supports habitat for sensitive salmonids (especially for coho salmon and steelhead), reversal of stream channel incision, increased ground water recharge, and an increase in open water availability during dry summer months and drought"⁶⁴(pg 4, paragraph 1).

Beaver coexistence will support the restoration and maintenance of the beaver wetland complex which will amplify Carbon storage capacity and is of critical importance in watershed management strategies designed to enhance carbon sequestration with natural, low-tech, and low-cost techniques⁶⁵.

The Kw'as Bay wetland complex is a beaver maintained and managed natural wetland ecosystem, that provides a multitude of ecosystem services to prevent disaster risk and provide wildlife habitat. However, beaver have also presented ongoing and longstanding

⁶⁰ "International Union for Conservation of Nature: Water," International Union for Conservation of Nature, n.d., <https://www.iucn.org/nature-2030/water>.

⁶¹ "International Union for Conservation of Nature: Water."

⁶² Washington Department of Fish & Wildlife, "Riparian Ecosystems, Volume 2: Management Recommendations," Riparian Ecosystems, 2 (n.d.): 80.

⁶³ Wohl, "Landscape-Scale Carbon Storage Associated with Beaver Dams"; Richard A. Birdsey, "Carbon Storage and Accumulation in American Forest Ecosystems" (US Department of Agriculture Forest Service, August 1992).

⁶⁴ Washington Department of Fish & Wildlife, "Riparian Ecosystems, Volume 2: Management Recommendations."

⁶⁵ Wohl, "Landscape-Scale Carbon Storage Associated with Beaver Dams."

challenges for road and trail access. Coexistence strategies will reduce the disaster risk associated with flooding and drought, allowing beaver to maintain the wetlands at this site, in turn maintaining healthy watershed function and the ecosystems services that wetlands provide for climate adaptation and resilience.

By coexisting with beavers and protecting a natural beaver-maintained wetland complex this project will reduce risks to the Cortes Island community from natural hazards and climate-related risks and builds on the risk assessments and planning work summarized above.

12. Construction Environmental Management Plan

12.1. *Least Risk Windows*

To avoid impacts and potential risks to wildlife during construction the proposed works will consider least risk timing windows in the South Coast Region for wildlife in project scheduling and implementation.

Instream works are planned between August 15th and September 15th.

Least Risk Work Windows:

- **Beaver:** General timing window for beaver dam alteration: June 15th to September 15th

“Opening plugged culverts or removing beaver dams and draining ponds between September 15th and June 15th can result in mortalities of both beavers and fish, and will not normally be accepted”⁶⁶.

- **Fish:** The least risk window for Costal Cutthroat Trout at this site is August 15th to October 31st ⁶⁷.
- **Amphibians:** coincide with fisheries windows, eggs have hatched by mid-summer, or mid-July. Works are planned outside of spring breeding, egg-laying, and summer larval rearing windows for amphibians known/expected to use the site⁶⁸.

⁶⁶ BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development, “Terms and Conditions For Changes In And About A Stream Specified By Ministry of Forests, Lands and Natural Resource Operations Habitat Officer, West Coast Region (Vancouver Island & Gulf Islands).”

⁶⁷ Ministry of Environment, Lower Mainland Region, “Guidelines for Reduced Risk Instream Work Windows, (March 2006),” March 2006, https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/work_windows_low_main.pdf.

⁶⁸ Ovaska, K., Sopuck, L., Engelstoft, C., Matthias, L., Wind, E., and MacGarvie, J., “Guideline for Amphibian and Reptile Conservation during Urban and Rural Land Development in British Columbia” (Province of British Columbia, 2014), https://www.env.gov.bc.ca/wld/documents/bmp/HerptileBMP_complete.pdf.

- **Birds:** The site falls in the migratory bird nesting zone A1⁶⁹. The regional bird nesting period for this zone is late March to mid-August⁷⁰. Works are planned outside of bird nesting periods.

12.2. Construction Mitigation Measures

12.2.1. Clearing and Vegetation Removal

Vegetation clearing is not required as part of this project. No heavy equipment will be used to install Beaver Coexistence solutions. No significant damage to riparian vegetation, grass, or upland areas is expected as part of the proposed works.

12.2.2. Site Delineation and Protection of ESAs (Environmentally Sensitive Areas)

The risk of negatively impacting surrounding ESAs is low, as the work is being done by hand, with no heavy equipment. The work is instream, and the greatest risk will be sedimentation and water quality (See section [Erosion and Sediment Control](#)). Risks to ESAs will be mitigated by the following measures:

- QEP will clearly mark the project footprint on the ground. ESAs and vegetation to be protected will be delineated and avoided during construction.
- QEP and contractors/crew will meet prior to construction, walk the site, looking at the ESAs and discuss best practices and strategies for avoiding impacts to ESAs and wildlife.
- Daily wildlife sweeps will be conducted by QEP.
- Water levels will be low at the time of construction. Altering of beaver dams is not expected to lower water levels behind the dams. (See [Figures 7](#), and [Figures 17, 29, 30, 42, 43](#))
- A minimum number and area of access routes and staging areas will be established to reduce impacts to ESAs.
- No soil, fuel, or machinery will be stored within the ESAs.

12.2.3. Mitigation Measures for Fish and Wildlife

For an exclusion fence installation, significant mitigation, such as fish isolation and salvage, may not be necessary. If the installation of the pond leveler involves breaching or destroying the beaver dam, it is recommended to consider fish salvage and isolation in any upstream areas that may be affected by drainage⁷¹.

⁶⁹ Government of Canada, "Nesting Periods," Nesting Periods, July 26, 2023, <https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods/nesting-periods.html#toc0>.

⁷⁰ Government of Canada, "Regional Nesting Periods Tables in Canada. Table 1a. Regional Nesting Period Table in Canada, Technical Information for Planning Purposes: Nesting Zone A.," accessed March 3, 2025, <https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods/nesting-periods.html#ZoneA>.

⁷¹ Jim Krivanek, DFO, "RE: Beaver Coexistence Installation," February 19, 2025.

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For this project, water levels will be low at the time of construction, and upstream wetland pools will not be dewatered. Therefore, a fish salvage will not be required prior to installation of beaver coexistence solutions, as the wetland water elevation will not be lowered below natural low water elevations.

Photos taken August 29th 2024 (Figures 17, 29, 30, 42, 43) demonstrate low water conditions. The wetland pool upstream of the dam would not be de-watered during construction.



Figure 7. Low water conditions, water is approximately 1m below the top of the existing beaver dam. The pond leveller is planned to be installed 30cm below the top of the dam, therefore the wetland upstream of the dam will not be dewatered during construction. Photo: August 29, 2024.

QEP will monitor turbidity levels to ensure they remain within provincial guidelines, as this will help to mitigate any environmental impacts.

A request for review will be submitted to the Department of Fisheries and Oceans (DFO) to obtain best management practices, ensuring that the project does not contravene the Fisheries Act.

12.2.4. Wildlife Interactions

During construction there is the chance to encounter and/or impact wildlife. Due to working during the least risk timing windows for wildlife, the risk of encountering wildlife is considered low. This risk will be mitigated by the following measures:

- Project personnel will immediately report incidental encounters with wildlife to the QEP. Measures to avoid and protect wildlife will be employed, such as delineating an ESA/buffer zone if necessary, and/or temporarily moving activities to another part of the work site until the animal has cleared the area.

In the unlikely event that large mammals or predators are present, efforts will be made to scare them off, these wary animals usually will avoid large groups and noise from construction. If the animal persists, a Conservation Officer with the Ministry of Environment will be contacted to determine the best course of action. Conservation Officer 24-hour hotline: 1-877-952-7277.

12.2.5. Erosion and Sediment Control

- Alterations of the beaver dam and moving soil and dam materials poses the risk of triggering erosion and/or runoff of sediments potentially leading to downstream impacts to aquatic habitats and surface water. Due to the timing of the proposed works, and the low water levels, this risk is considered low (see low water photos [Figures 17, 29, 30, 42, 43](#)).

The following mitigation measures will be employed to manage these risks:

- Construction activities are planned for least risk windows for beaver, fish, amphibians, and migratory birds which coincides with when water levels are naturally low.
- If there is surficial flow during the work window, sediment and erosion control measures will be implemented, monitored, and maintained if deemed necessary by the QEP.
- To mitigate sediment during construction beaver dam removal must occur slowly, a bit at a time, in order to minimize scouring and the addition of silt to downstream areas. Water flowing through a dam breach should normally not exceed 0.2 square metres in area (i.e., a typical breach could measure 1.0 metre x 20 centimetres in size)⁷².
- All material removed from a beaver dam must be side-cast in such a manner that it cannot re-enter the stream⁷³.
- Turbidity levels will be monitored to ensure they remain within provincial guidelines, as this will help to mitigate any environmental impacts.
- Construction/disturbance will be managed such that, if there is sediment entering the watercourse exceeding provincial guidelines, work will be halted until water clarity returns to baseline.
- The extent and duration will be managed/mitigated such that there will be minimal sediment releases, and any that do occur will be of very short (i.e. less than 5-10 minutes) duration.
- Work will only take place during favorable weather conditions, and construction will be stopped during intense precipitation events with more than 20mm in 24 hours.

⁷² BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development, "Terms and Conditions For Changes In And About A Stream Specified By Ministry of Forests, Lands and Natural Resource Operations Habitat Officer, West Coast Region (Vancouver Island & Gulf Islands)."

⁷³ BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development.

- All exposed soils will be seeded with non-persistent annual cover crop and/or native seed mix to establish a vegetative cover reducing the potential for erosion.
- The restoration site will receive revegetation treatment and management following construction, as per the revegetation plan below in [section 13.3.3](#).
- The site hydrology and installations will be monitored post-construction to ensure that the beaver coexistence solutions are functioning as intended, with any repairs being made as soon as possible after detection, as per the post-construction monitoring plan below in [section 13.1](#).

12.2.6. Fuels and Hazardous Materials/Spill Contingency and Response

The use of heavy equipment poses the potential risk of an accidental release or spill of hazardous materials such as oil, hydraulic fluids, lubricants, anti-freeze etc. onto the land surface or water courses. The result of a spill could negatively impact wildlife, habitat, and/or human health. This risk is considered null, since no heavy equipment or machinery will be used as part of the installation.

Any spills of a substance that is toxic, polluting, or deleterious to aquatic life of reportable quantities (e.g., 100 liters to land, or any quantity to water) will be immediately reported to the Provincial Emergency Program 24-hour phone line at **1-800-663-3456**.

12.2.7. Fire Prevention and Response Plan

The potential for fire ignition on site is a low risk given there are no high-risk activities planned during construction as per Schedule 3 of the *Wildfire Regulation*⁷⁴. Therefore, a BC *Wildfire Act* and *Wildfire Regulation* High Risk Activity Exemption is not required for this project. The following fire prevention measures will be followed during construction:

- Designated smoking areas will be established if necessary away from dry fuels and any explosive, flammable, or hazardous materials.

13. Effectiveness Monitoring & Adaptive Management Plan

13.1. Post Monitoring Goals and Objectives

13.1.1. Goals

1. Maintain proper functioning of the beaver coexistence solutions.
2. Identify and control erosion.
3. Identify and control weeds and non-native plants.

⁷⁴ Government of British Columbia, "Wildfire Legislation and Regulations," 2005, <https://www2.gov.bc.ca/gov/content/safety/wildfire-status/about-bcws/governance/legislation-regulations>.

13.1.2. Objectives

13.1.2.1. Hydrology

1. Ensure proper functioning condition of beaver coexistence structures
 - 1.1 For pond-levelers ensure water elevations are maintained at satisfactory levels, and levelers are freely flowing.
 - 1.2 For culvert exclusion fencing, ensure freely flowing condition for water and wildlife.
2. Ensure that the following erosion events do NOT occur, with any required corrective measures implemented as soon as possible if erosion does occur:
 - 2.1 Head-cuts and gully formation within the restoration project area.
 - 2.2 Sheet erosion and sediment stability/mobility issues.

13.1.2.2. Revegetation

Revegetate all areas of disturbed soil as per the Revegetation Plan, [section 13.3.3](#) of this report including:

1. For riparian areas, complete seeding, and planting with native grasses (or non-native non-persistent cover crops), sedges, and other native riparian vegetation to achieve 60% ground cover after year-1 post-construction.

13.2. Hydrology

13.2.1. Duration and Frequency of Effectiveness Monitoring to Demonstrate Properly Functioning Condition

The structures will require monitoring and minimal maintenance, which would be performed by SRD/MoTT contractor maintenance crews as part of their existing routine maintenance activities. MoTT contractors, Mainroad, will monitor and maintain what falls within the Kw'as Bay Road Right of Way which will include cleaning the fencing at the culvert inlet. SRD contractors, FOCI, will monitor and maintain pond levelers. Typically pond levellers require zero maintenance, the system should last 10 years before any maintenance needs to be done to the structure itself. Culvert protection fences should need no more than six hours annually and this would usually be during high flow season where some debris may build up along the outside wall in the form of logs or branches being washed downstream.

The project includes the development of an assessment and maintenance plan so staff and contractors are fully trained to maintain this infrastructure (developed as part of Phase 2 funding). Beaver coexistence specialist will provide a training workshop for MoTT and SRD staff and their maintenance contractors Mainroad and FOCI. Additionally, Klahoose First Nation Guardians will be invited to attend the training workshop, and financial support will be provided to facilitate their engagement on the project.

As Beaver Coexistence structures have a limited life span (approximately 10 years) monitoring will be ongoing in perpetuity, and monitoring will determine the need for replacement of structures at end of functioning life.

13.2.2. Metrics to Measure Properly Functioning Condition

Properly functioning condition will be assessed by visual surveys including dated photographs.

Properly functioning condition is defined as: freely flowing beaver coexistence structures, that are functioning to maintain satisfactory water elevations, and the absence of erosion, channel, or gully formation, or the necessity to breach a beaver dam to maintain appropriate water elevations.

13.3. Riparian Planting Post Condition

13.3.1. Duration and Frequency of Effectiveness Monitoring to Demonstrate Successful Plant Establishment/Survival

Identifying and controlling weeds and non-native plants: The construction site will be examined for weeds and non-native plants by SRD contractors (FOCI) throughout the year, during routine maintenance and management actions to control weeds will be planned. Invasive plant species will be monitored and treated using the guidelines detailed in the *BMPs for Invasive Plants in Parks and Protected areas of BC*.⁷⁵

Measuring plant survival and replanting as needed: Area of soil disturbance will be small and limited to localized sections of beaver dams where pond levelers are installed. As such, visual surveys will be sufficient to determine revegetation success and need for replanting.

13.3.2. Outline of Details for Invasive Abatement/Disposal

Minimizing the spread of invasive species is a key concern during implementation of any ecological restoration project because the area of soil that is exposed may create conditions for non-native plants to become established. For this project, the area of exposed soil will be small, and beaver dams are naturally a dynamic environment. Therefore, it is expected that invasive species management will be minimal for this project.

The Project Team will incorporate BMPs targeting invasive plant prevention and control into all plans and management activities that will result in disturbance to native vegetation and soils. Applying these BMPs will help mitigate the adverse effects of invasive plants on

⁷⁵ BC Parks; Invasive Species Council of BC, "Best Management Practices for Invasive Plants in Parks and Protected Areas of British Columbia: A Pocket Guide for BC Parks Staff, Volunteers and Contractors."

native plants, wildlife, and the environment. This section was prepared with reference to the *Best Practices for Preventing the Spread of Invasive Plants During Forest Management Activities*⁷⁶ and the *BMPs For Invasive Plants in Parks and Protected Areas of BC*⁷⁷. FOCI conducts invasive species monitoring and management on various sites across Cortes Island, including the Dillon Creek Wetland Restoration Project at Linnaea Farm and staff are skilled and experienced with identification and management of invasive plants.

The following is a list of BMPs for invasive plant prevention and control:

- Vegetative baseline survey assessment has been completed by QEP. Invasive species currently in the work site will be managed and removed by hand prior to construction. The work site will be inspected prior to construction and new infestations will be reported and managed.
- Equipment will be thoroughly washed before being mobilized to the site to prevent the spread of invasive species. Infested sites will be avoided for staging and parking.
- Clothes, boots, hand tools, and other equipment used for treating invasive plants will be carefully cleaned before leaving the site.
- Soil disturbance will be minimized outside of restoration areas, and native vegetation maintained. Natural regeneration and understory vegetation will be retained in areas where management activities could affect the cover, density, and species composition of the native plant community.
- Disturbed sites and exposed soils will be re-vegetated as soon as possible. Bare soil will be seeded immediately after installation of beaver coexistence solutions. Seeds and soils may be mulched lightly to retain moisture and aid in seed germination. Composition of seed mixes to best suit each site is planned for disturbed area. When available, native seed will be used, as well as non-invasive/non-persistent agronomic species for erosion control. Only Canada Certified Number 1 Grade seed will be used.
- Further disturbance on the restoration sites will be avoided and minimized as new seedlings establish.
- Invasive plants will be removed prior to seed set to prevent build-up of seed banks that will take years to control.
- Invasive plants will be carefully and properly disposed of based on species specific recommendations listed below from the Invasive Species Council of BC.
- If herbicide is required for invasive plant management, the following BMP will be employed: *“Herbicide should be applied based on manufacturer and Regulatory Agency contract specifications to ensure that these materials do not enter streams after application and that staging areas are not in close proximity to watercourses.*

⁷⁶ Invasive Species Council of BC & Ministry of Forest, Lands, and Natural Resource Operations, “Best Practices for Preventing the Spread of Invasive Plants During Forest Management Activities. A Pocket Guide for British Columbia Forest Workers.” (Government of BC, 2013).

⁷⁷ BC Parks; Invasive Species Council of BC, “Best Management Practices for Invasive Plants in Parks and Protected Areas of British Columbia: A Pocket Guide for BC Parks Staff, Volunteers and Contractors.”

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During herbicide application, in the event of precipitation, all activities must cease immediately, as there is an increased risk of chemical transport via surface runoff to watercourses. An integrated approach of manual, chemical, mechanical and preventative means should be used for weed and pest control. Herbicide and other pesticides must be used during the optimum time for control of the target species”⁷⁸.

Invasive Species Council of BC recommendations:

“Reed Canary Grass: Cut plants frequently and regularly (3 times per year for 4 years at a minimum) to prevent seed production and weaken root reserves. Spreading rhizomes are very difficult to pull and any remaining fragments will readily re-sprout

Himalayan Blackberry: Use a pulaski, mattock, or backhoe to remove as much root as possible. Ensure biomass is disposed of at a landfill. Any remaining root fragments will re-sprout; be sure to re-inspect

Canada Thistle: Highly invasive plant. Incomplete pulling or cutting can stimulate remaining roots to re-sprout and worsen infestations. Continual, repeated cutting or pulling will deplete root reserves

Oxeye Daisy: Pull or cut prior to seed set. Pulling or cutting during or after flowering will disperse seeds. Plants will continue to flower and grow if soil is not shaken from roots

Scotch Broom: Small plants should be gently pulled from moist soil. Ensure all roots are removed. Large plants may be cut off as close to the soil surface as possible, without causing soil disturbance

Burdock: First year rosettes are easily hand-pulled. Deep roots of mature plants require digging to remove as much root as possible. Preventing dispersal of burs is particularly important

Knapweed: Taproot may be hand-pulled from moist soil. Remove as much of the root system as possible”⁷⁹.

⁷⁸ Ministry of Environment, “Fish and Fish Habitat Protection Best Management Practices for Bridge, Ditch and Road Maintenance Activities within the Peace Region” (Government of BC, September 29, 2023), https://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/wildlife-wildlife-habitat/regional-wildlife/northeast-region/best-mgmt-practices/bridge_ditch_and_road_maintenance_bmps_for_the_peace_region_-_version_20_2008-09-24.pdf.

⁷⁹ BC Parks; Invasive Species Council of BC, “Best Management Practices for Invasive Plants in Parks and Protected Areas of British Columbia: A Pocket Guide for BC Parks Staff, Volunteers and Contractors.”

13.3.3. Revegetation and Planting Plan

The project construction team will ensure disturbed soils from construction will be seeded with native graminoids (and/or non-native non-persistent cover crops), sedges, rushes, herbaceous, and other native vegetation, directly after construction soil disturbance.

The following is the BMP for seeding following soil disturbance:

“A well-prepared seedbed provides the best germination potential, and will allow some flexibility in reducing seed rates. Seedbed suitability declines rapidly after rainfall, so application rates should be increased if seeding is delayed until after a rainfall... Seedbed conditions deteriorate with time after tillage because rainfall will cause crusting of the soil at the surface and filling the small cracks and pores that trap seed. For this reason, seeding should occur immediately after tillage”⁸⁰.

Native seed blends may be applied at a dry seeding rate of 15-30kg/ha (2500-5000 seeds per square meter)⁸¹. Cover crop may be seeded at a rate of 1 bag (approx. 25kg or 50lbs)/460m². Collecting seeds of wetland/riparian species and seeding into disturbed soils directly after construction is particularly effective, and highly recommended. The project team is planning to collect native seed of local provenance for seeding. Additionally, patches of native vegetation from modified sections of beaver dam will be protected, set aside, and transplanted during construction, when possible, to provide natural seed bank and native vegetation establishment.

14. Example Diagrams and Photos

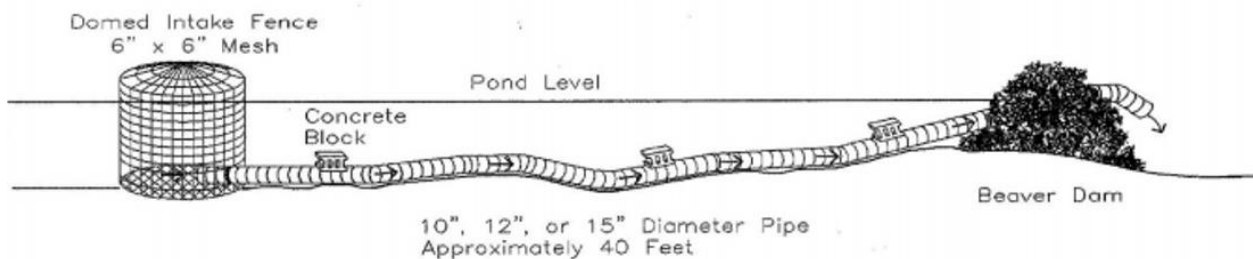


Figure 8. Example Diagram of a Pond Leveler⁸²

⁸⁰ Government of British Columbia, "Soil Rehabilitation Guidebook. Appendix 2. Revegetation Techniques," 2023, <https://www.for.gov.bc.ca/ftp/hfp/external/!publish/FPC%20archive/old%20web%20site%20contents/fpc/fpcguide/soilreha/app2.htm>.

⁸¹ Government of British Columbia.

⁸² Callahan, Mike. n.d. "Flexible Pond Leveler." Beaver Solutions LLC. <https://www.beaverinstitute.org/wp-content/uploads/2017/07/FlexiblePondLeveler.pdf>.

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Figure 9. Left: Installation of a pond leveler in a beaver dam without dewatering the pool behind the dam. Photo credit: Chris Holtslag.

Figure 10. Right: Vanisle wetlands installation of a pond leveler in a beaver dam to maintain satisfactory water elevations. Photo credit: Chris Holtslag.

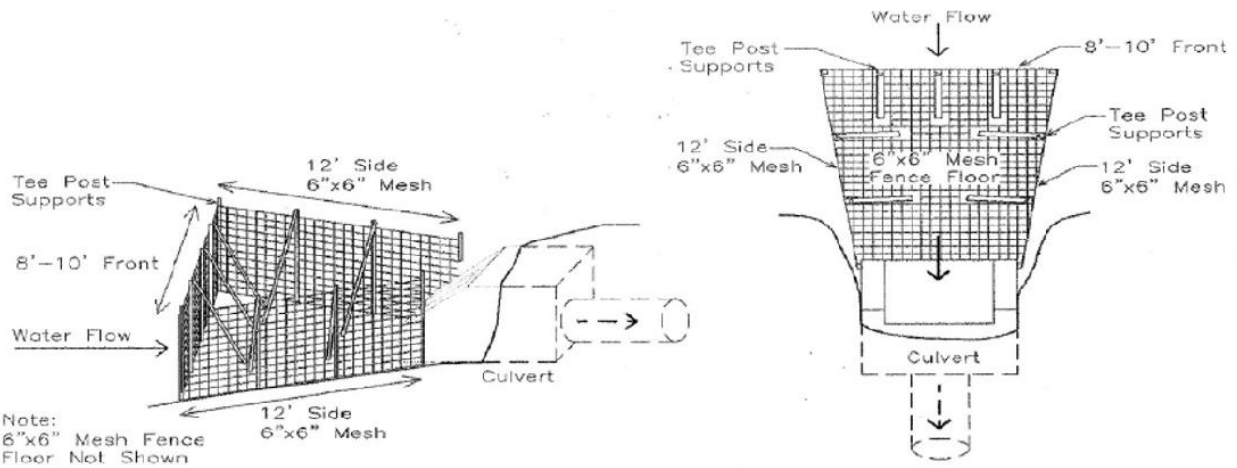


Figure 11. Example Diagram of a Culvert Protector or "Keystone Fence".⁸³

⁸³ Callahan, Mike. n.d. "The Keystone Fence." Beaver Solutions LLC. <https://www.beaverinstitute.org/wp-content/uploads/2017/07/TheKeystoneFence.pdf>.



Figure 12. Beaver exclusion culvert protection fence installed by Vanisle Wetlands. Photo credit: Chris Holtslag.

15. Cost-Benefit Analysis

Tremendous cost savings and protection of critical infrastructure would result from the implementation of the proposed beaver coexistence solutions. Educating provincial, regional, and local staff who oversee critical infrastructure about beaver coexistence tools is the first step in the implementation and maintenance of these low-cost, proven methods to co-exist with beaver. Here's a statement from Highway Superintendent Chesterfield, MA, who was involved in a beaver coexistence solutions project "We used to come out every single morning, two hours a day. Now we don't. It [flow device] keeps us happy because the water still goes under the road and doesn't wash it out. It saved us a lot of money"⁸⁴. For more testimonials visit [Beaver Solutions](#).

The maintenance of the proposed structures is less rigorous and less costly than removing or breaching beaver dams that are causing flooding (which often requires heavy equipment and/or rigorous physical labour). A study on pond levelers in Alberta found that twelve pond leveler devices installed in a wetland park near Edmonton saved the provincial government approximately \$180,000 over 7 years. This results in cost-benefit ratio of 8 dollars savings for every dollar spent on pond levelers⁸⁵.

⁸⁴ Mike Callahan, "Beaver Solutions."

⁸⁵ 2018 Glynnis A. Hood et al. Mitigating Infrastructure Loss from Beaver Flooding: A Cost-Benefit Analysis

16. Closing

Ongoing and longstanding challenges with beaver at the Kw'as Bay site on Cortes Island, BC, have had negative impacts for community safety, implications for disaster risk, impacts to fish and fish habitat, as well as ecological impacts on the freshwater ecosystem of adjacent lakes and wetlands. Proposed solutions to coexist with beaver include the installation of 3 pond levelers and a culvert protection fence. No beavers would be trapped, re-located, or killed, and no beaver dams would be removed as part of this project.

The project will reduce disaster related risks and provide climate change adaptation and resilience for the residents of Cortes Island and to many communities beyond Cortes Island by delivering transferrable knowledge to government and the public, and direct training for staff and contractors. The project will serve to save community resources, and help solve problems related to drought and flooding, which result in infrastructure damage and risks to public safety. The project will also serve to protect and conserve aquatic ecosystems and wetlands created and maintained by beaver, thus maintaining ecosystem services and supporting climate adaptation and resilience.

Should you require additional information, please feel free to contact the undersigned with the contact information listed below.

Sincerely
Miranda Cross



17. About the Authors

Miranda Cross, RPBio

Wetland Restoration Specialist

Rewilding Water and Earth Inc.

miranda@rewildingwater.ca

Phone: 250-850-9020

Miranda Cross is a Wetland Restoration Specialist living on Cortes Island BC. Miranda graduated from University of Victoria with a Bachelor of Science, double major in Biology and Environmental Studies. She also earned a diploma in Organic Land Care from the [Gaia College](#), as well as two [Permaculture Design Certificates](#). Miranda operated an ecological landscape design and consultation business for 10 years on the West Coast, prior to joining the team at Rewilding Water & Earth Inc. (RWE) in 2021. Working with RWE Miranda specializes in wetland & stream restoration including: site assessment & restoration

design, permitting, project management, construction supervision, environmental monitoring, effectiveness monitoring & adaptive management, and reporting.

Miranda is an apprentice of Tom Biebighauser ([Wetland Restoration and Training LLC.](#)) and Robin Annschild ([Rewilding Water and Earth Inc.](#)) since February 2019. Tom and Robin are Wetland Restoration Specialists working to restore wetlands across BC and beyond. Since the start of her apprenticeship in 2019 she has joined both Tom and Robin on projects across BC to learn the restoration techniques developed by Tom Biebighauser. Miranda has worked with Tom and Robin to restore wetlands and streams on more than 34 project sites in BC. Miranda was a participant in the BC Wildlife Federation's Wetlands Institute of 2019 and 2020 where she was able to gain valuable knowledge from various experts and other participants.

Christopher Holtslag

Vanisle Wetlands

Ph: 250-735-3757

<https://vanislewetlands.com/>

The non-lethal solution to beaver interactions

Owner/operator of Vanisle Wetlands for the past five years, working with municipalities, Regional Districts and branches of the Provincial Government to implement non-lethal beaver management methods.

Chris studied at the Beaver Institute in Massachusetts which is run by Mike Callahan aka the godfather of beavers. Mike has been doing coexistence work with *Castor Canadensis* (North America Beaver) for over 35 years and has more than 2000 flow device combinations throughout the United States. Chris was the first Beaver Institute certified Beaver Corp Professional to graduate from the program and one of only a handful of people providing coexistence options to beaver management in Canada. His background includes underwater construction, commercial diving, heavy equipment operator, logging and marine restoration.

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19. Appendix A: Site Photos

19.1. Upper Beaver Dam #1



Figure 13. Before. Upper beaver dam has been breached to lower the water elevation, so the park access trail is not flooded. January 14, 2021.



Figure 14. Right. The SRD installed a new bridge, boardwalk, and pond leveler to manage water elevations and park access. March 26, 2024.



Figure 15. Left. Chris Holtslag is examining the inlet of pond leveler installed in the upper dam. May 1, 2024.



Figure 16. Location of the proposed new inlet location, 20m away from the dam to prevent clogging and sediment build up. May 1, 2024.



Figure 17. The intake cage for the pond leveler was built with inappropriate materials, which are starting to rust. Additionally, this cage was placed too close to the dam where sediment will accumulate. This photo was taken during low water conditions, mid August, and demonstrates that the wetland pool upstream of the dam would not be de-watered during construction. Note the pond leveller is exposed. This pond leveller would be replaced as part of the project, using the same outlet elevation, therefore the pool wetland would not be dewatered. August 29, 2024.

19.2. Middle Beaver Dam #2



Figure 18. Left. This beaver dam has been breached to manage water levels, and subsequently been repaired by beaver. January 14, 2021.

Figure 19. Right. Old pond leveller pipe that is not functioning circled in white. To be replaced with new pond leveler. August 29, 2024.



Figure 20. Left. Middle beaver dam, the pond leveler is not visible and not functioning. May 1, 2024.

Figure 21. Right. Chris Holtslag is standing in the location of the proposed new pond leveler intake cage. May 1, 2024.

19.3. Lowest Beaver Dam #3



Figure 22. Left. This beaver dam had a pond leveler installed that is not functioning as intended. The pipe is too small diameter, and the intake not properly placed. The beaver dam still needed to be breached to manage water levels. March 13, 2023.



Figure 23. Left. The parking lot access to Kw'as Park is flooded due to an adjacent beaver dam. March 26, 2024.



Figure 24. Right. This beaver dam is causing the parking lot to flood. March 26, 2024.

Kw'as Bay Beaver Coexistence Pilot Project CEMP



Figure 25. This beaver dam has been breached to manage water levels, and subsequently been repaired by beaver. January 14, 2021.



Figure 26 Left, Figure 27 Right. This pond leveler was installed in the lowest dam to manage water levels. This pond leveler did not function as intended due to design flaws in the structure, and it became completely blocked by a beaver dam. Consequently, the dam had to be breached to manage water levels, and this structure has since been removed completely. January 14, 2021.

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Figure 28. Left. Chris Holtslag is investigating the location for the intake cage for the proposed pond leveler. May 1, 2024.

Figure 29. Right. Chris is standing in the best location for the intake cage. May 1, 2024.



Figure 30. Looking downstream at BD#3, photo showing low water levels from August 2024. The water is approximately 1m below the top of the dam. The pond leveller is designed to be installed 30cm below the top of the dam. August 29, 2024.



Figure 31. Looking east at BD#3 during low water conditions. Water is approximately 1m below top of dam. August 29, 2024.

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Figure 32. Left: The beaver dam is causing flooding of the parking lot. Right: Close up of the beaver dam, beaver have repaired a breach in this dam, evidenced by the darker area of fresh soil covered in sticks (circled in white) March 6 2025.

19.4. Kw'as Bay Road culvert



Figure 33. The culvert at Kw'as bay road is completely blocked by a beaver dam and water is flowing over the road. Notice the pile of organic soil and debris placed on the side of the road, from the last time the culvert was unblocked. May 2, 2022.

Kw'as Bay Beaver Coexistence Pilot Project CEMP



Figure 34. The culvert under Kw'as Bay Rd is blocked by a beaver dam, against the metal grate that was placed in front of the culvert. September 19, 2022.



Figure 35, Figure 36, Figure 37. The culvert is completely blocked by a beaver dam built on the grate placed in front of the culvert. The grate in front of the culvert provides the beaver with a solid and convenient place to build a dam. Notice the piles of organic soils and debris that are piled on the edge of the road from the last time the beaver dam was removed. January 12, 2021.

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Figure 38 and Figure 39. The grate that was covering the culvert has been removed, the culvert is not completely blocked and causing water to flow over the road. March 26, 2024.



Figure 40 and Figure 41. The road surface is eroding due to consistent water flow over the road. March 26, 2024.

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Figure 42. Chris Holtslag is standing at the inlet of the culvert which is totally submerged and blocked. A culvert protection fence is proposed for this location to reduce the risk of road failure and ecological impacts from continually unblocking the culvert. May 1, 2024.



Figure 43 and Figure 44. Now that water levels have dropped in the dry time of year, the culvert is exposed. The inlet of the culvert is damaged and bent out of shape from attempts to use a log with a backhoe to dislodge the beaver dam. August 29, 2024.

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Figure 45. The road culvert has been completely blocked for over a year, water is flowing over the road. March 6, 2025.



Figure 46. Left. Water flowing over Kw'as Bay Rd is eroding the road surface. March 6, 2025.

Figure 47. Right. Water flowing from the road, back into the ditched stream is eroding the road bank. March 6, 2025.

19.5. Aerial images



Figure 48. Aerial photo of the upstream beaver-maintained wetland. The beaver lodge is visible in the centre of the photo. May 1, 2024.



Figure 49. Aerial photo showing the bridge and beaver dams (numbered #1,2,3), and Kw'as Bay Rd. May 1, 2024.

Kw'as Bay Beaver Coexistence Pilot Project CEMP



Figure 50. Aerial photo of the bridge and beaver dam/pond leveler #1. White circle indicates the location of the new proposed intake cage. The new proposed cage is recommended to be installed 20m away from the beaver dam in deeper water. May 1, 2024.



Figure 51. Aerial photo, close up of existing pond leveler, notice the rust on the intake cage, which is placed too close to the beaver dam. May 1, 2024.

Kw'as Bay Beaver Coexistence Pilot Project CEMP



Figure 52. Aerial photo looking downstream at beaver dam#2. May 1, 2024.



Figure 53. Aerial photo, close up of beaver dam #2 showing location in relation to parking lot. May 1, 2024.

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Figure 54. Aerial photo showing beaver dam #3, blocked culvert and flooded Kw'as Bay Road. May 1, 2024.



Figure 55. Aerial photo of beaver dam #3 which is causing flooding of the parking lot for Kw'as Park. May 1, 2024.

Kw'as Bay Beaver Coexistence Pilot Project CEMP



Figure 56. Aerial photo of Kw'as Bay Road flooding due to the blocked, beaver dammed, culvert. May 1, 2024.

20. Appendix B: Additional Resources and Links

Beaver Solutions:

<https://www.beaversolutions.com/get-advice-beaver-problems/blocked-culvert/>

“Road culverts are the most common sites for problematic beaver damming. A blocked culvert can quickly cause dangerous and expensive road safety issues. Fortunately nearly every road culvert can be protected from beavers in a cost-effective, long-term, environmentally friendly and humane manner. We have installed over 1,000 culvert protective flow devices with a 98% success rate without the need for beaver removal. Our satisfied clients include state and local highway departments. See our video testimonials.”

The Beaver Institute:

<https://www.beaverinstitute.org/>

- [Self-Help Flexible Pond Leveler](#)
- [Self Help Culverts-Drains](#)

Working With Beavers:

<https://www.workingwithbeavers.ca/>

- [Pond levelers](#)
- [Exclusion Fencing](#)

Miistakis Institute

[Benefits of Beavers Videos](#)

[Beaver Pond Leveler Installation-Training Session](#)

[Beaver Coexistence Demonstration Project](#)

[Beaver Coexistence Workshop](#)

City of Port Alberni Beaver Coexistence Culvert Project:

<https://www.alberniavalleynews.com/news/city-of-port-alberni-learns-to-coexist-with-beavers-723842>

Scientific American: Beaver Emerges as climate solving hero

<https://www.scientificamerican.com/article/the-beaver-emerges-as-a-climate-solving-hero/>

Beaver: The North American freshwater climate action plan

<https://wires.onlinelibrary.wiley.com/doi/10.1002/wat2.1592>

21. Appendix C: Record of First Nation Engagement

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October 2024

Letter of Support: Strathcona Regional District Beaver Coexistence Pilot Project For Disaster Risk Reduction-Climate Adaptation, Kw'as Bay Rd and Kw'as Park, Cortes Island, BC

To Whom it may concern,

It is our understanding that The Strathcona Regional District is planning to apply for funding for the Disaster Risk Reduction Climate Adaptation Funding from the Province of BC at the site of Kw'as Bay Road and Kw'as Park access/parking lot, Cortes Island, BC.

The proposed project includes the implementation of beaver coexistence strategies at Kw'as Bay Road, Kw'as Park entrance. Please see attached brief description for details of proposed coexistence strategies

Klahoose First Nation is in support of the funding application, which will serve to Mitigate the ongoing Beaver related challenges such as;
Beaver dams and blocked culverts have caused the flooding of Kw'as Bay road and the Kw'as Park trail and parking lot. This poses risks for residents, impacts access/egress in the event of emergency, and impacts the park access right of way for recreational park users.
When beaver dams are breached to unblock culverts and mitigate flooding, sediments and nutrients are released to downstream aquatic ecosystems. This can have negative impacts for fish and wildlife, and contributes nutrients to Hague Lake, which is already experiencing algal blooms due to nutrient loading in recent years.
Save community resources, and help solve problems related to drought, flooding, which result in and infrastructure damage and risks to public safety
Protect and conserve aquatic ecosystems and wetlands created and maintained by beaver.

If there are any further questions, please contact us at

Klahoose First Nation
Street Address: 1790 Tork Road
Mailing Address: PO Box 9, Squirrel Cove, BC, V0P 1T0
Website: www.klahoose.org
Phone: +1 (250) 935-6536

Sincerely,

DocuSigned by:

5F5A867CEA554DB...
Chief Steven Brown

Kw'as Bay Beaver Coexistence Pilot Project CEMP

Tuesday, October 1, 2024 at 17:36:57 Pacific Daylight Time

Subject: Re: Kw'as Park Beaver Coexistence Project support request
Date: Tuesday, October 1, 2024 at 9:40:59 AM Pacific Daylight Saving Time
From: Miranda Cross
To: Natalie Pielle, Steven Brown
CC: Patricia McDougall, Johnny Hanuse, Emily White, Shaun Koopman
Attachments: image001.gif

Hello,

Checking in on the results of this item's addition to the council meeting Monday the 22nd. Did Klahoose pass a BCR in support of this? Or provide an LOS?

Sorry if I missed this, I've been working in the field, and not able to closely monitor my emails over the last couple of weeks. Still getting caught up.

The grant is due this week, on the 4th of October. Would it be possible to receive any written support from Klahoose by the 3rd?

Many thanks,

--

Miranda Cross, RPBio
Wetland Restoration Specialist
Rewilding Water and Earth Inc.
miranda@rewildingwater.ca
Phone: 250-850-9020

I respectfully acknowledge that I live within the traditional and ancestral territories of the toq qaymıx^w (Klahoose), ʔəʔamen qaymıx^w (Tla'amin), and ʔop qaymıx^w (Homalco) Nations.

From: Natalie Pielle <nataliepielle@klahoose.org>
Date: Friday, September 20, 2024 at 6:32 PM
To: Steven Brown <stevenbrown@klahoose.org>, Miranda Cross <Miranda@rewildingwater.ca>
Cc: Patricia McDougall <Patricia@klahoose.org>, Johnny Hanuse <johnnyhanuse@klahoose.org>, Emily White <EmilyWhite@klahoose.org>, Shaun Koopman <SKoopman@srd.ca>
Subject: RE: Kw'as Park Beaver Coexistence Project support request

Good evening,

Thank you for your email. This item has been added to the Council Meeting Agenda for Monday.

1 of 3

Kw'as Bay Beaver Coexistence Pilot Project CEMP

Happy Friday, have a great weekend everyone!

Kind regards,

Natalie Pielle
Executive Assistant, Klahoose First Nation
Email: nataliepielle@klahoose.org
Phone: (250) 935-6536 ext. 249



From: Steven Brown <stevenbrown@klahoose.org>
Sent: September 20, 2024 10:25 AM
To: Miranda Cross <Miranda@rewildingwater.ca>; Natalie Pielle <nataliepielle@klahoose.org>
Cc: Patricia McDougall <patricia@klahoose.org>; Johnny Hanuse <johnnyhanuse@klahoose.org>; Emily White <emilywhite@klahoose.org>; Shaun Koopman <SKoopman@srd.ca>
Subject: Re: Kw'as Park Beaver Coexistence Project support request

Good morning, Miranda,

Apologies for missing this. We'll have it added to our Council meeting on Monday and get back to you. Have a great weekend!

@Natalie Can you please add this as an item. Thanks!

||

Warm regards,
Steven Brown.
Chief, Klahoose First Nation.

On Fri, Sep 13, 2024 at 11:28 AM, Miranda Cross <Miranda@rewildingwater.ca> wrote:

Dear Chief Steven Brown, and Councillors Patricia MacDougal, Johnny Hanuse, Emily White,
Cc Natalie Pielle, and Shaun Koopman

The Strathcona Regional District is planning to apply for funding for the Disaster Risk Reduction Climate Adaptation Funding, Oct. 4th Deadline.

2 of 3

Kw'as Bay Beaver Coexistence Pilot Project CEMP

The proposed project includes the implementation of beaver coexistence strategies at Kw'as Bay rd, Kw'as Park entrance. Please see attached brief description for details of proposed coexistence strategies.

The assessment, planning, and design for this project is currently underway. Klahoose First Nation representatives, Elders and Guardian attended the internal stakeholders meeting in May 2024. At the time, they expressed interest and support for the project concept.

We would be happy to include costs to support Klahoose First Nation engagement for consultation, as well as Guardian involvement and training for implementation, installation, and maintenance of Beaver Coexistence strategies. The project would be monitored and maintained by the SRD and MOTI contractors, with no obligation from Klahoose for ongoing management, the training would be for Guardian education and skill-building for other potential beaver related projects in your territory.

Would Klahoose First Nation consider supporting this project's funding application with a Band Council Resolution for the October 4th deadline?

Thank you kindly for your time and consideration of this request. I recognize you have much important work to do, please let me know if I can support the process by providing more information, or answering any questions.

Kind regards,

--

Miranda Cross, RPBio
Wetland Restoration Specialist
Rewilding Water and Earth Inc.
miranda@rewildingwater.ca
Phone: 250-850-9020

I respectfully acknowledge that I live within the traditional and ancestral territories of the toq qaymıx^w (Klahoose), ʔəʔamen qaymıx^w (Tla'amin), and ʔop qaymıx^w (Homalco) Nations.

Kw'as Bay Beaver Coexistence Pilot Project CEMP

Friday, February 21, 2025 at 14:19:36 Pacific Standard Time

Subject: Benefits of Beavers Registration, May 2nd?
Date: Monday, April 1, 2024 at 11:01:45 AM Pacific Daylight Saving Time
From: Miranda Cross
To: Adam Smallwood, darrianhachez@klahoose.org
Attachments: image001.png, 2024 03 18 Internal beaver_coexistence_invitation_cortes_01.pdf

Hi Adam and Darrian,

Following up to check in with you about the Benefits of Beavers info sessions.

Will you be able to attend the May 2nd internal session from 10:30-2pm? Please see poster attached. There is also a public info session on May 1st from 3:30 -6pm, however we request that representatives from Klahoose First Nation participate in the internal meeting on May 2nd.

Is there anyone else from Klahoose First Nation who you think would be interested to attend? As previously mentioned, the project can cover your time and travel expenses to attend.

Please let me know if you have any questions, and if you are able to attend the May 2nd session.

Thank you,

--

Miranda Cross, RPBio
Wetland Restoration Specialist
Rewilding Water and Earth Inc.
miranda@rewildingwater.ca
Phone: 250-850-9020

I respectfully acknowledge that I live within the traditional and ancestral territories of the toq qaymıx^w (Klahoose), ʔəʔamen qaymıx^w (Tla'amin), and ʔop qaymıx^w (Homalco) Nations.

From: Miranda Cross <Miranda@rewildingwater.ca>
Date: Friday, March 1, 2024 at 4:23 PM
To: Adam Smallwood <adamsmallwood@klahoose.org>
Subject: Re: May 1st Benefits of Beavers Registration

Hello Adam,

Thanks for your interest in the Beaver Coexistence info session and tour.

I had reached out to some staff at Klahoose a couple months ago about this event. So I'm glad to hear from you. The email I sent previously is copied below.

1 of 4

Kw'as Bay Beaver Coexistence Pilot Project CEMP

You are more than welcome to attend the public session on the 1st of May. However as you'll read below, we'd like to invite representatives from Klahoose attend the internal stakeholders meeting on May 2nd. We will be sharing the same information, and visiting the site at Kw'as where beavers have been blocking culverts and flooding the road.

Since I sent the email below we have finalized the dates of May 1st for the public session and May 2nd for the internal session.

We have funding to support Klahoose participation for this event, so if there is anyone else you think may be interested, please extend the invitation and let them know we can pay for their time and travel expenses to attend.

Please let me know if you have any questions, or if you'd like to discuss.

Thank you for your interest and looking forward to meeting in person.

Email sent December 5 2023:

"Dear Mercedes Marleau, Darrian Hachez, Julie Hanuse, and Caroline Francis
Cc Shaun Koopman

I'm reaching out regarding a Beaver Coexistence Info Session and Site Tour, in partnership with the Strathcona Regional District (SRD), planned for Spring 2024 (potentially May 1-2).

Beaver Coexistence for Disaster Risk Reduction-Climate Adaptation (DRR-CA) workshops, knowledge transfer sessions, and report/land-use plan will contribute to a comprehensive, cooperative, and regional approach to DRR-CA through partnerships, education, and engagement with multiple stakeholders and project partners.

This project will develop and provide in-person, video, and written report knowledge transfer deliverables, which will be accessible to and influence strategies used to manage human beaver conflict especially around human infrastructure such as roads, homes, and buildings that are at risk of being impacted due to flooding or access/egress issues for residents, medical, and emergency services. This project will also support and enhance habitat for wildlife, mitigate nutrients flowing into aquatic ecosystems, and provide ecological learning opportunities for youth and community members.

We invite Klahoose First Nation's participation in this project, understanding that you have much important work, we would be honoured to make a financial contribution to the Nation and/or its representative for time and input. We would like to initiate a paid consultation for this project at your convenience. We would really appreciate any time you can spare for a meeting (either in person, by phone, or virtual) in the coming weeks.

We also request that representatives of your choosing attend a meeting with project partners and stakeholders (SRD, Ministry of Transportation, Neighbours, Friends of Cortes Island Society) (potential date May 2, 2024) to discuss the potential for implementation of Beaver Coexistence Strategies at Kw'as Bay rd.

Please let me know if I should re-direct this email to someone else, or if you have any questions about

Kw'as Bay Beaver Coexistence Pilot Project CEMP

this project.

Thank you for your time and for considering this request,"

--

Miranda Cross, RPBio

Wetland Restoration Specialist

Rewilding Water and Earth Inc.

miranda@rewildingwater.ca

Office: 250-285-0035

Cell: 250-850-9020

I respectfully acknowledge that I live within the traditional and ancestral territories of the toq qaymıx^w (Klahoose), təʔamen qaymıx^w (Tla'amin), and ʔop qaymıx^w (Homalco) Nations.

From: Adam Smallwood <adamsmallwood@klahoose.org>

Date: Wednesday, February 28, 2024 at 11:10 AM

To: Miranda Cross <Miranda@rewildingwater.ca>

Subject: May 1st Benefits of Beavers Registration

Hello Miranda,

My name is Adam Smallwood, and I am the new Emergency Planning Supervisor at Klahoose First Nation.

I would like to register for the May 1st Benefits of Beavers – Cortes Island event.

Please don't hesitate to reach out if you require any other information from me.

Thank you kindly.

Adam Smallwood – Emergency Planning Supervisor

Klahoose First Nation

1790 Tork Rd

Squirrel Cove, BC

V0P1T0

Cellular: 778-807-7482

Office: 250-935-6536, ext 242

adamsmallwood@klahoose.org

www.klahoose.org

Kw'as Bay Beaver Coexistence Pilot Project CEMP

Email Sent to Klahoose First Nation: December 5th 2023

Dear Mercedes Marleau, Darrian Hachez, Julie Hanuse, and Caroline Francis
Cc Shaun Koopman

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Please let me know if I should re-direct this email to someone else, or if you have any questions about this project.

Thank you for your time and for considering this request,

Miranda Cross