RYZUK GEOTECHNICAL

June 8, 2026
Project #: 11139-1

Ethan Wilding
434 Baker Road
Salt Spring Island, BC
V8M 1W6
Attn: Ethan Wilding (wilding@protonmail.com)

PROPOSED SHORELINE REVETMENT
434 Baker Road and 235, 237, 239 Quarry Drive – Salt Spring Island, BC

1. INTRODUCTION

As requested, we attended the referenced site on March 29, 2022, and on January 20, 2023, to assess the existing geotechnical conditions of the shoreline slope along the southwest margin of the four properties noted above. We understand there is concern about ongoing erosion issues and loss of vegetation at the crest adjacent to the shoreline slope, and are considering construction of a revetment structure along portions of the shoreline frontage. The shoreline exposure on these properties is designated as a Development Permit Area (DPA-3) within the Salt Spring Island Official Community Plan (OCP). As such, any work conducted within the shoreline (10 metres horizontally from the natural boundary of the sea) must be in conformance with the OCP and the Development Permit guidelines. We understand the owner at 434 Baker Road has agreed to manage receipt of our letter and communication with the larger resident group. This report is an updated version of our initial report, dated April 29, 2022. We herein provide a general description of the foreshore frontage to the four properties and also include site-specific sections for a revetment concept design along the frontage of 434 Baker Road at this time. Our associated comments and recommendations are contained herein, and our work has been carried out in accordance with, and is subject to, the attached Terms of Engagement.

2. SITE DESCRIPTION AND LOCATION

The properties are located on the coast of western Salt Spring Island overlooking Booth Bay and the Stuart Channel to the southwest. The three properties at 235, 237, and 239 are accessed by and bounded to the north by Quarry Drive and generally bounded to the east and west by similar residential lots. The property at 434 is separated from the Quarry Drive properties by a large residential parcel with access to the foreshore and is accessed from and bounded to the east by Baker Road. The site location plan is provided in Figure 1 below.

ENVIRONMENTAL ASSESSMENT V2.0

431 BAKER ROAD SALT SPRING ISLAND

PREPARED FOR:
SERENA KLAVER
KLAVER STRATEGIC PLANNING

AND

ISLANDS TRUST - SALT SPRING ISLAND
500 LOWER GANGES RD #1
SALT SPRING ISLAND, BC, V8K 2N8

CORVIDAE PROJECT #2025-301
JUNE 2026

CORVIDAE
ENVIRONMENTAL CONSULTING INC

SOLUTION ORIENTED. PROTECTION OF THE ENVIRONMENT. ABSOLUTE INTEGRITY. OPEN COMMUNICATION. RESPECT.

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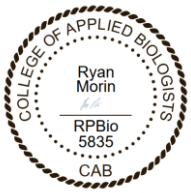
CAVEAT

This Environmental Assessment (EA) has been prepared with the best information available at the time of writing, including the Salt Spring Island Official Community Plan, communications with the client, a Site visit, review of Site plans, the former Environmental Assessment by Corvidae in 2023 with three additional properties and design drawings and other documentation relevant to the project.

Report prepared by:



Ryan Morin,
Senior Biologist
Corvidae Environmental Consulting Inc.

1 INTRODUCTION

Corvidae Environmental Consulting Inc. (Corvidae) is pleased to provide this Environmental Assessment (EA) for the property located at 431 Baker Road, Salt Spring Island (the Subject Property; Figure 1). The Subject Property is a single shoreline lot that is zoned as Rural (R) and occurs within the Shoreline Development Permit Area (DPA) 3 as outlined in the Salt Spring Island Official Community Plan (OCP) and shown on Map 20 (Figure 2). DPA 3, which includes upland areas within 10 metres of the natural boundary and the marine environment 300 m seaward of the present natural boundary (PNB; measured horizontally).

Table 1. Subject Property details

Civic Address	PID	Legal description	Current Zoning
434 Baker Road	009-555-781	LOT 5, PLAN VIP46155, SECTION 6, RANGE 1W, COWICHAN LAND DISTRICT, PORTION NORTH SALT SPRING	R

This EA is provided in support of proposed coastal erosion protection (shoreline revetment) at the Subject Property within the shoreline DPA. The project is proposed in response to identified bluff failure that is occurring due to the following mechanisms: 1) upland conveyance of rainwater contributing to pore water pressure in the soils/surface material wedge sitting atop bedrock coastal bluffs, and 2) wave action creating toe erosion (bedrock) or undercutting (sediments).

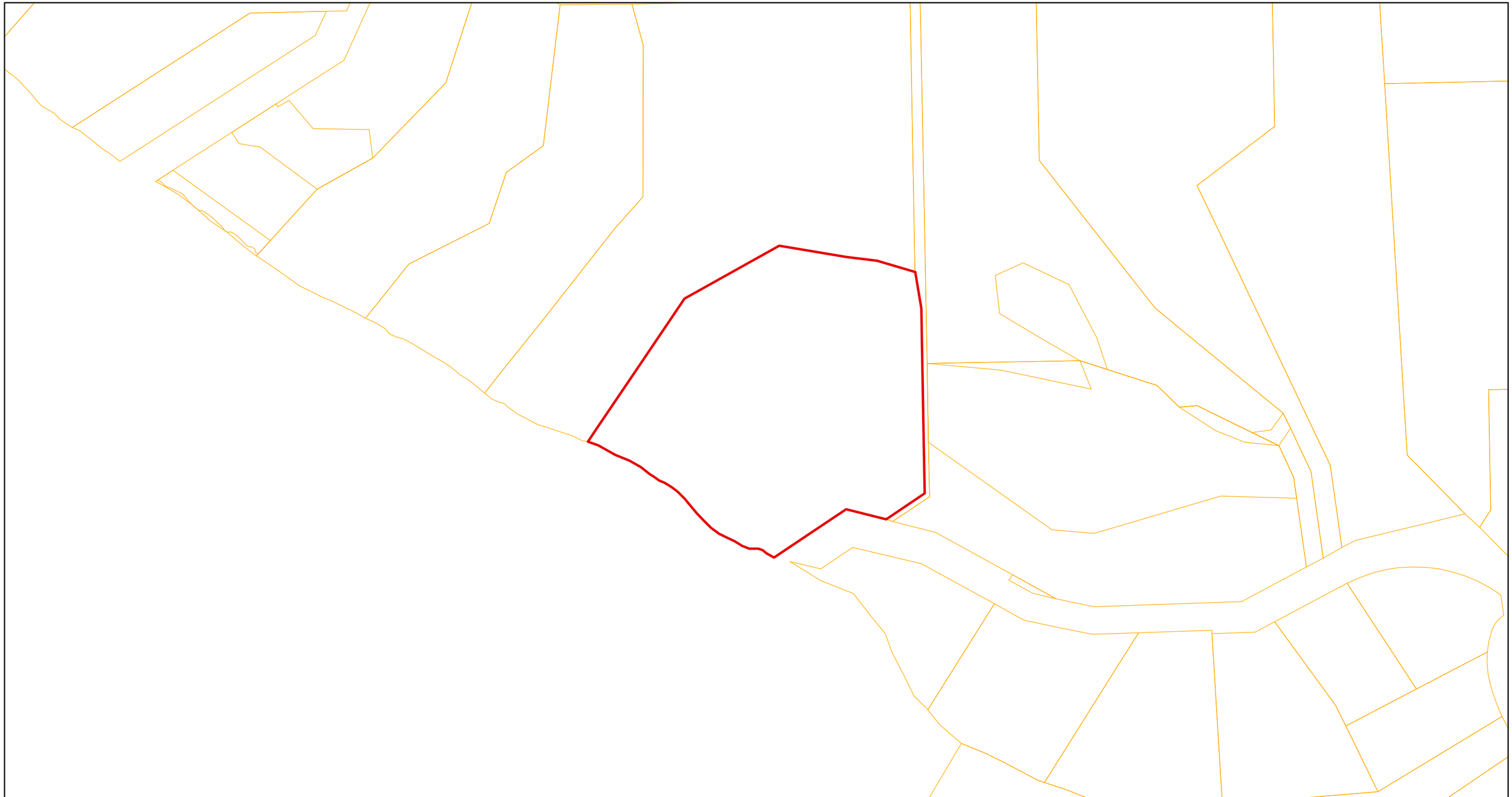
The Subject Property was previously included in a “Green Shores” revetment proposal in 2023, an initiative that follows the *Green Shores for Homes* (Stewardship Centre for BC 2023) guidelines promoting nature-based shoreline stabilization. The proposal aimed to use soft engineering techniques, such as native riparian plantings, large woody debris placement, and gentle slope regrading, to reduce erosion, enhance fish and wildlife habitat, and improve overall shoreline resilience while maintaining the natural character of the coast. In addition, the previous application included beach nourishment below the PNB.

Due to public conception of the beach nourishment project, the previous application was not approved by the Islands Trust; and the proponent wishes to pursue another option presented by Ryzuk in the previous investigation, a dry-stacked boulder wall extending the shoreline and partway up the slope.

An earlier version of this report was submitted to the Islands Trust and has since been re-assessed to investigate the terminology & definition of a “seawall” versus a “revetment”. This report addendum includes the assessment included in Briefing Note for Ryzuk Geotechnical Revetment Report & Drawing Revisions (Appendix C). In summary, Ryzuk determines: “a **seawall** is a vertical or near-vertical wall that reflects wave energy. A **revetment** is a sloped armor that dissipates wave energy through mass and porosity”. For the purposes of assessing environmental impacts from the proposal, the structure proposed at 434 Baker Road is considered a revetment.

1.1 PROJECT DESIGN

The proponent has retained Ryzuk Geotechnical to prepare a memorandum and concept drawing for the proposed project on August 29, 2025. The new proposal involves the installation of a shoreline revetment below the PNB composed of a dry-stacked boulder wall extending along the foreshore and partially up the slope, conceptual design drawings are shown on Sheets 1-3 in the Ryzuk memorandum (Appendix A). To maintain visual appeal and incorporate vegetation, boulders will be limited to the lower section of the revetment, while the upper portion will consist of a geotextile bin wall or similar reinforced slope system planted with native species listed in Table 6. The proposed revetment is not anticipated to cause any significant alteration to the existing hydraulic regime of the shoreline.



Site Location

Property Boundary

N

0 25 50 100 150 200 Meters

Project: 434 Baker Road | Sources: Capital Regional District

[redacted]

Rev. #	Date
0	November 06, 2025

Corvidae Project No.
COR-2025-301

Figure 1

1.2 REGULATORY FRAMEWORK

This EA is designed to comply with the provisions set out in the Salt Spring Island Official Community Plan (OCP) Volume 2 Part E for development permit areas (DPAs) and for compliance with the provisions for environmental protection contained in the following relevant legislation:

Municipal

Salt Spring Island OCP, Bylaw No. 434 (Salt Spring Island Local Trust Committee 2008)

<u>DPA 3 - Shoreline</u>

> "*Development Permit Area 3 is shown on Map 20. It is all that area of land covered by water between the natural boundary of the sea and a line drawn parallel to and 300 m seaward of the natural boundary of the sea. It also encloses the land within 10 m of the natural boundary of the sea (measured horizontally) in areas where the marine environment has been identified as being particularly sensitive to development impacts.*
>
> *Development Permit Area 3 is designated according to Section 879 (1)(a) of the Municipal Act to identify objectives and guidelines for the form and character of the commercial and general employment development allowed on the water surface. It is also designated according to Section 879 (1)(a) and (b) to protect the natural environment and to protect development from hazardous conditions*."

Objectives for DPA 3 include the following:

- *To protect the quality of the tidal waters that surround Salt Spring Island.*
- *To protect fish and wildlife habitat.*
- *To prevent erosion and hazardous conditions that could result from interrupting the natural geohydraulic processes along the shoreline.*
- *To protect development from hazardous conditions. BL488 (07/20)*
- *To protect the natural beauty of the island's shoreline areas where commercial and general employment developments are allowed.*
- *To ensure such development is unobtrusive and contributes to the natural, public character of the Crown foreshore.*

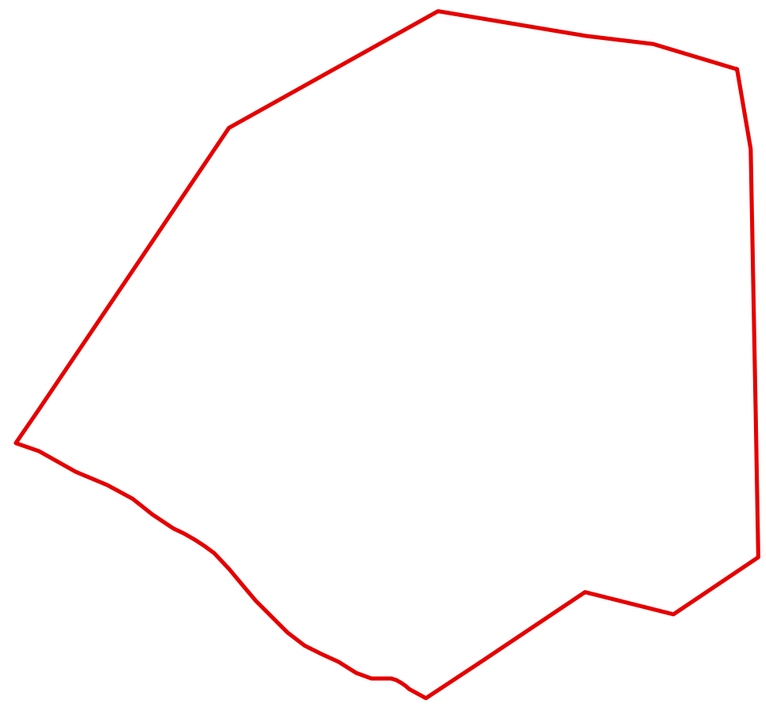
The development permit areas are shown in Figure 2. The guiding principle for the use of Development Permits is found within the *Local Government Act*. Development Permit Areas can be designated for purposes such as, but not limited to: protect, enhance and restore the biodiversity and ecological values and functions of environmentally sensitive areas; foster compatibility between development, existing land uses and environmentally sensitive areas; maintain connectivity between sensitive ecosystems; and protect water quality and quantity.

Provincial

- Wildlife Act (1996)
- Invasive Species Council of BC
- Weed Control Act (1996, current as of October 2016)

Federal

- Migratory Birds Convention Act (1994)
- Species at Risk Act (SARA) (2002)
- Fisheries Act (2019)
- Canadian Environmental Protection Act (CEPA) (1999)
- Canadian Navigable Waters Act (1985)



Development Permit Area 3 - Shoreline

- Property Boundary
- Shoreline - Forshore
- Shoreline - On-land portion

N

0 25 50 100 Meters

Project: 434 Baker Road | Sources: Capital Regional District

[redacted]

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Figure 2

1.3 SCOPE OF WORK

Corvidae completed an EA for the Subject Property in 2023 as part of a larger study area that included four additional properties, which documented the ecological features on the Subject Property with a focus on the shoreline and foreshore areas. Background information was reviewed including applicable databases. During the site assessments, the following features were documented in this report:

- Areas of sensitivity, including the marine shoreline environment.
- Areas of habitat and biodiversity values.
- Plant communities and plant species.
- Potential wildlife presence and wildlife habitat.
- Soil types and terrain.

2 METHODS

2.1 DESKTOP REVIEW

Baseline biophysical conditions were compiled by reviewing the best available data and information including existing reports for the area and conducting searches of online provincial and federal databases:

- BC Conservation Data Centre (BC CDC 2025a and 2025b).
- BC HabitatWizard (Province of BC 2023).
- Aerial photographs of the Property (Google Earth 2024).
- CRD mapping system and database (CRD 2024).
- Community Mapping Network (2018)
- Islands Trust maps (2017 and 2014)
- Salt Spring Island Official Community Plan Bylaw No. 434 (Salt Spring Island Local Trust Committee 2008).

2.2 FIELD ASSESSMENT

A field assessment of the Subject Property was completed in May, June, and September of 2023 by the undersigned Qualified Environmental Professional (QEP) from Corvidae as part of the application with 434 Baker Road and four additional properties. The assessment included characterizing vegetation communities, documenting wildlife signs and species observations, identifying wildlife habitat features, and recording current conditions on the Subject Property.

3 ENVIRONMENTAL ASSESSMENT RESULTS

3.1 CLIMATE AND BIOGEOCLIMATIC ZONE

The project is located within the Coastal Douglas-fir (CDF) biogeoclimatic zone, specifically in the Moist Maritime Coastal Douglas-fir Subzone (CDFmm) (BC CDC 2025b). The CDFmm occurs at low elevations (<150 m) along southeast Vancouver Island, the southern Gulf Islands, and part of the Sunshine Coast.The CDFmm has the mildest climate in Canada. This subzone has a long growing season with warm, dry summers and mild, wet winters.

3.2 TERRAIN AND SOILS

Soils in the CDF biogeoclimatic zone, generally derived from morainal, colluvial, and marine deposits, are typically Brunisols, grading with increased precipitation to Humo-Ferric Podzols (Nuszdorfer et al. 1991). Soils on the Subject Property are generally comprised of loam, well-draining, Orthic Dystric Brunisol soils. (GALIANO soil association) (BC SIFT 2018). The Subject Property slopes moderately to steeply from northeast to southwest in the direction of the shoreline.

3.3 VEGETATION

South-facing, dry banks along the shoreline and immediate backshore area are forested and characterized by a Douglas-fir – arbutus woodland with lesser amounts of shore pine and Garry oak. The structural stage was observed to be young forest with larger (mid-seral) trees occurring intermittently. Species observed are consistent with the red-listed Douglas-fir – arbutus ecological community, which is an ecological community that is at risk of being lost (extirpated, endangered or threatened) in BC. Understory species in the immediate backshore include predominantly low growth of salal and dull Oregon-grape. Banks along the shoreline are characterized by pink (hairy) honeysuckle, grasses, weeds, evergreen huckleberry, and invasive species. The moss layer is very poorly developed near the shoreline.

All vegetation species detected during the field assessment are listed in Table 2. Six invasive species were observed, including English ivy, Scotch broom, Himalayan blackberry, bull thistle, oxeye daisy, and spurge-laurel. All are listed as Control Species according to the Capital Regional District, whereby established infestations of these species are common and widespread throughout the Capital Region. Control should be focused on high value conservation areas (CRD 2019).

Table 2. Plant species observed on Subject Property during the field visits in 2023.

Common Name	Scientific Name	BC Provincial Status[1]	*SARA* Schedule 1 Status[2]
Arbutus	*Arbutus menziesii*	Yellow	--
Baldhip rose	*Rosa gymnocarpa*	Yellow	--
Balsam poplar	*Populus balsamifera*	Unknown	--
Bigleaf maple	*Acer macrophyllum*	Yellow	--
Blue wildrye	*Elymus glaucus*	Yellow	--
Bracken fern	Pteridium aquilinum	Yellow	--

Common Name	Scientific Name	BC Provincial Status[1]	*SARA* Schedule 1 Status[2]
Broadleaf stonecrop	*Sedum spathulifolium*	Yellow	--
Bull thistle	*Cirsium vulgare*	**Invasive**; Exotic	--
Common lamb's-quarters	*Chenopodium album*	Exotic	--
Common snowberry	*Symphoricarpos albus*	Yellow	--
Common sow-thistle	*Sonchus oleraceus*	Exotic	--
Douglas-fir	*Pseudotsuga menziesii*	Yellow	--
Dull Oregon-grape	*Mahonia nervosa*	Yellow	--
Evergreen huckleberry	*Vaccinium ovatum*	Yellow	--
English ivy	*Ilex aquifolium*	**Invasive**; Exotic	--
Field elm	*Ulmus minor*	Exotic	--
Garry oak	*Quercus garryana var. garryana*	Yellow	--
Himalayan blackberry	*Rubus armeniacus*	**Invasive**; Exotic	--
Oceanspray	*Holodiscus discolor var. discolor*	Yellow	--
Oxeye daisy	*Leucanthemum vulgare*	**Invasive**; Exotic	--
Pacific crab apple	*Malus fusca*	Yellow	--
Perennial sow-thistle	*Sonchus arvensis*	Exotic	--
Pink honeysuckle	*Lonicera hispidula*	Yellow	--
Red alder	*Alnus rubra*	Yellow	--
Salal	*Gaultheria shallon*	Yellow	--
Scotch broom	*Cytisus scoparius*	**Invasive**; Exotic	--
Scouler's willow	*Salix scouleriana*	Yellow	--
Slough sedge	*Carex obnupta*	Yellow	--
Spurge laurel	*Daphne laureola*	**Invasive**; Exotic	--
Trailing blackberry	*Rubus ursinus*	Yellow	--
Tufted hairgrass	*Deschampsia cespitosa*	Yellow	--
Western redcedar	*Thuja plicata*	Yellow	--
Willow dock	*Rumex transitorius*	Yellow	--

[1] BC CDC 2025a
[2] Government of Canada 2025a

3.4 WILDLIFE AND WILDLIFE HABITAT

The trees on the Subject Property and within surrounding areas provide nesting and roosting habitat for birds, including migratory songbirds, year-round resident species, raptors, and owls. Understory shrubs, although lacking in density overall, may provide nesting habitat for birds and small mammals. One bald eagle nest is mapped by the Wildlife Stewardship Atlas (WiTS) approximately 400-500 m northwest of the Subject Property (Nest ID BAEA-101-433; Community Mapping Network 2018). No nests were observed on or in the vicinity of the Subject Property during the assessment.

Above the shoreline, south-facing slopes may provide suitable habitat for reptiles, and forested areas are likely frequented by both large and small mammals and various avian species. Belted kingfisher nesting burrows were observed in several locations in the vicinity of the proposed project area (Photo 4). The species listed in Table 3 were observed on or near the Subject Property during the assessment.

Table 3. Wildlife Species observed on Subject Property during the field visit on May 30, 2023.

Common Name	Scientific Name	BC Provincial Status[1]	*SARA* Schedule 1 Status[2]
American robin	*Turdus migratorius*	Yellow	--
Bald eagle	*Haliaeetus leucocephalu*	Yellow	--
Brown creeper	*Certhia americana*	Yellow	--
Chestnut-backed chickadee	*Poecile rufescens*	Yellow	--
Dark-eyed junco	*Junco hyemalis*	Yellow	--
Orange-crowned warbler	*Vermivora celata*	Yellow	--
Red breasted nuthatch	*Sitta canadensis*	Yellow	--
Spotted towhee	*Pipilo maculatus*	Yellow	--

[1] BC CDC 2025a
[2] Government of Canada 2025a

3.5 SPECIES AND ECOLOGICAL COMMUNITIES AT RISK

A query of the BC CDC iMap tool yielded occurrences of three species and five ecological communities at risk within a two-kilometer radius of the Subject Property, including one masked occurrence (BC CDC 2025b). Species are listed in Table 4 and the location of occurrences in relation to the Subject Property is provided in Figure 3.

One ecosystem at risk overlaps the Subject Property boundary: the Garry oak / California brome (*Quercus garryana* / *Bromus carinatus*) ecological community (red-listed). This occurrence is based on Terrestrial Ecosystem Mapping (TEM) and has not been confirmed on the ground (Province of BC 2023). This ecological community was not detected during the assessment. Species observed near the shoreline adjacent to the Subject Property most closely characterize the Douglas-fir / arbutus ecological community (coniferous woodland habitat) which is also red-listed but is not mapped in this area by the CDC. This community has been impacted through disturbance associated with residential development along the shoreline.

No other species or ecosystems listed in Table 4 were observed on the Subject Property during the assessment, and no suitable habitat for those species was identified.

Table 4. Terrestrial species at risk that may occur in the vicinity of the Subject Property.

Common Name	Scientific Name	BC Provincial Status[1]	*SARA* Schedule 1 Status[2]
Species			
Common sharp-tailed snake	*Contia tenuis*	Red	Endangered
Painted Turtle - Pacific Coast Population	*Chrysemys picta* pop. 1	Red	Threatened
Threaded vertigo	*Vertigo rowellii*	Blue	Special Concern
Western screech-owl, *kennicottii* subspecies	*Megascops kennicottii kennicottii*	Blue	Threatened
Ecological Community			
Douglas-fir / dull Oregon-grape	*Pseudotsuga menziesii / Mahonia nervosa*	Red	n/a

Garry oak / California brome	*Quercus garryana / Bromus carinatus*	Red	n/a
Garry oak / oceanspray	*Quercus garryana / Holodiscus discolor*	Red	n/a
Grand fir / dull Oregon-grape	*Abies grandis / Mahonia nervosa*	Red	n/a
Trembling aspen / Pacific crab apple / slough sedge	*Populus tremuloides / Malus fusca / Carex obnupta*	Red	n/a

[1] BC CDC 2025a
[2] Government of Canada 2025a

A query of the Fisheries and Oceans Canada Species at Risk Distribution Map (Government of Canada 2025b) yielded the following marine species at risk that have the potential to occur in proximity to the project:

Table 5. Aquatic species at risk that may occur in the vicinity of the Subject Property.

Common Name	Scientific Name	*SARA* Schedule 1 Status[1]
Basking shark	*Cetorhinus maximus*	Endangered
Bluntnose sixgill shark	*Hexanchus griseus*	Special Concern
Grey Whale (Eastern North Pacific population)	*Eschrichtius robustus*	Special Concern
Harbour Porpoise	*Phocoena phocoena*	Special Concern
Humpback Whale	*Megaptera novaeangliae*	Special Concern
Killer Whale (Northeast Pacific southern resident population)	*Orcinus orca*	Endangered
Killer Whale (Northeast Pacific transient population)	*Orcinus orca*	Threatened
Leatherback Sea Turtle	*Dermochelys coriacea*	Endangered
Longspine thornyhead	*Sebastolobus altivelis*	Special Concern
Northern Abalone	*Haliotis kamtschatkana*	Endangered
Rougheye rockfish type I	*Sebastes aleutianus*	Special Concern
Rougheye rockfish type II	*Sebastes entomelas*	Special Concern
Steller Sea Lion	*Eumetopias jubatus*	Special Concern
Tope	*Galeorhinus galeus*	Special Concern
Yelloweye Rockfish	*Sebastes ruberrimus*	Special Concern

[1] Government of Canada 2025b

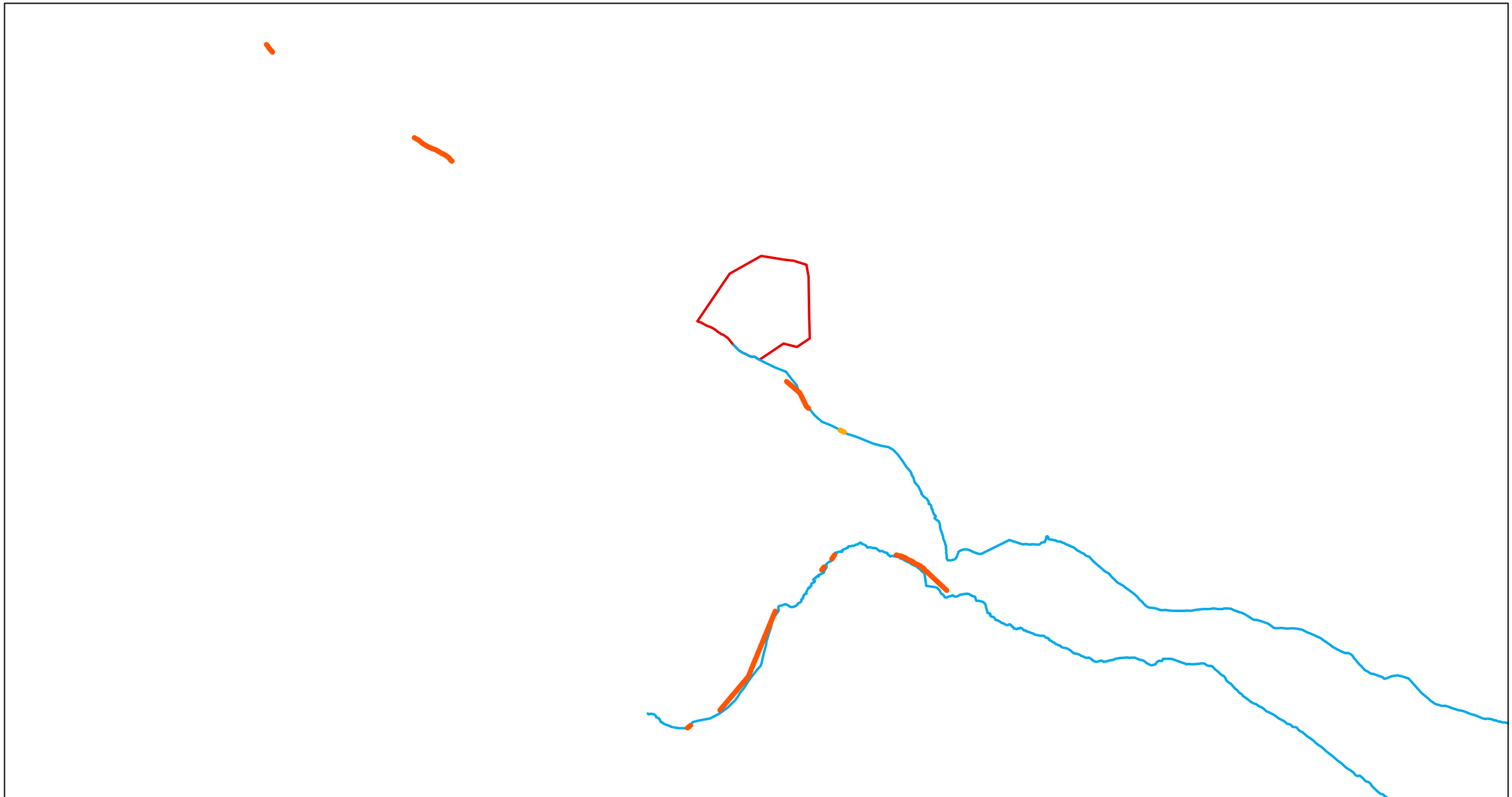
CRITICAL HABITAT

A mapped western painted turtle critical habitat polygon overlaps the northeastern corner of 434 Quarry Road (Province of BC 2025b; Figure 3). Critical habitat mapping is based on known occurrences and potential occurrences of suitable aquatic habitat features. Critical habitat may include lakes, ponds, marshes, river channels, roadside or drainage ditches, sluggish streams, and sloughs, and up to 150 m of terrestrial habitat surrounding the aquatic feature, as most western painted turtles in B.C. are typically found within 150 m from water (Environment and Climate Change Canada 2018). The critical habitat polygon is associated with an unnamed lake that is located upslope of the project area. The project area includes only the immediate shoreline area which is not considered suitable habitat for western painted turtle.

3.6 MARINE ENVIRONMENT

The shoreline type within the proposed project area is classified as low rock/boulder (Islands Trust n.d.). As per Map 11 of the Salt Spring Island OCP, a portion of the shoreline near 434 Baker Road is classified as an 'Environmentally Sensitive Shoreline Area' (Figure 4).

The marine environment supports a variety of species, including plainfin midshipmen, shorebirds, waterfowl, river otters, and marine mammals. In addition, mapped eelgrass beds (Islands Trust 2014) that provide potential herring spawning habitat, along with mapped suitable spawning areas for surf smelt and Pacific sand lance (Islands Trust 2017), are located in proximity to the proposed project area. These forage fish species play a vital role in the marine food web, serving as a key food source for numerous marine predators.



Sensitive Shoreline Area

- Sensitive Shoreline Area
- Property Boundary

Forage Fish Spawning Habitat

- Surf Smelt
- Surf Smelt/Pacific Sandlance

Eelgrass Meadow (2022)

- Dense
- Moderate
- Undetermined

N

0 100 200 400 600 Meters

Project: 434 Baker Road | Sources: Capital Regional District

[redacted]

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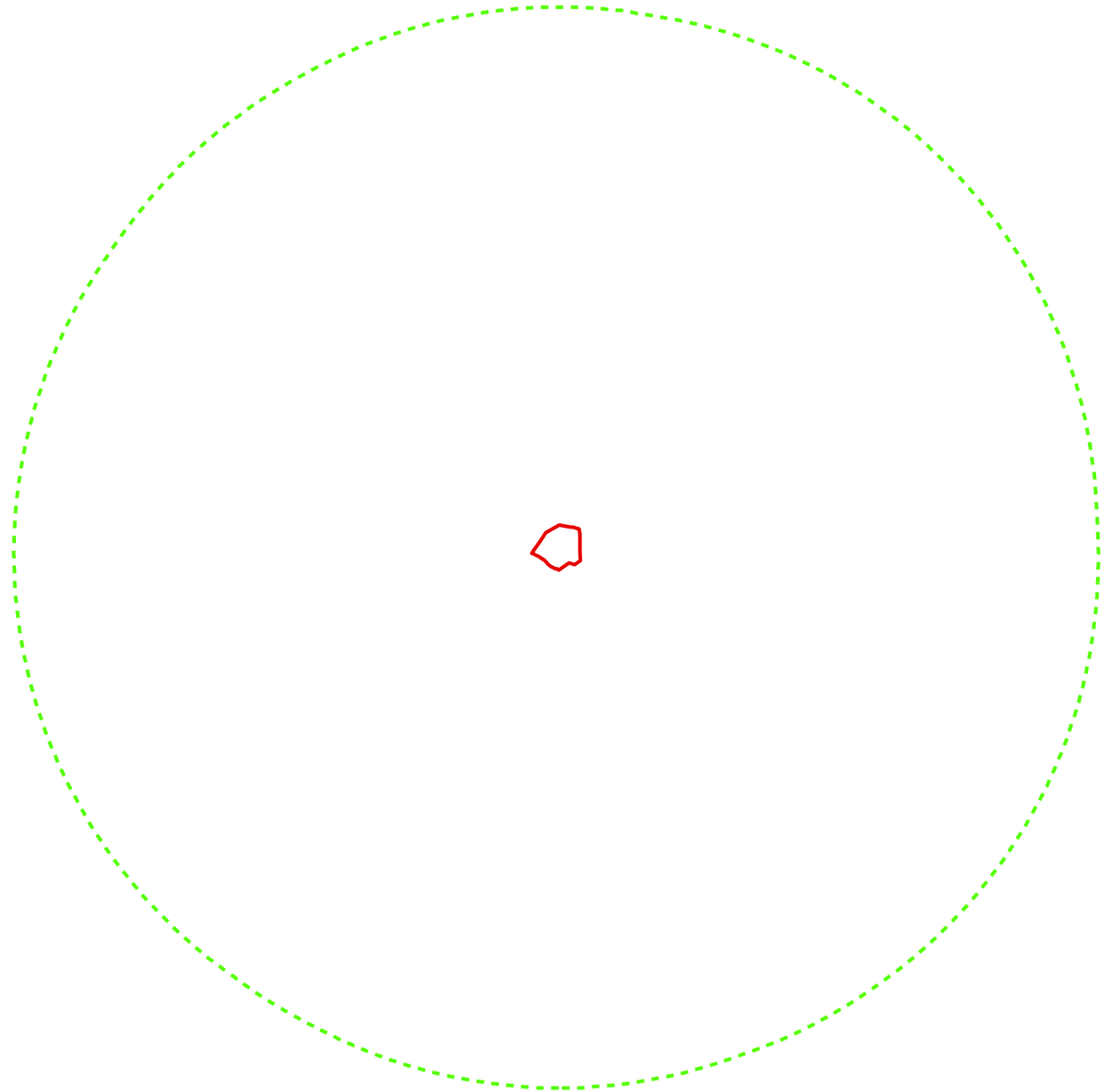
Figure 3



Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

SAR and critical habitat within 2 km of the site

Property Boundary
2km area around property boundary

Species at Risk
Common Sharp-tailed Snake
Douglas-fir / dull Oregon-grape
Garry oak / California brome
Western Screech-Owl, kennicottii subspecies
Garry oak / oceanspray
Howell's violet
Painted Turtle - Pacific Coast Population
Threaded Vertigo
Grand fir / Dull Oregon-grape
Trembling aspen / Pacific crab apple / slough sedge

Critical Habitat
Sharp-tailed Snake
Western Painted Turtle Pacific Coast population

N

0 500 1,000 2,000 Meters

Project: 434 Baker Road | Sources: DataBC, Capital Regional District

[redacted]

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Figure 4

4 POTENTIAL ENVIRONMENTAL IMPACTS

The potential impacts of the proposed Project on the environment include the following:

- Impacts on sensitive ecosystem areas, including the marine environment
- Loss of vegetation and the spread of invasive plant species
- Change in wildlife habitat availability and wildlife mortality risk
- Sediment movement in the Project area and release of deleterious substances into the marine environment
- Impacts that could compromise First Nations archaeological, cultural, historical, or heritage sites or significant outstanding landscape features

The environmental impacts of the project activities on the Subject Property will be reduced by the implementation of the mitigation and restoration measures recommended in Section 6 of this report. These impacts may be updated in future should the design plans change.

4.1 VEGETATION

As the Subject Property contains predominantly non-native or landscape (horticulture) species, vegetation removal and replacement is not expected to have negative impacts on the environment. Replacement of non-native species with native shoreline species on the area above the PNB will result in an improvement to native biodiversity of plant species in the area. Native species typically have deeper roots than invasive species, contributing to improved soil stability on the steep slope.

Vegetation in the marine shoreline (terrestrial) uplands area controls surface water run-off, preventing excessive silt and surface run-off from entering the marine environment, and removal of that vegetation may destabilize the slope and facilitate the movement of sediment or pollution into the marine ecosystem.

INVASIVE SPECIES

Invasive plants are highly effective at colonizing disturbed soils and degraded plant communities. They readily establish in these areas due to their broad ecological tolerance, rapid growth, and ability to spread quickly. The effects of invasive plant establishment may be the reduction or displacement of native species through resource and spatial competition. During construction and landscaping, movement of machinery, materials, and removed vegetation and soil may facilitate the spread of invasive species.

4.2 WILDLIFE AND WILDLIFE HABITAT

Removal and/or alteration of trees and shrubs may result in the loss of habitat for some wildlife species. Noise from site preparation and construction may temporarily disturb and displace remaining wildlife, but the impacts will be short term. Wildlife that normally frequents the area is likely to return following construction and landscaping.

4.3 MARINE ENVIRONMENT

As the construction will take place directly below the PNB, areas within the intertidal zone will be impacted. There will be temporary impacts to the high intertidal zone from the staging and operation of heavy equipment. Impacts may include the disruption of normal behavior and movement of shoreline and marine wildlife.

Project activities during the construction of the revetment have the potential to cause harmful alteration, disruption, or destruction (HADD) to fish or fish habitat, including:

- Sediment Runoff: increased turbidity resulting from mobilization of shoreline sediments soil and sediment from the Subject Property can be washed into nearby water bodies, leading to increased turbidity. This can smother sensitive marine habitats like eelgrass beds.
- Contamination: The use of construction equipment, materials and other deleterious substances can lead to contamination of the marine environment.
- Altered Shoreline: Hard construction features like seawalls can change the natural shoreline dynamics, disrupting ecosystems that depend on the shifting and dynamic nature of the coast.

When considering whether a project is likely to cause HADD of fish or fish habitat, the following components are assessed against project related effects:

- The Subject Property provides rearing habitat for plainfin midshipmen and suitable spawning habitat for surf smelt and Pacific sand lance; however, impacts to these habitats are expected to be minimal with the implementation of appropriate mitigation measures (working within least-risk windows, controlling spill and erosion risk, avoiding equipment in these specific spawning and rearing habitats).
- Mobile organisms are expected to leave the area during project activities. The overall magnitude of impacts on wildlife is anticipated to be low due to the combination of site exclusion, salvage efforts, and additional mitigation measures.
- No localized effect on fish populations is expected from the proposed project activities. Direct injury or mortality of fish will be avoided through mitigation measures and the environmental monitoring of construction activities. No measurable effects of the physical works are expected to impact fish populations. Post project habitat productivity is expected to be the same as pre-construction conditions.

4.4 EROSION AND SEDIMENT CONTROL

Exposed soils are susceptible to erosion and can result in the movement of sediment on and off the Subject Property. Damage or degradation of soil surfaces during site preparation and construction can include changes to soil structure, increased erosion, and soil compaction.

4.5 FIRST NATIONS HERITAGE AND ARCHAEOLOGICAL SITES

The project area lies within the traditional territory of local First Nations, and it is acknowledged that unrecorded heritage or archaeological resources may be present. Should any artifacts, features, or

suspected cultural materials be encountered during construction, all work in the vicinity will cease immediately, and the Archaeology Branch and the appropriate First Nations will be notified to determine next steps in accordance with the *Heritage Conservation Act*.

5 RECOMMENDED ENVIRONMENTAL PROTECTION MEASURES

Preliminary mitigation measures for the proposed project include the following:

- Construction will be completed during periods of low tide (work in the dry).
- Ensure that works are overseen by an Environmental Monitor (EM) for the entirety of the project.
- Enhancement of backshore vegetation through planting of native species, particularly overhanging species such as Oceanspray (see Table 6 for specific species and quantities). The detailed design plan provides specific plant species, locations, spacing, methods of planting and maintenance.
- Avoid mapped suitable spawning forage fish habitat and ensure that the timing of project works does is outside of the forage fish spawning period.
- Remove invasive species along the backshore and re-plant with native species.

The following criteria were considered when developing measures to mitigate the potential effects of project-related activities on fish and fish habitat:

- Maximize environmental protection.
- Avoid contravention of the Fisheries Act.
- Promote efficient, cost-effective construction of the project.

It is the purpose of this section to examine the characteristics of the proposed construction method and provide mitigation measures, based on Best Management Practices and site-specific conditions, that will meet the above criteria.

5.1 ENVIRONMENTAL MONITORING

Environmental monitoring for the shoreline revetment will occur throughout the project by a QEP from Corvidae. Construction activities will be monitored for conformity with this EA and regulatory requirements. Corvidae will work collaboratively with the contractor to proactively guide construction and protect the marine environment.

The Environmental Monitor (EM) will prepare a final project report encompassing all visits completed during the project period. The Environmental Monitoring Report shall include details regarding:

- Date, time, weather, location and tide status.
- Site activities, site conditions and equipment onsite during visits.
- Communications with onsite crew.

- Photographic records of site conditions.
- Work plan modifications or mitigations required.
- Environmental incidents, impacts and corrective actions taken.

5.2 PROTECTION OF FISH AND FISH HABITAT

The Department of Fisheries and Oceans Canada identifies periods of lower or least risk for in-water and near-water works (Government of Canada 2014). These periods have been determined through consideration of the seasonal distribution and abundance of fish, as well as the time of sensitive life stages (spawning).

The summer timing window of least risk for DFO Fisheries Management Area 17 – Nanoose Bay, Galiano Island is June 1 - September 1. All work will take place within the least risk timing window.

Works will be scheduled during low tide to avoid any in-water activities.

The following measures will be implemented to mitigate impacts to fish and potential fish spawning habitat:

- Work area will be salvaged for invertebrates prior to conducting works. Exclusion zones will be established by the EM and communicated with the contractor.
- All riprap used will be non-acid generating, clean and free of fine sediment and debris.
- Large woody material that is removed for installation will be stored within the Subject Property. Once construction is complete, large woody material from the vegetation will be secured along the shoreline.
- Works will be conducted in a way that does not result in the trapping of fish. No excavations should be left open in such a way that they may be covered during the tidal change. All voids between riprap will be backfilled to the same elevation of the shore.

5.3 EROSION AND SEDIMENT CONTROL

The primary focus of erosion and sediment control planning is erosion control; if there is no erosion, there is no sediment. Erosion control is far more cost effective to implement and manage than sediment control. The EM must ensure that all erosion and sediment control measures surrounding the isolated work area prevent the release of sediment into the marine environment.

Appropriate erosion and sediment control measures will be implemented to avoid the release of deleterious substances into the marine environment. These measures may include, but are not limited to, the following:

- Heed weather advisories and scheduling work to avoid wet, windy and rainy periods that may result in high surface water flow volumes and/ or increase erosion and sedimentation.
- Sediment control measures will be installed to capture falling debris prior to excavation and soil disturbance. This will include sediment fencing backed with construction fencing between the excavation work and the shoreline.
- Operating and staging of equipment will be kept in stable, dry areas and all works will be conducted on dry ground.

- The construction footprint will be clearly marked to ensure that no disturbance outside of the project footprint occurs.
- Erosion and sediment control measures will be regularly inspected and maintained during all phases of the Project.
- Erosion and sediment control measures will only be removed once all disturbed ground has been permanently stabilized.
- The marine environment will be regularly monitored for signs of sedimentation during all phases of the work.
- Areas of exposed soil will be revegetated with the native species listed in Table 6 immediately following completion of the revetment. For all clearing, material upslope will be removed immediately away from the marine environment.
- To ensure vegetation establishment the planted area will be irrigated with drip hoses immediately following installation.

Table 6. Recommended native vegetation to plant on areas of disturbance landward of the Project.

Common Name	Species	Spacing
SHRUBS		
Baldhip rose	*Rosa gymnocarpa* var. *gymnocarpa*	1 – 2 m
Common snowberry	*Symphoricarpos albus*	
Red flowering currant	*Ribes sanguineum*	
Oceanspray	*Holodiscus discolor var. discolor*	
HERBS / GROUNDCOVER		
Beach Pea	*Lathyrus japonicus*	40 cm
Dune Wildrye	*Leymus mollis*	
Entire leaved gumweed	*Grindelia stricta*	
Nodding Onion	*Allium cernuum*	
Sea Thrift	*Armeria maritima*	

5.4 SPILL CONTROL

A large, labeled mobile spill kit capable of mitigating spills of 100 liters of fuel will be kept on site. The kit will contain absorbent pads (hydrocarbons and antifreeze), absorbent socks (oil, gas & diesel), granular bentonite absorbent, hazmat disposal bags, large nitrile gloves and a spill instruction sheet.

The following measures will be used to prevent the entry of deleterious substances into the marine environment:

- Spill response plan will be implemented immediately in the event of a deleterious substance spill.

- Machinery on site will have been maintained, in a clean condition and free of fluid leaks prior to entering the site.
- Hoses and connections will be inspected before initial start up, prior to shift starting.
- Biodegradable hydraulic fluids will be used for heavy equipment.
- Secondary containment will be used under equipment and fuel storing containers.
- In the event of a spill, work will be stopped immediately and deleterious substances contained to prevent further dispersal.
- Spills of sewage, oil, fuel, or other deleterious material will be reported when near or directly into a waterbody.
- Clean up measures will be suitably applied so as not to result in further alteration of the immediate marine environment. Deleterious substances will be disposed of appropriately.

All debris from the Project shall be appropriately contained in the immediate work area, collected and disposed of in accordance with all applicable legislations, guidelines and best management practices. If the HADD of fish habitat or death of fish is observed, the proponent is required to report to DFO immediately through the DFO Pacific Observe, Record and Report phone line at 1 800 465 4336.

6 SUMMARY

An environmental assessment was completed at 434 Baker Road, Salt Spring Island to evaluate conditions on the Subject Property and potential impacts of the proposed shoreline revetment plan presented by Ryzuk. The assessment reviewed topography, vegetation, wildlife habitat, coastal processes, and potential effects on adjacent foreshore and riparian areas. The proposed works include regrading the lower bank, installing shoreline revetment, and heavily planting and with native vegetation (followed by irrigation) to restore slope stability and ecological function. All construction will occur during low tide and within the upper intertidal zone to avoid wetted areas and is planned within the least-risk fish window. Upon approval from Islands Trust, DFO will be informed of this project so the Federal regulator can determine if a Fisheries Act authorization under sections 34.4(2)(b) and 35(2)(b) is required.

With proper implementation of erosion and sediment controls and native plant restoration, environmental impacts are expected to be low and localized. Overall, successful implementation of the work will improve long-term shoreline stability, without impacting habitat values, while protecting upland areas from further erosion. Corvidae reserves the right to revise this opinion should project designs change.

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APPENDIX A – PROPERTY PHOTOGRAPHS

Photo 1. Close-up of foreshore ground, looking southeast. May 30, 2023.

Photo 2. West view of the foreshore environment. May 30, 2023

Photo 3. Foreshore environment in front of Subject Property looking west

Photo 4: Eroding bank with extensive patch of invasive Scotch Brome

Photo 5: View of eroding beach with residence in background.

Photo 6: Eroding bank conditions around the PNB at the Subject Property

Photo 3. Example erosion control to protect marine environment during work.

APPENDIX B – CONCEPT DRAWING OF SHORELINE REVETMENT

General Notes:

1. Backfill to consist of free-draining angular 25 kg class riprap. (Typically equivalent to a 450 mm minus blast rock). If preferred, riprap can be replaced with core boulders with a minimum 1.5 m diameter in the lower course.

2. Backfill to be compacted with an excavator bucket to a minimum of 95% of the Standard Proctor Maximum Dry Density value (SPMDD) or judged equivalent.

3. Boulders to be comprised of sound durable materials with minimum dia. of 1.5 m for lower, 1.0 m for middle and for upper course, and set atop bedrock (with possible inclusion of dowels pending review of rock surface and cutslope) and stacked at 1 H : 1 V or flatter.

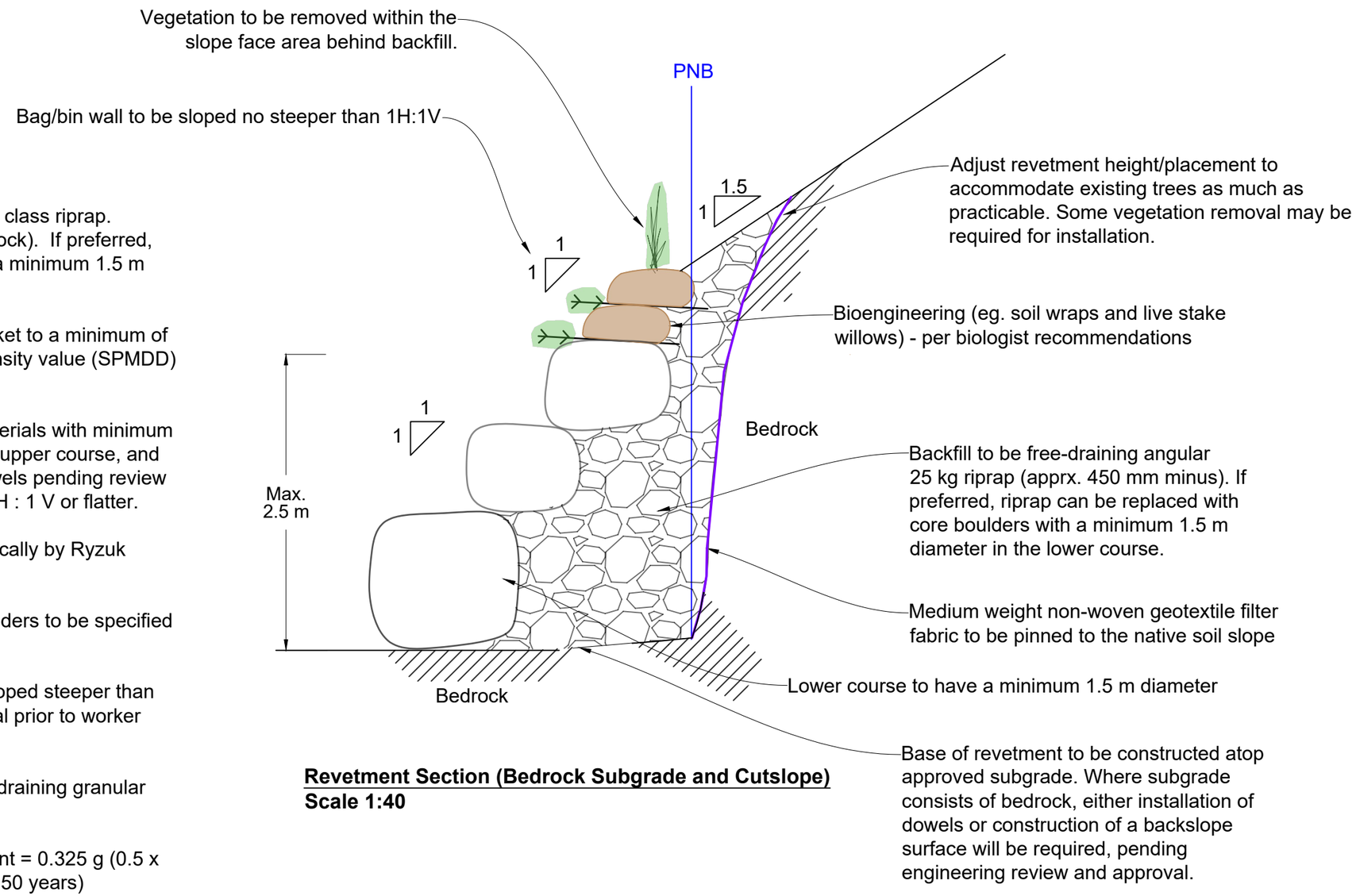
4. Revetment construction to be monitored periodically by Ryzuk Geotechnical.

5. Installation of bioengineered system above boulders to be specified by others.

5. Temporary cutslopes greater than 1.2 m and sloped steeper than 0.75H:1V to be reviewed by Ryzuk Geotechnical prior to worker entry/approach.

6. Revetment drainage to be provided by the free draining granular backfill placed directly behind the revetment.

7. Seismic design horizontal acceleration coefficient = 0.325 g (0.5 x 2% probability of ground motion exceedance in 50 years) determined from the 2020 NBCC Online Calculator for this site assuming site class"C". Seismic design considered revetment deformation acceptable without collapse.



Revetment Section (Bedrock Subgrade and Cutslope)
Scale 1:40

NOTES
1. This drawing is scaled for 11x17 sheet and does not require further scaling to fit. Scales will differ if printed on different sheet size.

RYZUK GEOTECHNICAL
100 - 771 Vernon Avenue - Victoria, BC V8X 5A7
250-475-3131 mail@ryzuk.com

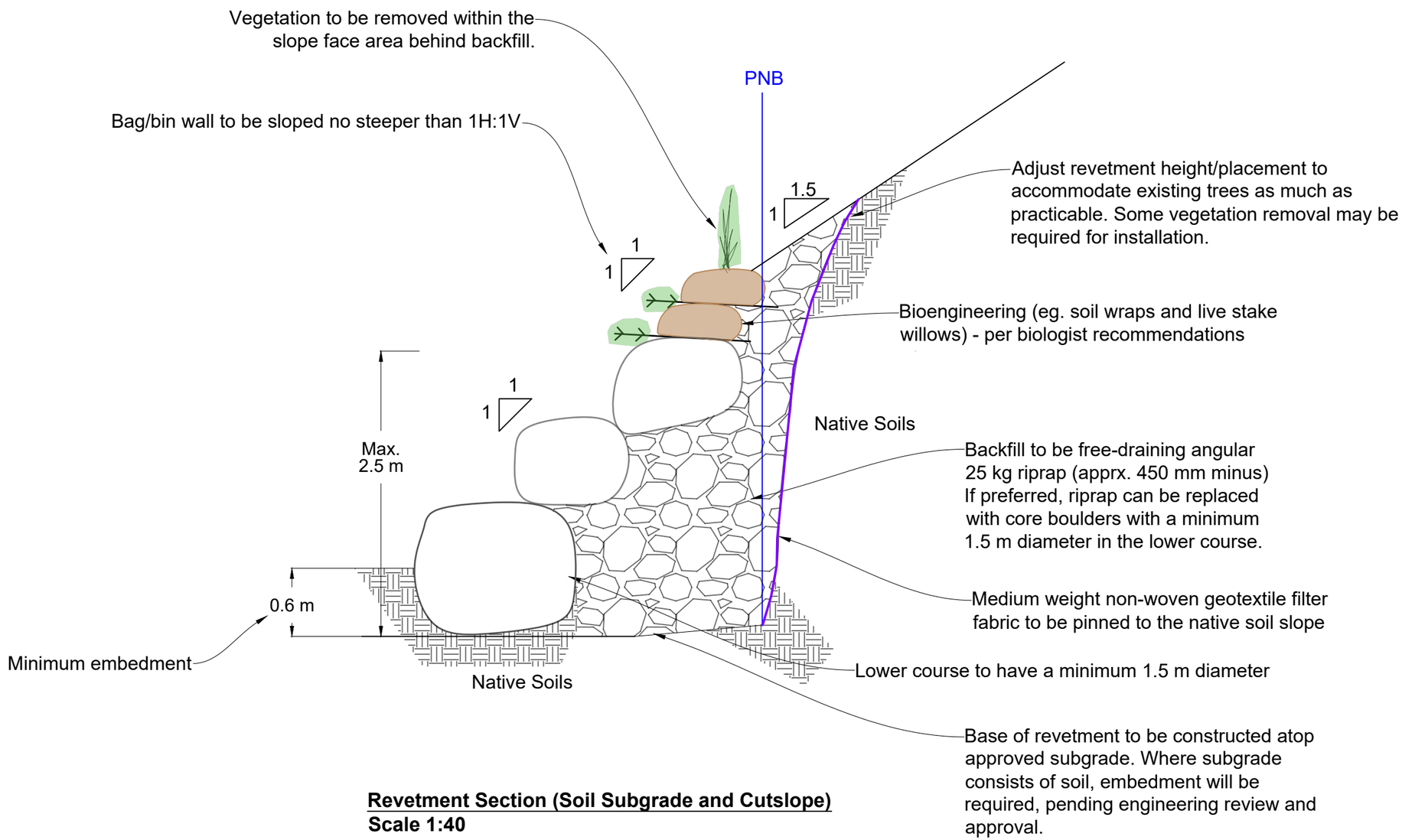
REV.	DESCRIPTION	YY/MM/DD	DRAWN BY
01	CONCEPT REVIEW	26/05/29	ESR
00	CONCEPT REVIEW	25/08/25	ESR

SEAL

PTPN: 1002996

PROJECT No. 11139-1	CLIENT: Ethan Wilding
EOR/LEAD: ARJ	PROJECT TITLE: Proposed Shoreline Revetment
REVIEW	PROJECT ADDRESS: 434 Baker Road - Salt Spring Island, BC
SCALE: 1:40	DRAWING PACKAGE: **Proposed Shoreline Revetment Concept**
SHEET No. 2 of 3	SHEET NAME: **Typical Shoreline Revetment Section (Bedrock) and General Notes**

R:\Ryzuk Data\8-11000 to 8-11999\11139-1 434 Baker Road – SSI\4 Ryzuk Drawings\11139-1.2026.05.28.Revetment.ESR.dwg



Revetment Section (Soil Subgrade and Cutslope)
Scale 1:40

NOTES

1. This drawing is scaled for 11x17 sheet and does not require further scaling to fit. Scales will differ if printed on different sheet size.

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SHEET No. 3 of 3	SHEET NAME: **Typical Shoreline Revetment Section (Soil) and General Notes**

R:\Ryzuk Data\8-11000 to 8-11999\11139-1 434 Baker Road – SSI\4 Ryzuk Drawings\11139-1.2026.05.28.Revetment.ESR.dwg

APPENDIX C – RYZUK BRIEFING

Briefing Note for Ryzuk Geotechnical

Revetment Report & Drawing Revisions Ahead of Resubmission

Prepared for Serena Klaver, MA, RPP, MCIP
Property 434 Baker Road, Salt Spring Island
Regulatory frame OCP Bylaw 434, DPA 3 (Shoreline); LUB 355 (Section 9.11)

A. Why the terminology matters

Under the OCP's regulatory framework, the proposed structure counts as a **revetment**, not a seawall. The application package describes a sloped, dry-stacked boulder structure (three to four boulders high, geotextile filter cloth, shot rock backfill, sited below the natural boundary). That is a clean fit to the OCP D.9 revetment definition: sloped, protects an existing eroding shoreline, built of randomly placed boulders, against wave action. It is therefore governed by **E.3.4.27** (revetment-specific guidance), not by E.3.4.26 (bulkheads).

Why the confusion exists

The current engineering documents inconsistently call the structure a "stacked boulder seawall" and a "seawall revetment." That is colloquial usage. In coastal engineering and standard dictionary usage (Oxford, which is the OCP's D.1.8 fallback when a word is undefined), a **seawall** is a vertical or near-vertical wall that reflects wave energy. A **revetment** is a sloped armor that dissipates wave energy through mass and porosity. The Baker Road structure is the latter.

> **Practical implication.** If staff or any opposing party characterizes the work as a "seawall," that is a regulatory-classification error. The OCP defines "revetment" and explicitly contemplates revetments under E.3.4.27. There is no OCP test or prohibition keyed to the word "seawall." When responding to staff or to council, anchor on D.9 and E.3.4.27.

Definitions snapshot

Term	OCP 434	LUB 355	Notes
Revetment	Defined (D.9)	Not defined	Sloped; built of randomly placed boulders
Seawall	Not defined	Used, not defined (S-zone use table)	Default: Oxford / vertical wave-reflecting wall
Rockwall / rock wall	Not defined	Not defined	Avoid as a regulatory term
Bulkhead	E.3.4.26	Not defined	Different structure; different test
Breakwater	Not in glossary	Defined (offshore)	Different structure

B. Specific revisions for Ryzuk

1. Standardize the regulatory term throughout

Use "revetment" consistently. The OCP defines "revetment" at Section D.9; "seawall" is undefined in the OCP and the LUB. Classify the structure as a revetment in every document.

Strike from the report and drawings:

- "Stacked Boulder Seawall"
- "Seawall Revetment"
- "Boulder Wall" (where used as the primary descriptor)

Replace with:

- "Sloped Boulder Revetment" or "Rock Revetment" (preferred)
- Project title: "Baker Road Shoreline Stabilization — Rock Revetment"

> **Definitional footnote to add to the report's introduction:**
> *This structure is a "revetment" as defined in OCP Bylaw 434, Section D.9: a sloped shoreline structure built to protect an existing eroding shoreline against waves, wakes, currents or weather, commonly built of randomly placed boulders.*

2. Specify the slope ratio on drawings and in text

The OCP definition turns on the word **"sloped."** Drawings and report should state the slope ratio in numeric form (e.g., 1.5H:1V). A documented slope ratio is the single clearest piece of evidence that the structure is a revetment, not a vertical seawall.

3. Address every element of OCP E.3.4.27 by name

E.3.4.27 sets four tests for revetments. The report should address each explicitly:

- **No loss of riparian vegetation or fish habitat** — cross-reference Corvidae's environmental assessment.
- **Materials sized to the estimated hydraulic energy of the location** — state the design wave/energy basis and confirm boulder mass is matched (not over-sized).
- **Prevent collapse** — stability statement.
- **Filter cloth used to aid drainage** — already designed in; call it out by E.3.4.27 reference.

4. Address every element of OCP E.3.4.21 by name

E.3.4.21 lists what a geotechnical report on shoreline stabilization must show. Confirm each is addressed:

- (a) Need to protect existing structures
- (b) Whether new structures could be sited to avoid shoreline modification (N/A — protecting existing)
- (c) Any natural hazards, erosion, or geohydraulic interruption arising on this property or adjacent properties or foreshore
- (d) Cumulative effect of shoreline stabilization works along the drift sector
- (e) Water quality / fish or wildlife habitat (defer to QEP)
- (f) Recommended permit conditions

If (c) and (d) are not addressed in writing, please add a short addendum. These are common staff objection points.

5. Distinguish from bulkheads, groins, weirs, and jetties

Add one paragraph stating what the structure is **not**, to narrow the regulatory frame to E.3.4.27 alone:

- **Not a bulkhead (E.3.4.26)** — does not perform a vertical retaining-wall function; not holding back upland soil.
- **Not a groin, weir, or jetty (E.3.4.25)** — does not project into the water; oriented parallel to shore, not perpendicular.

6. Pre-empt OCP E.3.4.23 (preference for natural means)

E.3.4.23 says shoreline stabilization should use natural means "rather than structural solutions such as concrete or large riprap," and that applications for structural solutions "should provide an explanation as to the need for structural solutions."

Include a short paragraph explaining why vegetative stabilization or protective berms alone are insufficient at this site. Reference site-specific factors: wave energy, slope, existing erosion rate, exposure, and any failed prior measures. Staff lean heavily on E.3.4.23 in refusals.

7. Inert materials confirmation (E.3.4.24)

One sentence stating boulders are inert, locally-sourced granite or basalt, with no debris or contaminated material. Easy to add, easy to forget.

8. Confirm "below the natural boundary" framing with elevation reference

Drawings should show, with a stamped elevation reference, that the structure is sited below (or at) the Present Natural Boundary. If any portion sits above the PNB, the wording must be precise — that has different jurisdictional implications.

9. Drift sector / cumulative effect note

Even a brief comment on drift cell context is valuable: presence or absence of existing armoring on neighbouring properties, and whether cumulative effects along the drift sector are material. This addresses E.3.4.21(d) directly.

10. Stamp, date, version-control

The revised report should be signed, sealed, dated, and clearly labeled as superseding any prior versions. Mixed-version drawings in an application package create their own openings for objections.

Strike-and-replace summary

Strike	Replace with
Stacked Boulder Seawall	Sloped Boulder Revetment
Seawall Revetment	Rock Revetment
Boulder Wall (as primary term)	Rock Revetment
"wall" (where ambiguous)	"revetment"

Prepared by Klaver Strategic Planning. Based on OCP Bylaw 434 (Volume 2, October 2020 consolidation) and LUB 355 (March 2025 consolidation). Section citations refer to those versions. Not legal advice.

Figure 1: Site location plan showing each property and the extent of their shorelines.

3. BACKGROUND AND SITE RECONNAISSANCE

Our assessment consisted of traversing the beach at low tide to visually assess the conditions of the shoreline slope. Combined, the four properties share approximately 340 m of shoreline on Booth Bay. The intertidal area is characterized by a veneer of sand, gravel, cobbles, and occasional boulder material overlying near vertically inclined exposures of sandstone and shale bedrock. Salt Spring Island Geology mapping by the BC Geological Survey indicates the bedrock exposed along this section of Booth Bay is comprised of mudstone, siltstone, and sandstone of the Cretaceous aged Ganges (Pender) Formation. There is abundant wave transported log and driftwood material present on the beach, generally occurring at the back of the beach at the shoreline slope.

We have previously undertaken work at several properties along Booth Bay, including 237 Quarry Drive and at 431 Baker Road, and noted exposed bedrock at the foreshore of these properties during our past assessments.

Generally, the shoreline slope is between 5 and 10 m in height and is moderately steep to nearly vertical. In places, the shoreline slope is comprised of till-based soil consisting of dense to very dense brown silty sand with some cobbles on the crest and upper few metres of the slope overlying steeply dipping bedrock, which is exposed in the base of the slope. In other areas, the shoreline slope is comprised entirely of native till based soil, and here it hosts low scrubby brush and some mature coniferous fir and other mature deciduous tree species. We observed several of the trees at the crest of and on the shoreline slope that had been partially undermined by erosion, resulting in the exposure of much of their root system.

There are sloughed soil mounds up to 1 m in depth at the toe of the slope in some areas, indicative of past slope instability. Where trees are present on the upper soil portion of the slope, we observed pistol butting of the tree trunks, indicative of soil creep downslope. We observed bedrock rubble in the form of tabular rock slabs up to 0.20 m in size at the slope toe, indicative of failure of the bedrock portions of the slope. Some evidence of toe erosion of the soils was noted, with an erosional scarp up to 1.5 to 2 m in some areas due to wave impact.

The property at 434 Baker Road has roughly 120 m of shoreline facing Booth Bay. The shoreline slope on the property is approximately between 2 – 8 m in height, generally lower in height and composed of native dense brown till based soil in the southeast and transitioning to higher slopes in the northwest, with the lower slope comprised of steeply dipping bedded sandstone and siltstone and transitioning to native soil in the upper. The slopes are mostly steeply sloped to near vertical, with evidence of an erosional scarp at the toe approximately 1.5 m in height on some portions of the slope. There is evidence of recent surficial soil movement and bedrock erosion at the Present Natural Boundary (PNB) of the property. Where native soils are present the slopes are well vegetated with brush and mature coniferous and deciduous trees, and we observed some large trees at the slope crest tilted toward the foreshore, or with exposed root systems due to erosion of the surrounding soils.

There is approximately 75 m of shoreline fronting Booth Bay at 239 Quarry Drive. The shoreline slopes on the property are roughly between 2 and 5 m in height, and mostly comprised of native dense till based soils down to the beach elevation in the southeast and taller slopes with shale and sandstone exposed lower in the slope, transitioning to native soils in the upper section toward the northwest. We observed large volumes of sloughed soils at the toe of the slope along this portion of the foreshore. Additionally, several large trees at the crest or midway down the slope had their root system exposed, and at one location, a tree had slipped downslope toward the beach and was cut to leave the stump and root ball hanging mid-slope. There is a wooden staircase near the southeast property line of this parcel, which leads down the slope from the crest to the beach. The foundation support for the concrete footings mid-slope have been undermined due to erosion and sloughing of the soils beneath the footing.

The property at 237 Quarry Drive has roughly 70 m of shoreline at the PNB of Booth Bay. The shoreline slope to the property is approximately 7 – 8 m in height and approximately inclined between 50 and 70 degrees from horizontal. The crest of the slope is well vegetated with mostly mature coniferous species. Thinly bedded and steeply dipping shale and sandstone are exposed at the slope toe, which transition upslope into native, dense, brown sandy silt with gravel soils. We observed slumping and migration of surficial soils downslope, obscuring the bedrock in some locations. Additionally, we observed an overturned tree with root mass exposed approximately mid-slope toward the southeast property line.

The shoreline slopes adjacent to 235 Quarry Drive trend roughly southeast – northwest for roughly 70 m, are between 7 and 10 m in height, and inclined between 50 degrees from horizontal and vertical. The crest of the slope is well vegetated with mature coniferous tree species, and a low scrubby vegetation is developed on the slope face. Several large trees at the slope crest had root systems exposed and were beginning to overturn downslope. In one case, the tree appears to be dying from a lack of soil nutrients and water support to the tree root mass and will likely overturn

downslope. The shoreline slope is comprised of a well weathered shale in the lower portion and a brown, dense till based soil in the upper section. Slumping and loss of soil from the slope crest have obscured the toe of the slope in some areas.

4. GEOTECHNICAL ASSESSMENT AND RECOMMENDATIONS

Although we consider the shoreline slope fronting all properties to be globally stable, natural regression of the slope along this section of the coastline is occurring due to a combination of the steepness of the exposed slope and toe erosion as a result of periodic large storm events that may coincide with high tides during the winter months. We expect that small-scale translational slides causing episodic sloughing and crest regression will continue to occur as the slope attempts to regain its natural stable angle of repose in conjunction with vegetation being established. We expect that the siltstone and sandstone exposed in much of the shoreline slope will erode at a slower rate than where the slope is comprised of soil. However, the sedimentary rock exposed is considered ‘soft’ and more easily eroded than a crystalline igneous or metamorphic rock, and we observed failure of the bedrock at one location on the shoreline slope at the Baker Road parcel. The dip of the bedding planes along the foreshore being near vertical, potentially promotes an increased rate of erosion, as wave attack erodes the slope toe and undermines such, whole bedding planes may fail by toppling in episodic events.

We expect that the rate of shoreline regression should not vary significantly from that experienced historically; however, recent reports compiled for the Capital Regional District on Coastal Sea Level Rise Risks indicate this area may experience an approximately 0.9 m sea level rise by the year 2100. In this event, potential for additional erosion could be expected at the base of the slope, which may ultimately result in a more rapid rate of regression.

While soft shore protection techniques are preferred in many situations, the conditions that are causing the shoreline slope erosion at the site do not particularly favor biotechnical engineering, making its implementation impractical. Biotechnical stabilization is often considered for low-energy environments and/or low bank waterfront properties. In this case, the primary mechanism of instability is coastal shoreline erosion resulting in an over steepened slope face. Wave attack at the toe of the slope is locally steepening the slope face, causing sloughing and minor failures. This natural process then ultimately results in gradual recession of the slope crest and loss of upslope property. In summary, it is our professional opinion that these methods would be ineffective at preventing erosion of the slope toe. This argument is supported by the fact that the existing slope has lost much of its vegetation because of sloughing events, as such has not been sufficient to protect the slope against erosion and has been periodically compromised by the underlying slope instability.

Accordingly, we present several options outlined below for consideration to protect the shoreline slope, including construction of some form of revetment. The following options and associated discussions have been retained herein for completeness and to provide context regarding the range of shoreline stabilization approaches previously considered for the properties assessed as part of our original investigation. Since issuance of our original assessment, we understand that the owner of 434 Baker Road has elected to further consider the stacked boulder revetment option (Option 2) below for the subject property.

4.1 OPTION 1

Option 1 is to leave the foreshore as it currently is and accept that the natural erosive process will continue over time. Lower portions of the slope controlled by bedrock will experience a slower rate of erosion than where native soil extends to the beach. In this scenario, the shoreline slope toe would continue to be eroded during large storm related events, and the continued loss of trees, vegetation, and materials from the slope/property would occur.

4.2 OPTION 2

Option 2 would involve armouring the base of the slope by creating a stacked boulder revetment along the Natural Boundary. This construction would be configured at 45 degrees or flatter and therefore would be classified as a reinforced armoured slope and not a retaining wall in accordance with the EGBC Professional Practice Guidelines for Retaining Wall Construction (Version 1.2, dated October 10, 2024). Construction of such would help to mitigate ongoing erosion of the toe of the slope; however, surficial sloughing of soils on the higher portions of the slope would continue to occur as the slope attempts to gain equilibrium with the angle of repose of constituent soils. Trees currently at the slope crest may continue to overturn and uproot until this equilibrium is reached. Sloughed soils contained at the top of the revetment would provide a place for vegetation to develop on the slope, aiding further in stability. Above this, the remaining portion would consist of a geotextile bin wall or similar system reinforced slope with the inclusion of select plantings to be specified by the project biologist.

Stacked boulder revetments are relatively economical to construct and can easily be placed along a curvilinear natural boundary. They are also more aesthetically pleasing, and their irregular surface allows for growth of interstitial vegetation to further reduce the potential for erosion and improve aesthetics. We note there are existing stacked boulder revetment structures on the foreshore of the property at 241 Quarry Drive and adjacent to the public beach access on Baker Road. If this option is favorable, interlocking, angular boulders roughly 1 to 1.5 m in size would be stacked three to four rows high at 45 degrees or flatter along the curvilinear face of the PNB to aid in reducing storm related scour along the shoreline slope. Base boulders should be embedded a minimum of 0.6 m below the existing beach elevation where native soils are present at this level. If bedrock is exposed, either installation of dowels or construction of a backslope surface will be required, pending engineering review and approval. Backfill behind the tightly fit boulders would consist of free-draining angular 25 kg riprap (approx. 450 mm minus). If preferred, riprap can be replaced with core boulders with a minimum 1.5 m diameter in the lower course. A medium-weight non-woven geotextile fabric should be placed against the native soils between the granular backfill

and the slope face. We note that the proposed shoreline revetment concept is not expected to result in a significant change to the hydraulic regime of the shoreline. The attached design drawing shows the proposed design concept.

In areas along the shoreline slope where native soil is present at the Natural Boundary, soils could be excavated such that the stacked boulder revetment would reside landward of the Natural Boundary on private property, otherwise such would extend onto the foreshore in order to limit terrestrial disturbance. Where bedrock is exposed at the Natural Boundary, the proposed revetment would reside seaward of the Natural Boundary. Provincial guidelines state that if works project extends beyond the PNB, a foreshore crown lease may be required, and such is typically priced as a percentage of the assessed land value. In past discussion with a Natural Resource Specialist with the Province, they indicated that it could take up to three years for a crown lease application to be reviewed.

A review of the area indicates there is currently a license of occupation which covers the foreshore area of the noted parcels for the purposes of aquaculture. It is our understanding that a licence of occupation does not grant exclusive use of a site; however, prior to commencing construction, we recommend pursuing provincial approval in this regard.

4.3 OPTION 3

Option 3 would entail slope modification such that the resultant slope configuration would meet a 2 Horizontal:1 Vertical (H:V) slope angle. We generally consider that a soil slope configured at 2H:1V will maintain long-term stability. The resultant slope could be protected against future erosion using a combination of plantings, gravel, logs, and stones. This option may be viewed as a ‘green solution’ and as such would be supported provincially through the Green Shores Program and administered through the Stewardship Centre for BC’s Green Shores. If a crown foreshore lease is required, using the nature-based erosion protection promoted by Green Shores, the application will be viewed as a priority file. This option would entail the removal of a large amount of native material from the foreshore slope and involve removal of the vegetation and mature trees currently residing at the slope crest, to meet the above-noted configuration. Extensive earthworks such as this, within 10 m of the PNB, would need to adhere to the Land Development Guidelines for the Protection of Aquatic Habitat as per the DPA-3 guidelines.

Option 4 would include the use of sculpted shotcrete and soil nails to provide stabilization to the soils within the shoreline slope. Soil/rock nails would be installed into the slope, and shotcrete sprayed onto the soil surface, which could be sculpted, textured, and tinted to maintain the look of the surrounding environment. This option would likely be the most expensive but may offer the most robust slope stabilization. In this case, the shotcrete and soil/rock nails could be placed encompassing the total height of the shoreline slope, which would likely reduce the future episodic shallow soil failures that have occurred in the past.

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5. CONSTRAINTS AND CONSIDERATIONS

We understand that there may be an opportunity for beach access via the termination of Baker Road for construction equipment to complete any works. Since construction requires access to the intertidal area, work must be undertaken in conformance with DFO's Best Management Practices (BMPs). These guidelines must be followed when working in and around the intertidal area and include (but are not limited to); avoiding unnecessary disturbance to the beach area, use of adequate silt abatement protection, tightly sealed engine and hydraulic systems (vegetable oil preferred), on-site spill kit, and refueling away from the intertidal area. Beach access is also prohibited in periods of high tide or heavy rain/storm events. The local work periods established by DFO are between July 1 and October 1 (summer window) or December 1 and February 15 (winter window). Notification to DFO should be submitted prior to commencement of construction in order to give DFO the opportunity to review and/or inspect the works. The DFO may require a detailed examination of the potential impacts of the proposed works on fish and fish habitat. Additionally, an Environmental Professional or Biologist would need to be engaged in support of the project.

The suggested revetment options included here are intended to reduce the extent of shoreline slope erosion; however, except for the shotcrete and re-configuration options, are not expected to significantly improve the current stability conditions of the overall slope. It is possible that some additional regression of the upper portion of the slope above any revetment structure will occur as the slope begins to stabilize to its natural angle of repose. It is also possible, however, that localized instabilities will continue to occur as such have occurred in the past.

6. CLOSURE

From a geotechnical perspective, we consider the options outlined to be feasible; however, we consider that Options 3 and 4 are probably not in keeping with the DPA-3 development guidelines, as they either involve removal of native trees and vegetation or involve use of concrete to provide structural stability. We consider that Option 2 may be carried out in accordance with the Official Community Plan. We consider the construction would not significantly change the existing hydraulic regime of the area, nor would it adversely affect adjacent properties.

We trust the proceedings are suitable for your purposes at present. Please contact us if you have any questions or concerns.

Sincerely,
Ryzuk Geotechnical
Permit to Practice Number: 1002996

Eugenio Saenz Ramos, EIT
Advanced Junior Engineer

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Attachment(s): - Proposed Shoreline Revetment Concept Drawings

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