



CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

Initial Environmental Review

Porteau Cove Campground, Porteau Cove, BC



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Project Number: 496-03-01-04

Date: August 10, 2023

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Acknowledgement

We acknowledge that we are within the traditional territory of the Skwxwú7mesh Úxwumixw (Squamish), xʷməθkʷəy̍əm (Musqueam), and səliłwətał (Tsleil-Waututh) Nations.

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- A Phase 1 - Environmental Site Assessment
- A Stage 1 – Preliminary Site Investigation (as per the Contaminated Sites Regulations of the Waste Mgt. Act)
- An Environmental Impact Assessment

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1 Introduction

Cascade Environmental Resource Group Ltd. (Cascade) was retained by Lionsgate Excavations Ltd. (Lionsgate) to conduct an Initial Environmental Review (IER) for the proposed Porteau Cove Campground in Porteau Cove, BC. Lionsgate intends to use the findings of this report to support the rezoning of the subject site and to make land use decisions for the development of the subject site, based on the environmental opportunities and constraints identified in the IER.

This report will review and assess the conditions, ecosystem integrity, habitat potential, species present (plant and animal), and aquatic features on or adjacent to the development parcel. It includes a discussion of the environmental regulatory framework that may affect development activities and provides alternatives for mitigation or resolution. Potential constraints are discussed and recommendations are included to inform and facilitate the environmental review and approval process.

Field investigations were conducted on June 29, 2023, July 11, and August 1, 2023 by Jordann Foster, R.P.Bio., Erin Schott, R.B.Tech. I.T., and Kristen Radosevic, B.I.T. Mapping support was provided by Oliver Chew, B.Sc., Adv.Dip. All project team members have extensive experience in conducting environmental inventories, reviews, and assessments.

1.1 Location

The subject site is located in Electoral Area D of the Squamish-Lillooet Regional District (SLRD) on a privately owned property in Porteau Cove, BC. It is located directly to the east of the Porteau Cove Provincial Park campground, just to the west of Highway 99 (Map 1).

1.1.1 Lot Description

The following information regarding the subject parcel was obtained from the SLRD Public Web Map (SLRD, 2023b):

PID: 027-966-950

Area: 7.27 ha

Legal: LOT 1 DISTRICT LOT 1748 GROUP 1 NEW WESTMINSTER DISTRICT PLAN BCP41560
EXCEPT PLAN BCP46926

1.1.2 Proposed Development

The proposed campground development includes a common amenity greenspace, access roads, a reception/amenity building, a sani-dump station, an operations/maintenance building, 3 comfort stations, 6 group/family tent sites, 55 parking stalls, 42 RV campsites, 37 tent walk-in campsites, and 7 tent/car sites.



1.2 Methodology

Prior to visiting the subject site, SLRD online mapping for the site was reviewed, as were Habitat Wizard mapping for aquatic resources and CDC iMap for rare and endangered species information and terrestrial mapping. On-site reconnaissance of the study area was conducted on June 29, July 11, and August 1, 2023.

Terrestrial Ecosystem Mapping (TEM) standards (RISC, 1998) were used as a guideline to identify and delineate the ecosystem units and define their distribution within the subject site. The ecosystem units present on the subject site were then investigated in the field (ground-truthed).

Vegetation existing on the site was documented and wildlife presence was identified through visual observations, bird songs and feeding signs, where present. Potential wildlife for the area's habitats that were not observed during the ecological site survey are described using the BC Conservation Data Centre (CDC), a centralized BC government database of information on species and ecological communities (BC MOE, 2023). Valued ecosystem components such wildlife trees were also recorded during the survey. The Aquatic assessment followed the provincial standards of a detailed assessment defined by the Riparian Areas Protection Regulation (RAPR) (MFLNRORD, 2019).



GIS Cartographer: Oliver Chew
 Date: 2023-07-10
 CERG File #: 496-03-01
 Projection: NAD 1983 UTM Zone 10N



0 0.5 1 2 3 4
 Kilometers

Map 1 - Location

Porteau Cove Campground
 Porteau Cove
 British Columbia



2 Existing Environmental Conditions

2.1 Physical Environment

2.1.1 Climate

The subject site lies within the Southern Pacific Ranges Ecosection, within the Coast Mountains Ecoprovince in southern British Columbia (Demarchi, 1996). This Ecosection is comprised of large granitic mountains that rise abruptly from the Fraser Valley and Sunshine Coast (Demarchi, 1996). This ecosection is strongly affected by westerly Pacific storms from the late fall and into the winter, which bring heavy rain and snow (Demarchi, 1996). The summers are occasionally rainy, but generally dry and warm (Demarchi, 1996). The mild climate makes for a long growing season, and feature usually only minor water deficits on zonal areas (Green and Klinka 1994). Mean annual precipitation for the site location is 2230.2 mm of a mix of rainfall and snowfall, taken from the nearest weather station at Squamish STP Central (1981 to 2010 Climate Normals, Environment Canada, 2019).

2.1.2 Geology

The subject site lies within the Southern Coast Mountains and is underlain by granitic rock of the Coast Plutonic Complex. This Complex is characterized by gneisses and granitoid rocks with pendants and septae of metavolcanic and metamorphosed rocks. These reflect a complex history of volcanic activity, magmatic intrusion and uplift (Monger and Journeay, 1994; Schiefer et. al, 2010).

2.1.3 Geomorphology

The existing landforms in the Sea to Sky region were formed during Pleistocene epoch glaciations and subsequent glacial-fluvial action and mass-wasting in the form of rock and debris flow released by frost heaving, erosion, and seismic activity. The resulting surficial features of the upland terrain consist of glacial till, glycologenic colluvial soils overlying morainal materials or bedrock.

The subject site is located along the coast of Howe Sound. The litho stratigraphic unit of this area is Quadra Sediments (Government of BC, 2022). Sediments are poorly sorted to non-sorted with particle sizes that range from boulders to clay. They have reached their present locations due to gravity influenced, direct movement. Slow displacement geological processes have occurred here, such as creep and solifluction, as well as quick movements including earth flows (Government of Canada, 2019).

2.1.4 Hydrology

The subject site is located along the coast of Howe Sound, within a previously mapped aquifer (number 422). Aquifer 422 is an alluvial or colluvial fan sand and gravel aquifer. Based on the area's hydrology, the aquifer's vulnerability is listed as moderate susceptibility to contamination from service sources. It has an aquifer classification of IIIB, and is determined to be lightly developed based on the water balance and water use (Bernardinucci and Ronneseth, 2002; Government of BC, 2022).

Soils in this area are well drained, with water being removed from the soil readily. Excess water flows either downward into permeable material or as subsurface run off. Generally, soils have a water storage capacity of 4 to 5 cm, and are usually intermediate in depth and texture (Government of Canada, 2019).

Two streams are located within the study area. One is located within the subject site and the other is located just to the north of the subject site. Both are described later in the report within Section 2.6.

2.2 Terrestrial Environment

2.2.1 Soils

The soil type for the Coast Mountain and Islands physiographic region is of the Podzolic Order, residing in the Ferro-Humic Great Group (Luttmerding, 1971). These soils overlay igneous intrusive rock, which is resistant to weathering, thus retarding soil development. Over time, however, physical and chemical weathering has produced a coarse-textured acidic soil (Luttmerding, 1971). Ferro-Humic Podzols are characterized by the prominent grey (Ae) layer of eluviation beneath the organic surface layer and overlaying a reddish-brown iron-rich B horizon. The soil mapping of iMapBC roughly 6 kilometers south of the subject site displays the uppermost parent material as colluvial (iMap BC, 2023). This is an acidic soil that is massive to moderately well stratified, and has a texture of medium skeletal.

During the ecological site survey on July 11, 2022, soil pits dug on the subject site identified extensive previous disturbance, likely material placement from the highway construction and quarry activities. No soil horizons or evidence of natural soil deposition were observed within the soil pits onsite.

Soil exposed or stockpiled on the subject site during development activities is subject to erosion and transport by water and wind. The amount of erosion can be controlled by proper planning and preparation, covering disturbed soils, revegetating slopes, and by minimizing the amount of exposed soil available onsite.

2.3 Vegetation

2.3.1 Vegetation Associations

During the ecological site survey conducted on July 11, 2023, it was determined that the subject site consists of extensive previous human disturbance within the active aggregate quarry, with a modified forest habitat within the eastern extent of the subject site. Native vegetation exists; however, it has mostly grown from within the anthropogenic material placement from the site's historic uses. A description of the vegetation age class and canopy modifiers on the subject site are provided in Table 1. Vegetation identified on the subject site is listed in Table 2.

Table 1: Vegetation Age Class Descriptions

Structural Stage Code	- Interpretation
3a/b Shrub	- Shrub dominated communities maintained by environmental conditions or disturbance - 3a low shrub < 2 metres tall - 3b tall shrub < 10 metres tall - Tree cover <10 %



Structural Stage Code	Interpretation
4 Pole/Sapling	- Densely stocked trees - Self-thinning not yet evident - Time since disturbance usually < 40 years
5 Young Forest	- Stocking density persists - Self-thinning not yet evident - Time since disturbance usually 40-80 years
Modifiers: B – Broadleaf C – Coniferous M – Mixed	- Broadleaf stands composed of > 75 % broadleaf tree cover - Coniferous stands composed of > 75 % coniferous tree cover - Mixed stands neither coniferous nor broadleaf compose > 75 % of the total tree cover

Table 2: Vegetation identified within the subject site

Common Name	Scientific Name
Trees	
Red alder	<i>Alnus rubra</i>
Big leaf maple	<i>Acer macrophyllum</i>
Sitka spruce	<i>Picea sitchensis</i>
Douglas fir	<i>Pseudotsuga menziesii</i>
Western redcedar	<i>Thuja plicata</i>
Western hemlock	<i>Tsuga heterophylla</i>
Shrubs	
Red alder	<i>Alnus rubra</i>
Oceanspray	<i>Holodiscus discolor</i>
Sitka spruce	<i>Picea sitchensis</i>
Salmonberry	<i>Rubus spectabilis</i>
Mountain ash	<i>Sorbus sitchensis</i>
Hardhack	<i>Spiraea douglasii</i>
Forbs	
Spiny wood fern	<i>Dryopteris expansa</i>
Western sword fern	<i>Polystichum munitum</i>
Bracken fern	<i>Pteridium aquilinum</i>

Thimbleberry	<i>Rubus parviflorus</i>
Trailing blackberry	<i>Rubus ursinus</i>
Deer fern	<i>Struthiopteris spicant</i>
grass sp.	-
Moss	
Various mosses	-

2.3.1.1 Biogeoclimatic Zone Classification (CWMdm)

The subject site is located within the dry maritime subzone (dm) of the Coastal Western Hemlock Zone (CWH). This biogeoclimatic subzone occurs at elevations up to 650 m and extends along the Sunshine Coast, and adjacent islands, to the lower Fraser Valley (Green & Klinka, 1994).

The CWHdm subzone has a coastal climate, which, in conjunction with existing soil conditions, results in productive forest growth. Within the 'dm' subzone, a number of different site series exist. The site series classification represents subtle changes in microclimate, soil conditions, and associated vegetation. The different site series are further classified into terrestrial ecosystem units based on the structural stage of the vegetation and the terrain of the site.

2.3.1.2 Terrestrial Ecosystems

During the ecological site survey conducted on July 11, 2023 ground survey plots of the subject site were carried out; collecting soil and vegetation attributes for the site. Terrestrial Ecosystem Mapping (TEM) codes for the polygon areas were identified based on the vegetation and soil attributes.

The subject site was classified into one vegetated TEM polygon and three non-vegetated TEM polygons (Map 3). Polygon 1, gravel pit (GP), code was given to the area of existing disturbance within the aggregate quarry, consisting of access roads and material piles. The GP code was also used to describe the areas of disturbed soils overgrown with invasive plant species on the southern aggregate quarry extent (Map 3). Polygon 2, a combination of rocky outcrop (RO) and talus (TA), was used to describe the southern extent of the subject site, which includes a vertical rock wall just below the highway and a steep talus slope down to the railway track (Map 3). Polygon 3, river (RI) was used to describe the stream running east to west through the subject site (Map 3). Polygon 4, CWHdm (Site Series 05 and 06) was given to the forested areas on the eastern extent of the subject site with a forest overstory (Map 3). The polygon TEM codes are described in the following sections.



Polygon 1

GP – gravel pit

Polygon 1 is designated a gravel pit (GP) code. This non vegetated anthropogenic site designation is representative of an anthropogenic site series and is not considered a natural site. This polygon encompasses the currently disturbed aggregate quarry, access roads, material piles, and previously disturbed vegetated areas with abundant invasive plant species, with a total area of 3.4 ha on the subject site (Map 3) (Photo 1 and Photo 2).



Photo 1: Looking south at Polygon 1 at the main access and parking area. June 29, 2023.



Photo 2: Looking east at vegetation piles and remnant material piles overgrown with invasive plants within Polygon 1. Note, forest in the background is within Polygon 4. June 29, 2023.

Polygon 2

8TA / 2RO – 80% talus and 20% rocky outcrop

Polygon 2 is designated a combination of two non-vegetated codes, with a total area of 2.1 ha on the subject site (Map 3). 20% RO – rocky outcrop accounts for the vertical rock face located at the southeastern extent of the subject site (Photo 3). The rock face has evidence of blasting, likely for quarry activities, is west-facing, and has no vegetation growth. 80% TA – talus accounts for the steep, west aspect talus slope located at the southern extent of the subject site, extending down to the railway tracks. Vegetation within the talus slope is minimal, and consists of various bryophytes growing on the rock surface with small amounts of red alder and Sitka spruce shrub growth (Photo 4).



Photo 3: Looking southeast at the rocky outcrop within Polygon 2. July 11, 2023.



Photo 4: Looking north at the talus slope within Polygon 2. June 29, 2023.

Polygon 3

RI – river

Polygon 3 is designated a non-vegetated River (RI) code. This code is used to identify the presence of watercourses and is delineated by the surveyed highwater mark of the watercourse that flows through the centre of the subject site (Map 3) (Photo 5 and Photo 6). The watercourse is further discussed in Section 2.6 below.



Photo 5: Looking east, upstream, at Polygon 3, the watercourse on the subject site. June 29, 2023.



Photo 6: Looking west, downstream, at Polygon 3, the watercourse as it flows through the central culvert on the subject site. June 29, 2023.



Polygon 4
5RS 5mM / 5HD 5mM

Polygon 4 - TEM Code Site Series
50% RS(05) (Cw – Sword fern)
50% HD(06) (HwCw – Deer fern)

POLYGON 4 TEM CODE DERIVATION				
Decile				Multi-storied
5	RS	5	m	M
	Cw – Sword fern	Young Forest		Mixed Canopy
Decile				Multi-storied
5	HD	5	m	M
	HwCw – Deer fern	Young Forest		Mixed Canopy

Polygon 4, **5RS 5mM / 5HD 5mM**, consists of the forested area to the east of the aggregate quarry on the eastern extent of the subject site, with a total area of 1.8 ha on the subject site (Map 3). This is an anthropogenically disturbed forest that contains remnant mature trees and young forest growth within a previously disturbed area. Previous ground disturbance includes material placement from quarry activities, highway development, services installation, and access roads.

The topography of this polygon features varying steep slopes and gullies – likely formed by weathering and erosion of material – with a general western aspect. No parent soil material was located within the soil pits of the survey plots, only anthropogenically placed aggregate and soil were identified.

Several large stumps indicate evidence of logging activities within Polygon 4 (Photo 7). However, numerous large trees, mainly Douglas fir, were also observed. This Polygon also includes the steep ravine banks on either side of the onsite watercourse (Map 3). Abundant coarse woody debris (CWD) and low value wildlife trees were observed in Polygon 4 (Photo 8 and Photo 9).

As the soil pits did not provide sufficient soil nutrient and moisture regime information, the vegetation observed growing within Polygon 4 was used to identify the two site series that constitute the forest ecosystem. Trees in Polygon 4 consist of an even mix of Douglas fir, western redcedar, bigleaf maple, and red alder, with less abundant western hemlock (Photo 9). Understory coverage includes abundant salmonberry, thimbleberry, western sword fern, bracken fern, and trailing blackberry. Less abundant vegetation includes red huckleberry, oceanspray, spiny wood fern, and various grasses and bryophytes.

The forest is considered a young climax forest, with several mature Douglas fir trees at its southern extent and a stand of pole sapling red alder at its northern extent (Photo 10). The average forest age was measured at 60 years old, with average tree mensuration measured at 51 cm diameter at breast height (DBH), and 30 m tall.



Photo 7: Looking north at a large stump in Polygon 4, evidence of previous logging activities. July 11, 2023.



Photo 8: Looking west at a low value wildlife tree within Polygon 4. July 11, 2023.



Photo 9: Looking south at abundant CWD debris on the forest floor of Polygon 4. July 11, 2023.



Photo 10: Looking south at the small pole sapling stand within a more recently disturbed section of Polygon 4. July 11, 2023.

2.3.1.3 Rare and Endangered Plant Species and Ecological Communities

In BC, there are two governing bodies involved with the ranking of species and/or ecological communities at risk. At the national level, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) provides advice to the *Species at Risk Act* (SARA), and at the provincial level, the Conservation Data Centre (CDC) manages the BC Status List.

The Canadian government created SARA in 2002 to complement the Accord for the Protection of Species at Risk (a national effort to identify and protect threatened and endangered wildlife and their associated habitats across the country). COSEWIC is the scientific body responsible for assigning the status of species at risk under SARA. This system uses the following terminology:

- Extinct (XX)
- Extirpated (XT)
- Endangered (E)



- Threatened (T)
- Special concern (SC)
- Not at risk (NAR)
- Data deficient (DD)

A species that is listed as Endangered, Extirpated or Threatened is included on the legal list under Schedule 1 of the Act and is legally protected under the Act with Federal measures to protect and recover these species in effect.

The BC CDC designates provincial red or blue list status to animal and plant species, and ecological communities of concerns (BC MOE, 2023). The red list includes indigenous species or subspecies considered to be endangered or threatened. Endangered species are facing imminent extirpation / extinction, whereas threatened groups or species are likely to become endangered if limiting factors are not reversed. The blue list includes taxa considered to be vulnerable because of characteristics that make them particularly sensitive to human activities or natural events. Although blue listed species are at risk, they are not considered endangered or threatened. Yellow listed species are all others not included on the red or blue list and may be species which are declining, increasing, common, or uncommon.

Table 3 to Table 5 below include CDC listed (i.e. rare and threatened) plant, ecological communities, and wildlife that have the potential to occur on the subject site; species designated as SARA Schedule 1 are also noted. This potential is based on broad habitat preferences delineated by forest district and biogeoclimatic zone and refined by habitat type available in the subject site. Forest, riparian, and anthropogenic habitat type were selected to identify potential listed species and ecological communities for the purposes of this report.

Potential occurrences are then designated as 'unlikely', 'possible', or 'confirmed' based upon species specific habitat requirements and an on-site assessment of those habitats. Note that a comprehensive evaluation of the subject site for each species was not conducted. An ecological site survey for rare and endangered species should be undertaken prior to clearing for those specific species identified as 'possible' or 'confirmed' from the Potential Occurrence column in the tables below.

The CDC iMap (2023) lists no occurrences of rare and endangered plant species on the subject site. A list of potentially occurring plant species at risk for the area containing the subject site is provided below in Table 3. Two of these species are associated with the specific habitat present on the subject site; however, they were not observed during the ecological site survey.

Table 3: Plant species at risk potentially occurring on the site

Common Name <i>Scientific name</i>	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA Status		
mountain hemlock dwarf mistletoe <i>Arceuthobium tsugense ssp. mertensianae</i>	Blue		Occurs in mesic conifer forests.	Unlikely – There have only been three instances reported in BC.
rigid apple moss	Red	Endangered	Occurs on dry cliffs, outcrops, and dry grassy areas. In the only Canadian site known for the	Unlikely – No Oregon white oak



Common Name Scientific name	Status		Habitat Requirements	Potential Occurrence
<i>Bartramia aprica</i>			species, it grows on a low elevation, south-facing, rocky slope in open stands dominated by <i>Quercus grana</i> .	stands onsite.
Vancouver Island beggarticks <i>Bidens amplissima</i>	Blue	Special Concern	Occupies a variety of wetland habitats including ditches, willow wetlands, old riverbeds, pond margins, streamsides, and tidal or non-tidal river edges. Historically known to occur within habitat restoration cells within the Squamish Estuary.	Unlikely – No wetted areas with sufficient substrate to grow in.
Roell's brotherella <i>Brotherella roellii</i>	Red	Endangered	Rotten wood in cool to moist mixed deciduous and coniferous forest, usually at low elevations along valley margins on slopes, stream terraces and swampy floodplains; often in remnant second growth in city parks.	Possible – Known populations nearby in Squamish. Suitable habitat present within Polygon 4.
Phantom orchid <i>Cephalanthera austini</i>	Red	Endangered	Occurs naturally in mature mixed woods, or woods with strong deciduous or coniferous components. In most locations, although not all, the orchids occur in sites with little to no ground cover. Occurrence also appears to be strongly correlated with limestone.	Unlikely – Limited habitat potential on the subject site.
banded cord-moss <i>Entosthodon fascicularis</i>	Blue	Special Concern	Extremely local on periodically humid or damp earth of terraces of exposed outcrop knobs in open stand of <i>Arbutus menziesii</i> and <i>Quercus garryana</i> on southern and eastern Vancouver Island.	Unlikely – No <i>Arbutus</i> Sp. or <i>Quercus</i> Sp. on the subject site.
silver hair moss <i>Fabronia pusilla</i>	Red	Endangered	Little information is available on habitat for <i>Fabronia pusilla</i> in BC. Habitat described on the two Schofield specimens from Sumas Mountain was a cranny on a dry semi-shaded vertical sandstone cliff and a damp, shaded sandstone cliff.	Unlikely – No sandstone on the subject site.
poor pocket moss <i>Fissidens pauperculus</i>	Red	Endangered	There are no detailed published accounts of habitat for <i>Fissidens pauperculus</i> in BC. Habitat where it has been found in Lynn Canyon was a silty outcrop in seasonal streamlet, and seepy consolidated silt cliffs.	Unlikely – No seepy consolidated silt cliffs on subject site.
Whitebark pine <i>Pinus albicaulis</i>	Blue	Endangered	Montane forests and on thin, rocky, cold soils at or near timberline at an elevation of 1300-3700 m in the sub-alpine to alpine zones.	Unlikely- subject site on elevations of 20-50 m.
Alaska holly fern <i>Polystichum setigerum</i>	Blue		Moist to mesic shady forests, rock outcrops, and lava flows in the lowland and montane zones. Forest floor in lowland coastal forests	Possible - Lowland coastal forest and rocky outcrops on the



Common Name <i>Scientific name</i>	Status	Habitat Requirements	Potential Occurrence
			subject site.
Henderson's checker-mallow <i>Sidalcea hendersonii</i>	Blue	Tidal flats, estuaries, and wetlands in coastal BC.	Unlikely – Limited habitat potential on the subject site.
pink water speedwell <i>Veronica catenata</i>	Blue	Lakes, Ponds, Open Water, Riparian Herbaceous, Wetland, Marsh	Unlikely – no suitable habitat on the subject site.

Source: BC Ecosystems Explorer, Ministry of Environment (2023).

Rare and Endangered Ecological Communities

The term "ecological" is a direct reference to the integration of biological conditions and non-biological features such as soil, landform and climate, including disturbance factors. The term "community" reflects the interactions of living organisms (plants, animals, fungi, bacteria, etc.), and the relationships that exist between the living and non-living components of the community. Currently, the most common ecological communities that are known in BC are based on the vegetation classification component of the Ministry of Forests and Range Biogeoclimatic Ecosystem Classification, which focuses on the terrestrial plant associations of BC's native plants.

Large tracts of undisturbed plant communities are considered ecologically more important than disturbed/fragmented or second growth communities. Vegetation on the subject site consists of a young forest structural stage growing in an anthropogenically disturbed area. Polygon 4 on the subject site contains two highly disturbed, red-listed ecological communities at risk, described below in Table 4.

Table 4: Ecological Communities at Risk Occurring on the Subject Site

Site Series Name Common Name <i>Scientific name</i>	TEM Code	Status BC List	BCG Zone	Polygon	Structural stage
western redcedar / sword fern dry maritime <i>Thuja plicata</i> / <i>Polystichum munitum</i> <i>Dry Maritime</i>	RS5mM	Red	CWHdm	4	5
western hemlock – western redcedar / deer fern <i>Tsuga heterophylla</i> - <i>Thuja plicata</i> <i>/ Struthiopteris spicant</i>	HD5mM	Red	CWHdm	4	5

2.4 Wildlife and Wildlife Habitats



Observations of wildlife and wildlife signs were recorded as part of the ecological site surveys conducted on the subject site on June 29, July 11, and August 1, 2023. The subject site contains potential wildlife habitat due to the presence of:

- Available forage and vegetation cover
- Aquatic and riparian habitat

2.4.1 Mammals

Although the subject site is isolated from the surrounding forest by the highway to the north / east and the railway tracks and campground to the west, there remains a connection to continued forest habitat to the south of the subject site. Coastal western hemlock zone is a common habitat for many mammals that might have the potential to occur on the subject site. Mammals that are commonly found in the CWH and potentially use the site for movement, forage, or cover include black bear (*Ursus americanus*), black-tailed deer (*Odocoileus hemionus columbianus*), snowshoe hare (*Lepus americanus*), deer mouse (*Peromyscus maniculatus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), raccoon (*Procyon lotor*), pine marten (*Martes americana*), pika (*Ochotona princeps*) and yellow-pine chipmunk (*Tamias amoenus*). No signs of mammals were observed during the site surveys.

2.4.2 Birds

The CWH ecosystem surrounding the Sea to Sky area is considered to have the greatest diversity and abundance of habitat elements in British Columbia. This habitat diversity results in a broad diversity of bird species. The young forest canopy in Polygon 4 and the riparian area of the watercourse on the subject site could provide habitat for a number of avian species and birds. No birds were observed visually or audibly during the site surveys; however, the surveys were conducted during hot, dry weather during midday and quarry machinery were active.

2.4.3 Amphibians and Reptiles

A comprehensive survey for amphibians and reptiles (herptiles) was not conducted as part of this report. No amphibians or reptiles were observed during the ecological site survey.

Amphibians typically found in the CWH biogeoclimatic zone include the western toad (*Anaxyrus boreas*) Northern Pacific treefrog (*Hyla regilla*), northwestern salamander (*Ambystoma gracile*), rough-skinned newt (*Taricha granulose*), and the long-toed salamander (*Ambystoma macrodactylum*). Garter snakes (*Thamnophis* spp.) and alligator lizards (*Elgaria coerulea*) are reptiles commonly found in the region and may use the subject site.

2.4.4 Wildlife Species at Risk

The CDC iMap (2023) lists no occurrences of rare and endangered animal species on the subject site. CDC explorer was used to produce a list of potential wildlife species at risk based on the site's biogeoclimatic zone and the habitat present on the subject site which is presented in Table 5. There are 19 wildlife species at risk that have the potential to occur on the subject site.



Table 5: Wildlife Species at Risk Potentially Occurring on the Subject Site

Common Name <i>Scientific name</i>	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Reptiles and Amphibians				
Western Toad <i>Anaxyrus boreas</i>	Yellow	Special Concern	Various upland habitats around ponds, lakes, reservoirs, and slow-moving rivers and streams.	Possible – Associated with riparian and forested habitat.
Coastal Tailed Frog <i>Ascaphus truei</i>	Yellow	Special Concern	Although they may be found in fish-bearing streams, tailed frogs typically occur in non-fish bearing, permanent, cold, fast flowing mountain streams that flow over rocky substrates.	Unlikely – Non-permanent watercourse on the subject site.
Northern Rubber Boa <i>Charina bottae</i>	Yellow	Special Concern	Woodlands, meadows, and clearings, not far from water, often under rotting logs or stumps, rocks or bark of dead fallen trees, from sea level to about 3,500 m.	Possible – talus slope and adjacent forest on the subject site.
Painted Turtle <i>Chrysemys picta</i>	No Status	Threatened / Special Concern	Ponds, marshes, small lakes, ditches, and sluggish streams, usually with muddy bottoms and considerable growth of aquatic plants	Unlikely - Not suitable habitat.
Common Sharp-tailed Snake <i>Contia tenuis</i>	Red	Endangered	Moist pastures, meadows, oak woodlands, broken chaparral, and edges of coniferous or hardwood forests.	Unlikely – Outside of known range.
Coastal Giant Salamander <i>Dicamptodon tenebrosus</i>	Blue	Threatened	In BC, this species is found in southwestern B.C., extending from the west side of Vedder Mountain to the slopes east of Chilliwack Lake.	Unlikely – Site is outside of species' range.
Gophersnake <i>Pituophis catenifer</i>	No Status	Extirpated / Endangered	A wide range of habitats, extending from lowlands to mountains: desert, prairie, shrubland, woodland, open coniferous forest, farmland, and marshes. Generally dry areas.	Unlikely - Not suitable habitat.
Northern Red-legged Frog <i>Rana aurora</i>	Blue	Special Concern	Wetlands, pools, and riparian areas of upland forests	Possible – Species may utilize forested area of site.
Oregon Spotted Frog <i>Rana pretiosa</i>	Red	Endangered	Oregon Spotted Frog is found in extreme southwestern British Columbia, within the Fraser River Basin.	Unlikely – Typically associated with medium to large wetlands (>4 ha).



Common Name <i>Scientific name</i>	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Birds				
Northern Goshawk, laingi subspecies <i>Accipiter gentilis laingi</i>	Red	Threatened	Coastal forests of BC, especially central and northern coastal islands. They tend to choose breeding areas which have stands with relatively large amounts of mature or old-growth trees or stand characteristics, near water sources, and in proximity to an abundant prey base.	Unlikely – no mature forest stands located on the subject site.
Western Grebe <i>Aechmophorus occidentalis</i>	Red	Special Concern	Nests on large inland bodies of water. Breeding ponds/lakes	Unlikely - No suitable habitat on the subject site.
White-throated Swift <i>Aeronautes saxatalis</i>	Blue	-	Nests in rock crevices in cliffs and canyons. Sometimes nests in buildings, and on seacliffs.	Unlikely – Outside of known range.
Nelson's Sparrow <i>Ammospiza nelsoni</i>	Red	-	Range in BC is from Dawson Creek and northwards	Unlikely – Outside of known range.
Great Blue Heron, fannini subspecies <i>Ardea herodias fannini</i>	Blue	Special Concern	Aquatic areas <0.5 m deep, fish bearing streams and rivers, undisturbed nesting in tall trees.	Unlikely – no suitable foraging or nesting habitat on the subject site.
Short-eared Owl <i>Asio flammeus</i>	Blue	Special Concern	In general, any area that is large enough, has low vegetation with some dry upland for nesting, and that supports suitable prey may be considered potential breeding habitat, although many will not have breeding short-eared owls. Nearby water is a requirement for nesting habitat.	Unlikely – Not suitable habitat on the subject site
Upland Sandpiper <i>Bartramia longicauda</i>	Red	-	Likely restricted to a few suitable areas within the Peace River lowlands near Ft. St. John and the Cariboo-Chilcotin grasslands near Riske Creek and at least one area in the East Kootenays north of Cranbrook.	Unlikely – Not within known range.
American Bittern <i>Botaurus lentiginosus</i>	Blue	-	Breeding occurs in lowland marshes in lakes, ponds, and rivers in south and central interior British Columbia and in the lower Fraser Valley.	Unlikely – No known sightings in the area.



Common Name <i>Scientific name</i>	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Marbled Murrelet <i>Brachyramphus marmoratus</i>	Blue	Threatened	Coastal areas within 2 km of shore, occasionally on rivers and lakes within 20 km of the ocean in old growth forest.	Unlikely- No old growth forest on the subject site.
Brant <i>Branta bernicla</i>	Blue	-	Marine marshy areas, along lagoons and estuaries, and on shallow bays. Peninsulas or islets in large wetland complexes, sometimes subject to tidal action.	Unlikely – No suitable estuaries or lagoons on the subject site.
Rough-legged Hawk <i>Buteo lagopus</i>	Blue	-	Grasslands, field, marshes, sagebrush flats, and open cultivated areas; sometimes rat-infested garbage dumps. Nests on cliffs (typically) or in trees in arctic and subarctic, in tundra, mountain sides, forests with plenty of open ground. Winters in low valleys of southern BC.	Unlikely – No suitable habitat on the subject site
Green Heron <i>Butorides virescens</i>	Blue	-	Aquatic areas, especially slow moving, shallow waters with good riparian cover.	Unlikely- Occurrences south near Fraser River and Van. Island
Smith's Longspur <i>Calcarius pictus</i>	Blue	-	Dry, grassy, and hummocky tundra. Damp alpine or arctic tundra swales or in wet meadows in forested country, usually inland from coast.	Unlikely – No suitable habitat on the subject site.
Red Knot <i>Calidris canutus</i>	Blue	Threatened	Primarily seacoasts on tidal flats and beaches, less frequently in marshes and flooded fields.	Unlikely – No suitable habitat on the subject site.
Canada Warbler <i>Cardellina canadensis</i>	Blue	Threatened	Known to reside in Dawson Creek and northwards.	Unlikely – Site is not within range.
Lark Sparrow <i>Chondestes grammacus</i>	Blue	-	Open situations with scattered bushes and trees	Unlikely – Outside of identified habitat range.
Common Nighthawk <i>Chordeiles minor</i>	Blue	Special Concern	Mountains and plains in open coniferous forest, savanna, grassland, and towns. Nesting occurs on the ground on a bare site in an open area.	Possible - Known in area, could use subject site for foraging or nesting.



Common Name <i>Scientific name</i>	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Evening Grosbeak <i>Coccothraustes vespertinus</i>	Yellow	Special Concern	Coniferous (primarily spruce and fir) and mixed woodland, second growth, and occasionally parks; in migration and winter in a variety of forest and woodland habitats, and around human habitation.	Possible – Subject site may contain suitable habitat.
Yellow-billed Cuckoo <i>Coccyzus americanus</i>	Red	-	Associated with open, brushy deciduous woodlands, riparian groves, overgrown orchards, woodlots, parks, and abandoned farmland, coastal alder groves, forest edges, wooded suburbs, and orchards.	Unlikely – Not known in the area.
Olive-sided Flycatcher <i>Contopus cooperi</i>	Yellow	Special Concern	Mixed coniferous-deciduous forest with old growth snags along forest edges	Unlikely – No old growth forest or obvious snags on subject site.
Tundra Swan <i>Cygnus columbianus</i>	Blue	Endangered	Lakes, sloughs, rivers, sometimes fields, in migration. Open tundra marshy lakes and ponds and sluggish streams in summer.	Unlikely – No open habitat on subject site.
Black Swift <i>Cypseloides niger</i>	Blue	Endangered	Nests behind or next to waterfalls and wet cliffs, on sea cliffs and in sea caves.	Unlikely- Not near suitable cliff nesting habitat.
Bobolink <i>Dolichonyx oryzivorus</i>	Red	Threatened	Tall grass areas, flooded meadows, prairie, deep cultivated grains, and hayfields.	Unlikely – No grass or meadows present
Horned Lark, strigata subspecies <i>Eremophila alpestris strigata</i>	Red	Endangered	Habitat consists of large expanses of bare or thinly vegetated land, including fields, prairies, dunes, upper beaches, airports, and similar areas with low/sparse grassy vegetation.	Unlikely – Not known in the area and not suitable habitat.
Rusty Blackbird <i>Euphagus carolinus</i>	Blue	Special Concern	Breeds in habitats that are dominated by coniferous forest with wetlands nearby including bogs, marshes and beaver ponds. During the winter, it is found in wet woodlands, swamps, and pond edges and often forages in agricultural lands.	Unlikely – Not suitable habitat.
Prairie Falcon <i>Falco mexicanus</i>	Red	-	Prefer primarily open areas, such as agricultural fields, grasslands, pasture and cliffs.	Unlikely – Outside of species range.
Peregrine Falcon, anatum subspecies <i>Falco peregrinus anatum</i>	Red	-	Cliff edges near water, interior rivers and wetlands	Unlikely – No suitable cliff habitat on subject site.



Common Name <i>Scientific name</i>	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Peregrine Falcon, <i>pealei</i> subspecies <i>Falco peregrinus pealei</i>	Blue	Special concern	Ledges of rocky island cliffs, estuaries and lagoons.	Unlikely – Site is not suitable habitat.
Gyrfalcon <i>Falco rusticolus</i>	Blue	-	Primarily open country in the Arctic, including tundra, open coniferous forest, mountainous regions, and rocky seacoasts; generally in coastal areas in winter	Unlikely – Not known in the area
Tufted Puffin <i>Fratercula cirrhata</i>	Blue	-	Nests on offshore islands or along the coast. Nests on slopes in ground burrows, and occasionally under boulders or rock piles.	Unlikely – Outside of known species range.
Northern Fulmar <i>Fulmarus glacialis</i>	Red	-	Pelagic. Nests in colonies primarily on sea cliffs, less frequently on low flat rocky islands.	Unlikely – Site is not suitable habitat, no sea cliffs.
Barn Swallow <i>Hirundo rustica</i>	Yellow	Threatened	Open areas, fields, ponds with vertical nesting habitat, especially buildings.	Unlikely - No existing structures on site.
Caspian Tern <i>Hydroprogne caspia</i>	Blue	-	Seacoasts, bays, estuaries, lakes, marshes, and rivers.	Unlikely – Not known in the area.
Yellow-breasted Chat <i>Icteria virens</i>	Red	Endangered	The Yellow-breasted Chat breeds in the extreme southern portions of the province in the Okanagan and Similkameen valleys.	Unlikely – Not within known species range.
California Gull <i>Larus californicus</i>	Red	-	Seacoasts, bays, estuaries, mudflats, marshes, irrigated fields, lakes, ponds, dumps, cities, and agricultural lands.	Possible – Site may have adequate nesting habitat.
Short-billed Dowitcher <i>Limnodromus griseus</i>	Blue	-	Mudflats, estuaries, shallow marshes, pools, ponds, flooded fields and sandy beaches. Prefers shallow salt water with soft muddy bottom, but visits various wetlands during migration.	Unlikely – Limited aquatic habitat on site.
Hudsonian Godwit <i>Limosa haemastica</i>	Red	-	Nests on grassy tundra, near water. Bogs and marshes. Near coast or river. Nests on the ground in a sparsely lined depression, in or under edge of prostrate dwarf birch or on dry top of hummock in sedge marsh	Unlikely - No suitable habitat.



Common Name <i>Scientific name</i>	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Western Screech-Owl <i>Megascops kennicottii</i>	No Status	Threatened	Lower elevations in woodland, especially broadleaf and riparian woodland, also moist coniferous forests; often in riparian zones; nests in tree cavities.	Possible – In forested riparian areas onsite. Forage habitat only.
Lewis's Woodpecker <i>Melanerpes lewis</i>	Blue	Threatened	Breeds primarily in open forested areas at low elevations where an abundance of large snags provides suitable nesting sites and an open, grassy understory supports high populations of flying insects. Found east of coast mountains.	Unlikely – Not known within Coast Mountains.
Black Scoter <i>Melanitta americana</i>	Blue	-	Coastal waters, less commonly on large inland lakes and rivers when not breeding.	Possible – Site is within non-breeding range and may be suitable habitat.
Surf Scoter <i>Melanitta perspicillata</i>	Blue	-	Primarily marine littoral areas, less frequently in bays or on freshwater lakes and rivers	Unlikely – No marine littoral habitat on subject site.
Double-crested Cormorant <i>Nannopterum auritum</i>	Blue	-	Follows river valleys, coastlines and water courses. Habitat includes lakes, ponds, rivers, lagoons, swamps, coastal bays, marine islands and seacoasts. Nests on the ground or in trees in freshwater situations, and on coastal cliffs.	Possible – Suitable potential habitat onsite.
Long-billed Curlew <i>Numenius americanus</i>	Yellow	Special Concern	Prairies and grassy meadows, generally near water.	Unlikely – No meadows present.
Black-crowned Night-heron <i>Nycticorax nycticorax</i>	Red	-	Marshes, swamps, wooded streams, mangroves, shores of lakes, ponds, lagoons; salt water, brackish, and freshwater situations. Roosts by day in mangroves or swampy woodland.	Unlikely – Not known in the area.
Sage Thrasher <i>Oreoscoptes montanus</i>	Red	Endangered	Sagebrush plains, primarily in arid or semi-arid situations, rarely around towns.	Unlikely – No plains onsite.
Band-tailed Pigeon <i>Patagioenas fasciata</i>	Blue	Special Concern	Coniferous and mixed deciduous lowland forests.	Possible – Broad range of habitat requirements.
American White Pelican <i>Pelecanus erythrorhynchos</i>	Red	-	Habitat includes rivers, lakes, reservoirs, estuaries, bays, and open marshes, sometimes inshore marine habitats.	Unlikely - No suitable habitat.



Common Name <i>Scientific name</i>	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Red-necked Phalarope <i>Phalaropus lobatus</i>	Blue	Special Concern	Occurring in migration on ponds, lakes, open marshes, estuaries, and bays, coastal lagoons, salinas, sewage ponds.	Unlikely - No suitable habitat.
American Golden-Plover <i>Pluvialis dominica</i>	Blue	-	Short grasslands, pastures, golf courses, mudflats, sandy beaches, and flooded fields	Unlikely – No suitable habitat.
Purple Martin <i>Progne subis</i>	Blue	-	Found from Port Neville and Shoal Bay, south to the tip of Vancouver Island (Pedder Bay area), on the west coast of the island in Barkley Sound and east to Squamish, Brae Island and Colony Farm, Pitt River.	Possible – Forested habitat is suitable and the site is within the species range.
Cassin's Auklet <i>Ptychoramphus aleuticus</i>	Red	Special Concern	Mostly pelagic, less frequently along rocky seacoasts	Unlikely – No rocky seacoasts present onsite.
American Avocet <i>Recurvirostra americana</i>	Blue	-	Lowland marshes, mudflats, ponds, alkaline lakes, and estuaries	Unlikely – No suitable habitat.
Black-throated Green Warbler <i>Setophaga virens</i>	Blue	-	The northeastern corner of British Columbia is the western extent of this species' breeding range. The majority of records are from the Peace Lowland of the Boreal Plains.	Unlikely – Site not within known species range.
Forster's Tern <i>Sterna forsteri</i>	Red	-	Freshwater and salt marshes, in migration and winter also seacoasts, bays, estuaries, rivers and lakes	Unlikely – No suitable habitat.
Spotted Owl <i>Strix occidentalis</i>	Red	Endangered	Strongly associated with old growth forest and prefer habitat with many large wildlife trees and coarse woody debris.	Unlikely – No suitable old growth forest within or near subject site.
Ancient Murrelet <i>Synthliboramphus antiquus</i>	Blue	Special Concern	Nineteen colonies are legally protected: 16 colonies are within Gwaii Haanas National Park Reserve, two (Reef and Limestone islands) are Provincial Wildlife Management Areas and one (Hippa Island) is an Ecological Reserve.	Unlikely – Site does not have mature canopies of Sitka spruce and western hemlock preferred for nesting.
Wandering Tattler <i>Tringa incana</i>	Blue	-	Associated with mountain streams and gravel bars within their breeding range, they bob and teeter while feeding and probe the water surface for insect prey, especially aquatic invertebrates.	Unlikely – No suitable habitat.



Common Name <i>Scientific name</i>	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Barn Owl <i>Tyto alba</i>	Blue	Threatened	Fields of dense grass. Open and partly open country (grassland, marsh, lightly grazed pasture, hayfields) in a wide variety of situations, often around human habitation.	Unlikely – Site not within known species range.
Common Murre <i>Uria aalge</i>	Red	-	Pelagic and along rocky seacoasts.	Unlikely – No suitable habitat.
Invertebrates				
Striated Fingernailclam <i>Sphaerium striatinum</i>	Blue	-	Lotic (flowing) and lentic (still lake or pond) environments and on mud, sand, gravel, and rock substrates and is most abundant at water depths of less than 2 m.	Unlikely – no suitable habitat present
Herrington Fingernailclam <i>Sphaerium occidentale</i>	Blue	-	Vernal pools and ditches, among grass and leaves.	Unlikely – no suitable habitat present
Rocky Mountain Fingernailclam <i>Sphaerium patella</i>	Red	-	This is a cold-water species found in lakes, rivers, sloughs, and streams.	Unlikely – no suitable habitat present
Olympia Oyster <i>Ostrea lurida</i>	Blue	Special Concern	Ocean/Intertidal Marine	Unlikely – no suitable habitat present
Oregon Forestsnail <i>Allogona townsendiana</i>	Red	Endangered	Mixed and deciduous forests, typically dominated by Bigleaf Maple. Requires coarse woody debris and copious amounts of leaf litter. Species occurrence is also associated with the presence of stinging nettle.	Unlikely - Not within known species range and not suitable habitat.
Puget Oregonian <i>Cryptomastix devia</i>	Red	Extirpated	In the US, it is a mature forest specialist; inhabits moist old-growth and late successional forests and riparian areas at low and mid elevation; in coarse woody debris and leaf litter	Unlikely- Not within species range
Prairie Fossaria <i>Galba bulimoides</i>	Blue	-	Habitat preferences not fully known. Descriptions vary, including perennial-water habitats (lakes, ponds and slow-moving streams), seepage areas and small streams; characteristically in seasonal flowing water.	Unlikely – Watercourse present on site is likely too fast moving.



Common Name <i>Scientific name</i>	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Dusky Fossaria <i>Galba dalli</i>	Blue	-	Habitat preferences not fully known, but potentially include lakes, ponds, rivers, and marshes across southern BC. Only 4 known occurrences, two of which are not confirmed	Unlikely – Watercourse present on site is likely too fast moving.
Pygmy Fossaria <i>Galba parva</i>	Blue	-	On wet mud flats, lakeshores and riverbanks; in marshes; among vegetation submerged in shallow water; prone to leave the water	Unlikely- No mud flat habitat.
Star Gyro <i>Gyraulus crista</i>	Blue	-	Eutrophic ponds, oligotrophic lakes, slow moving streams, and seasonal ponds in central and eastern BC.	Unlikely – Occurs in central and eastern BC
Northern Abalone <i>Haliotis kamtschatkana</i>	Red	Endangered	Habitat is predominantly kelp beds along outer well-exposed coasts; typically low intertidal.	Unlikely – No suitable habitat onsite
Emma's Dancer <i>Argia emma</i>	Blue	-	Along rivers, creeks and sometimes wave-washed lake beaches.	Unlikely – Not known in the area.
Vivid Dancer <i>Argia vivida</i>	Blue	Special Concern	Associated with cool or hot springs. Larvae live in pools and outflow streams.	Unlikely – no suitable spring areas on site.
Johnson's Hairstreak <i>Callophrys johnsoni</i>	Red	-	Primary habitat consists of older coniferous forests, especially those with Western Hemlock (<i>Tsuga heterophylla</i>) that are infected by dwarf mistletoe (<i>Arceuthobium tsugense</i>). However, it is also found in other forest types, most notably in Ponderosa Pine (<i>Pinus ponderosa</i>) or Gray Pine (<i>P. sabiniana</i>) forests infected with Western Dwarf Mistletoe (<i>A. campylopodum</i>).	Unlikely – Not known in the area.
Western Thorn <i>Carychium occidentale</i>	Blue	-	In low elevation forests(<80m a.s.l.) in rich, relatively undisturbed leaf litter; usually dominated by Bigleaf maple	Unlikely – No suitable habitat.
Hoffman's Checkerspot <i>Chlosyne hoffmanni</i>	Red	-	Openings and meadows in valleys.	Unlikely – No valleys or meadows
Monarch <i>Danaus periplus</i>	Red	Special Concern	Breeding areas are all patches of milkweed. Also use anthropogenic, grassland/shrub and agricultural areas.	Unlikely – Not known in the area.



Common Name <i>Scientific name</i>	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Alkali Bluet <i>Enallagma clausum</i>	Blue	-	Alkali Ponds/Salt Flats.	Unlikely – No ponds or salt flats.
Silver-spotted Skipper <i>Epargyreus clarus</i>	No status	-	Any place with lots of the major foodplants which are usually <i>Robinia</i> or <i>Amorpha</i> .	Unlikely – no Robinia or Amorpha observed on the subject site.
Dun Skipper <i>Euphyes vestris</i>	Blue	Threatened	Grassland/shrub, vernal pools and seasonal seeps.	Unlikely – No grasslands, vernal pools, or seeps.
Proterops Duskywing <i>Erynnis proterops</i>	Red	-	Open oak or mixed woodlands with the foodplant oaks.	Unlikely – No oak present.
Western Pondhawk <i>Erythemis collocata</i>	Blue	-	Western lowlands of B.C.'s south coast and at the north end of Osoyoos Lake in the southern interior. Around ponds and marshy lakes, especially where floating plants occur.	Unlikely - Outside of known species range.
Western Branded Skipper, <i>oregonia</i> subspecies <i>Hesperia comma oregonia</i>	Red	Endangered	Deciduous and broadleaf forest, and grassland/shrub ecosystems.	Unlikely – Not known in the area, site has unsuitable habitat.
Threaded Vertigo <i>Nearctula sp. 1</i>	Blue	Special Concern	Associated with old riparian forest containing bigleaf maples and an understory of ferns and shrubs on moist and rich sites.	Unlikely - Outside of species range.
Grappletail <i>Octogomphus specularis</i>	Red	-	Along wooded streams draining lakes. Pacific Coastal. In B.C., found only in the lower Fraser Valley, where it reaches the northern limit of its range.	Unlikely - Outside of known species range.
Sinuous Snaketail <i>Ophiogomphus occidentis</i>	Blue	-	Fly along clear sunny streams and lakeshores and are uncommon in settled areas. found only in the lower Fraser Valley, where it reaches the northern limit of its range.	Unlikely - Outside of known species range.
Blue Dasher <i>Pachydiplax longipennis</i>	Blue	-	In B.C., only in the lowlands of the south coast and at the north end of Osoyoos Lake in the southern interior.	Unlikely - Outside of known species range.
Indra Swallowtail <i>Papilio indra</i>	Red	-	Arid rocky mountainous lands: canyons, cliffs, foothills, barrens.	Unlikely – No known occurrences in area.



Common Name <i>Scientific name</i>	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Clodius Parnassian, claudianus subspecies <i>Parnassius clodius claudianus</i>	Blue	-	Moist riparian habitats along low-elevation streams on the coast.	Possible – In riparian habitat around watercourse.
Rocky Mountain Physa <i>Physella propinqua</i>	Blue	-	Only 14 records in BC. Broad habitat types from central to southern BC. Can be found in cool water habitats, most often in lakes.	Unlikely – No suitable habitat.
Sunset Physa <i>Physella virginea</i>	Blue	-	Only 7 records in BC over broad habitat types (lakes, rivers, creeks, and sloughs)	Unlikely – limited recorded occurrences.
Meadow Rams-horn <i>Planorbula campestris</i>	Blue	-	Found in vegetated ponds, swamps and flooded portions of permanent wetted areas.	Unlikely – No suitable habitat.
Zerene Fritillary, bremnerii subspecies <i>Speyeria zerene bremnerii</i>	Red	-	Deciduous forest, grassland and meadows.	Unlikely - No suitable habitat and no species observations on the mainland of BC.
Autumn Meadowhawk <i>Sympetrum vicinum</i>	Blue	-	In ponds, slow streams and lakes with dense, emergent vegetation	Unlikely – no suitable habitat on the subject site.
Black Petaltail <i>Tanypteryx hageni</i>	Blue	-	Found in seepage areas and bogs, flat or on hillsides, often associated with streams and usually not under forest canopy in wet mountain ranges.	Unlikely - No suitable habitat and no species sightings outside of the Fraser Valley.
Mammals				
Mountain Beaver <i>Aplodontia rufa</i>	Yellow	Special Concern	This subspecies is associated with coniferous, mixed and Red Alder forests on moist slopes or hillsides near small streams or seeps.	Unlikely - Aquatic feature not deep enough to support beaver
Roosevelt Elk <i>Cervus elaphus roosevelti</i>	Blue	-	Roosevelt Elk are restricted in British Columbia (and Canada) to Vancouver Island and portions of the southwestern mainland. A small remnant population of Roosevelt elk occur in the Phillips/Apple River area on the mainland coast.	Unlikely – Not within known habitat range
Townsend's Big-eared Bat <i>Corynorhinus townsendii</i>	Blue	-	Mesic habitats characterized by coniferous and deciduous forests	Possible – Mixed mesic forest habitat



Common Name <i>Scientific name</i>	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Big Brown Bat <i>Eptesicus fuscus</i>	Yellow	-	High mountains to low deserts, including cities. Generally prefer agricultural fields and open spaces.	Unlikely – Limited suitable habitat onsite.
Wolverine <i>Gulo gulo</i>	No Status	Special Concern	Arctic and alpine tundra, mountain and boreal forests. Limited to mountains in the south, primarily in large wilderness areas.	Unlikely - Highly disturbed area close to other development.
Silver-haired bat <i>Lasionycteris noctivagans</i>	Yellow	-	Habitat is primarily forested (frequently coniferous) areas adjacent to lakes, ponds, or streams, including areas that have been altered by humans.	Possible – Within forested areas.
Hoary Bat <i>Lasiurus cinereus</i>	Blue	-	Habitat includes primarily deciduous and coniferous forests and woodlands, including areas altered by humans. Foraging habitat includes various open areas, including spaces over water and along riparian corridors.	Possible – Within forested areas.
Snowshoe Hare, washingtonii subspecies <i>Lepus americanus washingtonii</i>	Red	-	The washingtonii subspecies hare population occurs at Burnaby Lake Regional Park.	Unlikely – Although it can be found in diverse habitats this species is not known in the area.
Long-tailed weasel, altifrontalis subspecies <i>Mustela frenata altifrontalis</i>	Red	-	Found in a wide variety of habitats, usually near water. Favored habitats include brushland and open woodlands, field edges, riparian grasslands, swamps, and marshes.	Unlikely – Not known in the area and unsuitable habitat onsite.
Southern Red-backed Vole, occidentalis subspecies <i>Myodes gapperi occidentalis</i>	Red	-	Prefers cool, mesic deciduous, coniferous, or mixed forests, especially areas with large amount of ground cover. Most of forested Canada (northern British Columbia to Labrador) south through the Rocky Mountains to central New Mexico.	Unlikely – Not known within Coastal Mountains.
Californian Myotis <i>Myotis californicus</i>	Yellow	-	Various habitats, including seacoasts, desert scrub, oak-juniper woodlands, montane and humid coastal forests, mountain meadows, canyons, riparian woodlands, grasslands, rural residential areas, and towns.	Possible – Diverse habitat preference.



Common Name <i>Scientific name</i>	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Long-eared Myotis <i>Myotis evotis</i>	Yellow	-	Occupy a diverse array of habitats, including lowland, montane, and subalpine woodlands, forests, shrublands, and meadows, wooded stream courses, and areas over water bodies.	Possible – Diverse habitat preference.
Little Brown Myotis <i>Myotis lucifugus</i>	Blue	Endangered	Summer roosts are in buildings and other man-made structures, tree cavities, rock crevices, caves and under the bark of trees. Uses underground habitat such as caves for hibernacula.	Unlikely – Only critical habitat identified in BC is in northern BC
Long-legged Myotis <i>Myotis volans</i>	Yellow	-	Mountainous areas wooded with coniferous trees, but also may be found in riparian and desert.	Possible – Diverse habitat preference.
Yuma Myotis <i>Myotis yumanensis</i>	Blue	-	Found in upland and lowland habitats, including riparian, desert, forests and usually near open water.	Possible – Diverse habitat preference.
Mountain Goat <i>Oreamnos americanus</i>	Blue	-	Alpine and subalpine habitat; steep grassy talus slopes, grassy ledges of cliffs, or alpine meadows. Usually at timberline or above. May seek shelter and food in stands of spruce or hemlock in winter.	Unlikely – Site low in elevation.
Fisher <i>Pekania pennanti</i>	No Status	-	It is mostly found in forest habitat, primarily older coniferous forests, preferably with closed canopy	Unlikely – No old growth forest on site.
Townsend's Mole <i>Scapanus townsendii</i>	Red	Endangered	Restricted to a very small area of land in the central Fraser Valley (Abbotsford and Juntindon).	Unlikely – Site not within known species range.



Common Name <i>Scientific name</i>	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Pacific Water Shrew <i>Sorex bendirii</i>	Red	Endangered	Occurs in moist riparian habitats with stream sides and marshes. Inhabits the coastal lowlands of northern California, Oregon, Washington and British Columbia, where it is restricted to the lower Fraser River valley.	Unlikely – Steep slopes throughout the subject site inhibit PWS movement, also outside of identified critical habitat.
Olympic Shrew <i>Sorex rohweri</i>	Red	-	Restricted to southwestern British Columbia in the Fraser Lowland and Northwestern Cascade Ranges Eco-sections.	Unlikely – Site not within known species range.
Trowbridge's Shrew <i>Sorex trowbridgii</i>	Blue	-	Restricted to the Lower Mainland and Fraser River corridor north to about Boston Bar.	Unlikely – Site not within known species range.
Grizzly Bear <i>Ursus arctos</i>	Blue	Special Concern	Non-forested or partially forested sites with a wide range of foraging opportunities and choice of habitats.	Unlikely - Site is close to other development with limited foraging.
Fish				
Green Sturgeon <i>Acipenser medirostris</i>	Blue	Special Concern	Coastal marine waters, estuaries, and the lower reaches of large rivers.	Unlikely – No suitable aquatic habitat.
White Sturgeon <i>Acipenser transmontanus</i>	No Status	Endangered	Large lakes and river	Unlikely – No suitable aquatic habitat.
Salish Sucker <i>Catostomus sp. 4</i>	Red	Threatened	Lowland streams and associated ponds and Lakes. Silt and sand substrates in sites with slow water velocity, and instream vegetation.	Unlikely – No suitable aquatic habitat.
Coastrange Sculpin, Cultus Population <i>Cottus aleuticus pop. 1</i>	Red	Threatened	Confined to the deeper waters of a low elevation montane lake	Unlikely – No suitable aquatic habitat.
Little Quarry Lake Benthic Threespine Stickleback <i>Gasterosteus aculeatus pop. 2</i>	Red	-	No habitat information available.	Unlikely – Site not within species' range.
Cutthroat Trout, <i>clarkii</i> subspecies <i>Oncorhynchus clarkii clarkii</i>	Blue	-	Low gradient coastal streams and estuarine habitats.	Unlikely – No suitable aquatic habitat.
Nooksack Dace <i>Rhinichthys cataractae – Chehalis lineage</i>	Red	Endangered	Small, lowland creeks.	Unlikely – Outside of known range.



Common Name <i>Scientific name</i>	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Bull Trout <i>Salvelinus confluentus</i>	Blue	-	Deep pools in cold rivers <15° C and lakes to small, steep gradient streams.	Unlikely – No suitable aquatic habitat.
Pygmy Longfin Smelt <i>Spirinchus sp. 1</i>	Red	-	Large, oligotrophic lakes.	Unlikely – No suitable aquatic habitat.
Eulachon <i>Thaleichthys pacificus</i>	Blue	Endangered / Threatened	Nearshore ocean bottom, coastal inlets.	Unlikely – No suitable aquatic habitat.

2.5 Valued Ecosystem Components

2.5.1 Wildlife Trees

Wildlife trees include significant standing snags, veteran trees, and trees with broken tops, holes, or cavities. These trees are important as perching, foraging, and nesting sites for birds and mammals. One wildlife tree was observed with Polygon 4: a red alder, which had a cavity hole and signs of feeding (Photo 11). This wildlife tree is rated as low wildlife value due to its small size and instability (BC MOE, 2017). No other wildlife trees were observed during the ecological site survey.



Photo 11: Red alder wildlife tree observed in the ground plot taken within Polygon 4. July 11, 2023.

2.5.2 Coarse Woody Debris

Coarse Woody Debris (CWD) on the forest floor is an indicator of potential species richness in forested areas. Microhabitats, decay, and nutrient cycling provide a range of life-cycle opportunities for smaller ground-dwelling wildlife (e.g. squirrels, shrews, and voles) and vegetation. Abundant CWD was observed within Polygon 4 on the subject site.



Photo 12: Looking south at abundant CWD debris on the forest floor of Polygon 4. July 11, 2023.

2.5.3 Wildlife Movement Corridor

Wildlife tend to use routes with particular features when moving across the landscape to forage for food, disperse, find mates, or locate breeding sites. These features can include such things as cover, shade, vegetation, water, or surface characteristics. Scale is also a significant factor in determining the suitability of a landscape; larger animals with home ranges covering hundreds of kilometres (e.g. grizzly bear) have far different movement corridor requirements than some amphibians (e.g. western toad), whose corridor requirements are measured in metres.

Wildlife movement across the subject site is restricted at the west, north, and east due to the presence of the provincial campground and the highway, although some animals may use the large diameter culverts to travel under the highway onto the site, using the riparian corridors. Possible animal movement may also occur to the south of the subject site, into the talus slope and forest habitat.

2.6 Aquatic Environment

An aquatic assessment was conducted for the subject site and surrounding adjacent lands (Appendix A). Two streams were identified, and attributes are described below.

Both streams are non-permanent and tenuously connected to Howe Sound at their downstream ends, where they flow into rocky beaches. Howe Sound is a fish-bearing waterbody with a large diversity of fish and marine wildlife species. During periods of the year when the streams contain water, they provide nutrients to downstream fish habitat and also have the potential to be rearing habitat.

2.6.1 Unnamed Stream 1

Unnamed Stream 1 flows generally east to west through the subject site. It flows onto the subject site from two large culverts (~2 m diameter) located just outside of the subject site (Photo 13). These culverts convey the stream under highway 99. At its upstream end on the subject site, the stream has steep ravine banks approximately 65 m wide. This ravine continues for 42 m until it reaches the onsite gravel road,



where the stream is culverted through a large diameter culvert (~2.8 m diameter) (Photo 14Photo 9). Just below the gravel road culvert, there are pipes crossing the stream channel that convey drinking water to the neighbouring provincial campground to the west (Photo 15). At this point, the stream flows through the aggregate quarry, with a heavily denuded riparian area, until it leaves the subject site through a third set of culverts (~0.8 m diameter) under an access road on the subject site and the railway tracks, located offsite (Photo 16).

Flows in the stream are likely high during wet seasons, as a very scoured channel with bank erosion was evident during the survey in June 2023 (Photo 17). However, it was dry when assessed, and therefore non-permanent. The average channel width of the stream is 6.23 m, the average gradient is 6 %, and it has a cascade-pool morphology. Channel substrate consists of boulders, river cobble, small and large woody debris (LWD), and leaf litter. There is abundant LWD within the stream channel at its upstream end, where it has steep ravine banks. The stream is tenuously connected to fish-bearing water at its downstream end, where it flows onto a rocky beach that is a part of the Porteau Cove Provincial Campground on Howe Sound (Photo 18).

Vegetation on the banks of Unnamed Stream 1, at its upstream end within the ravine, consists of big leaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), western hemlock (*Tsuga heterophylla*), and western redcedar (*Thuja plicata*) in the upper canopy. The understory contains dense vegetation within the ravine including salmonberry (*Rubus spectabilis*), thimbleberry (*Rubus parviflorus*), Pacific dogwood (*Cornus nuttallii*), vine maple (*Acer circinatum*), western swordfern (*Polystichum munitum*), Bracken fern (*Pteridium aquilinum*), deer fern (*Struthiopteris spicant*), and Pacific bleeding heart (*Dicentra formosa*). Minimal riparian vegetation is present at the downstream end, consisting of red alder, western redcedar, salmonberry, thimbleberry, western swordfern, and various invasive plant species.



Photo 13: Culverts (~2 m diameter) that convey Unnamed Stream 1 under highway 99 onto the subject site.



Photo 14: Looking west (downstream) at the large culvert that conveys Unnamed Stream 1 under the gravel access road for the aggregate quarry on the subject site.



Photo 15: Looking west (downstream) at water pipes crossing Unnamed Stream 1 on the subject site that convey drinking water to the neighbouring provincial park.



Photo 16: Looking west (downstream) at two culverts that convey Unnamed Stream 1 under a gravel access road on the subject site and the railway tracks, located offsite.



Photo 17: Looking at river left stream bank erosion indicative of heavy flows during the wet season in Unnamed Stream 1.



Photo 18: Looking west (downstream) at the Unnamed Stream 1 outlet into Howe Sound onto the provincial campground beach area. This is located on the neighbouring provincial campground property to the west.



2.6.2 Unnamed Stream 2

Unnamed stream 2, located to the north of the subject site, flows generally east to west. It is conveyed adjacent to the subject site from a large culvert (~2 m diameter) that runs under Highway 99 (Photo 19). There are two pipes crossing the stream channel that convey water to the neighbouring property to the north (Photo 20). The stream then flows into a second set of culverts (~0.8 m diameter) at its downstream end. These culverts convey the stream under the site access road, the railway tracks, and the neighbouring Provincial Park access road, where they outlet into Howe Sound (Photo 21).

Flows in the stream are likely high during wet seasons, as a very scoured channel with bank erosion was evident during the survey in August 2023. However, it was dry when assessed, and therefore non-permanent. The average channel width of the stream is 4.60 m, the average gradient is 2.3 %, and it has a riffle-pool morphology. Channel substrate consists of boulders, river cobble, small and large woody debris (LWD), and leaf litter. The stream is tenuously connected to fish-bearing water at its downstream end, where the culverts outlet onto a rocky beach that is a part of the Porteau Cove Provincial Campground on Howe Sound.

The riparian vegetation on the southern bank of Unnamed Stream 2 is only about 1-5 m wide (Photo 22). Vegetation on the banks of Unnamed Stream 2 consists of big leaf maple, red alder, western hemlock, western redcedar, and Douglas fir (*Pseudotsuga menziesii*) in the upper canopy. The understory contains salmonberry, thimbleberry, vine maple, Pacific ninebark (*Physocarpus capitatus*), western swordfern, and Pacific bleeding heart (*Dicentra formosa*), and various bryophytes.



Photo 19: Looking east (upstream) at the large culvert that conveys Unnamed Stream 2 under Highway 99.



Photo 20: Looking west (downstream) at the two water pipes crossing Unnamed Stream 2.



Photo 21: Looking north at the outlet of Unnamed Stream 2 into Howe Sound.



Photo 22: Looking west at the thin strip of riparian vegetation along the southern bank of Unnamed Stream 2. Note the gravel stockpile intrusion into the SPEA.

2.7 Socio-Economic Conditions

2.7.1 Cultural and Heritage Resources

The subject site is within the traditional territories of the Sk̓wxwú7mesh Úxwumixw (Squamish), xʷməθkʷəy̓əm (Musqueam), and səliłwətał (Tsleil-Waututh) Nations. They have current and long historical ties (Pre-European contact) to the land that include utilization of the natural resources of the area.

An archeological investigation was not conducted as part of this study. The site of proposed development is within an existing modified area and an archaeological site is unlikely to be located within the development area. However, archaeological sites are protected under the *Heritage Conservation Act*, and should such a site be discovered during development of the subject site, works must be halted and the archaeology branch must be contacted immediately (archaeology@gov.bc.ca).

2.7.2 Water Use

An aquifer (Aquifer number 422) encompasses the subject site and the adjacent property to the west (iMap BC, 2023). No other water licenses or water uses are registered for the subject site.

2.7.3 Mining

Under the Mineral Tenure Act and Mineral Tenure Act Regulation a free miner holding a Free Miner Certificate has the right to acquire and hold mineral titles, which acquire the subsurface rights that are available at the time of acquisition (BC Gov, 2019). The Mineral History Tenure, which includes the subject site, is No. 383068 (iMap, 2023).

The subject site is currently being used as an aggregate quarry, which contains several gravel roads, materials piles, and a septic field and water tank for the neighbouring provincial campground to the west. Lionsgate has owned the subject site and operated it under a mine permit (No. Q-7-66) since 2022. Prior to that, it was co-owned as an aggregate mine since 2018, and previously a BC Rail mine used to supply rail ballasts (Personal Communications, Joe McInnis, 2023).

2.7.4 Recreation and Tourism

The subject site is not currently used for recreation or tourism features. However, the subject site contains a land easement for a water tank and pipes that convey potable water onto the neighbouring provincial park to the west (Map 2). The subject site also contains a septic field, also used by the neighbouring provincial park.

2.7.5 Anthropogenic Features

The subject site consists of an anthropogenic aggregate quarry that contains the following features:

- Numerous stockpiles and material movement (Photo 23 and Photo 24)
- Main gravel access road onto site (Photo 25)



- Two sets of culverts that convey Unnamed Stream 1 through the subject site (Photo 14 and Photo 16)
- Gravel access road for the potable water tank (Photo 26 and Photo 27)
- Corrugated steel water pipes running underground (and over Unnamed Stream 1) (Photo 15)
- Septic field (Photo 28)



Photo 23: Looking south at aggregate quarry activities on the subject site. June 29, 2023.

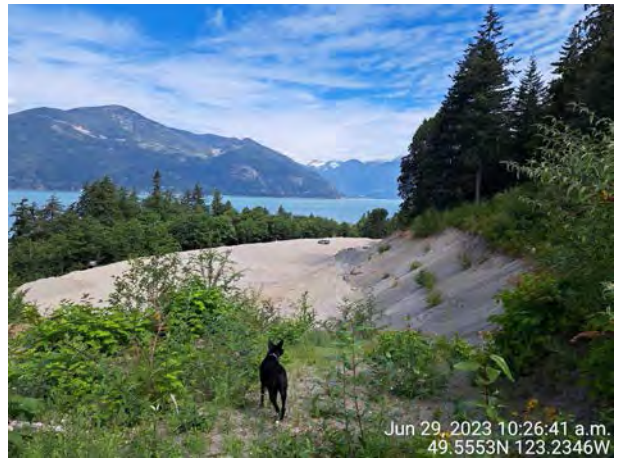


Photo 24: Looking north at aggregate quarry activities on the subject site. June 29, 2023.



Photo 25: Looking south at the main site access road. August 1, 2023.



Photo 26: Looking south at the access road to the water tank. June 29, 2023.



Photo 27: Looking east at the water tank on the subject site. June 29, 2023.



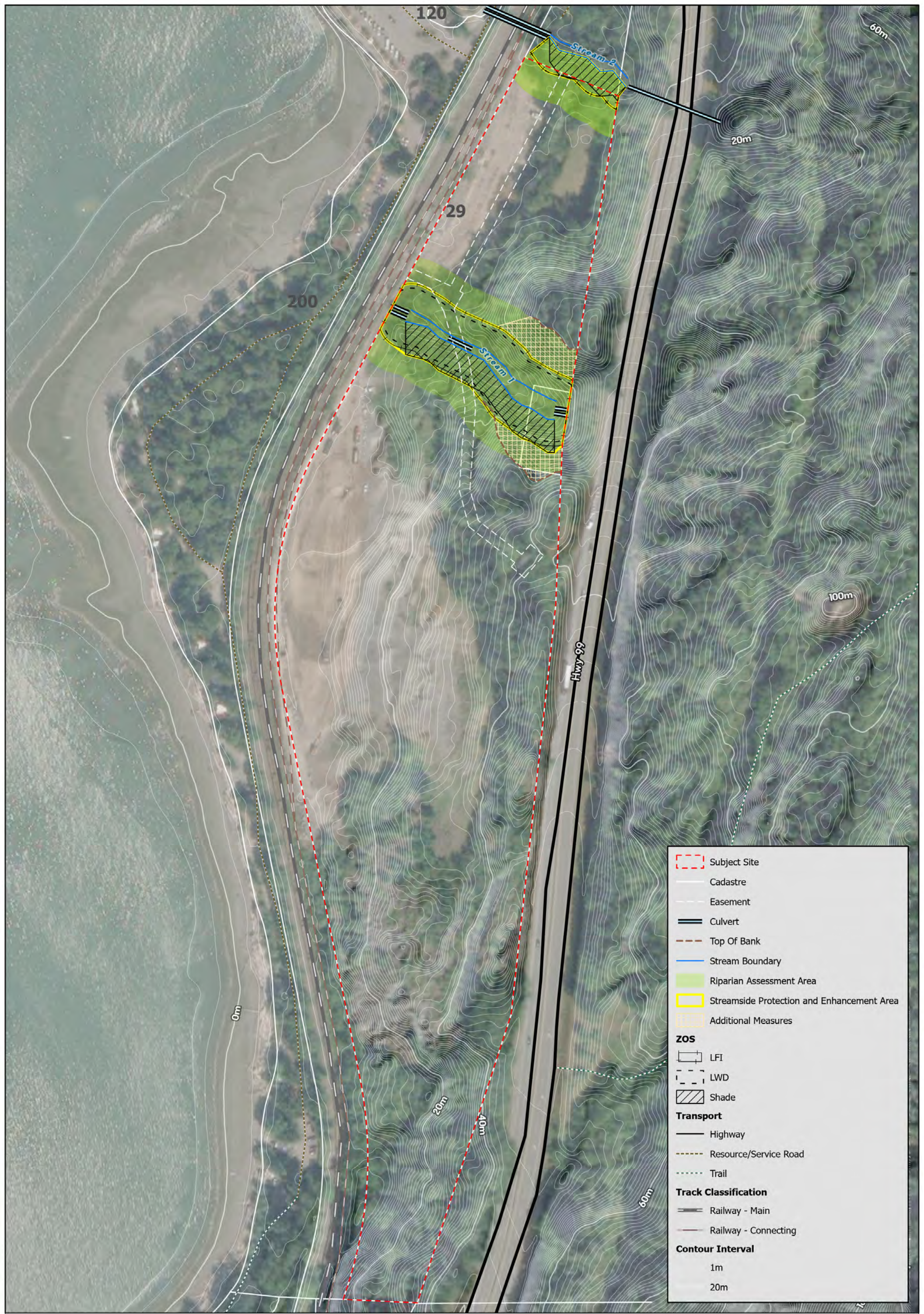
Photo 28: Looking northeast at the septic field on the subject site. June 29, 2023.



2.7.6 Adjacent Land Use

The subject site is located in Electoral Area D of the SLRD on a privately owned property in Porteau Cove, BC (PID: 027-966-950) (Map 1). The subject site is bounded by:

- Privately owned land that contains a parking lot, garbage disposal bins for the provincial park and public washrooms to the north,
- Highway 99 to the east,
- Privately owned forested land to the south, and
- CN Rail and Porteau Cove Provincial Park and Campground to the west.



Subject Site

Cadastre

Easement

Culvert

Top Of Bank

Stream Boundary

Riparian Assessment Area

Streamside Protection and Enhancement Area

Additional Measures

ZOS

LFI

LWD

Shade

Transport

Highway

Resource/Service Road

Trail

Track Classification

Railway - Main

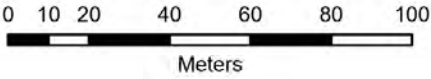
Railway - Connecting

Contour Interval

1m

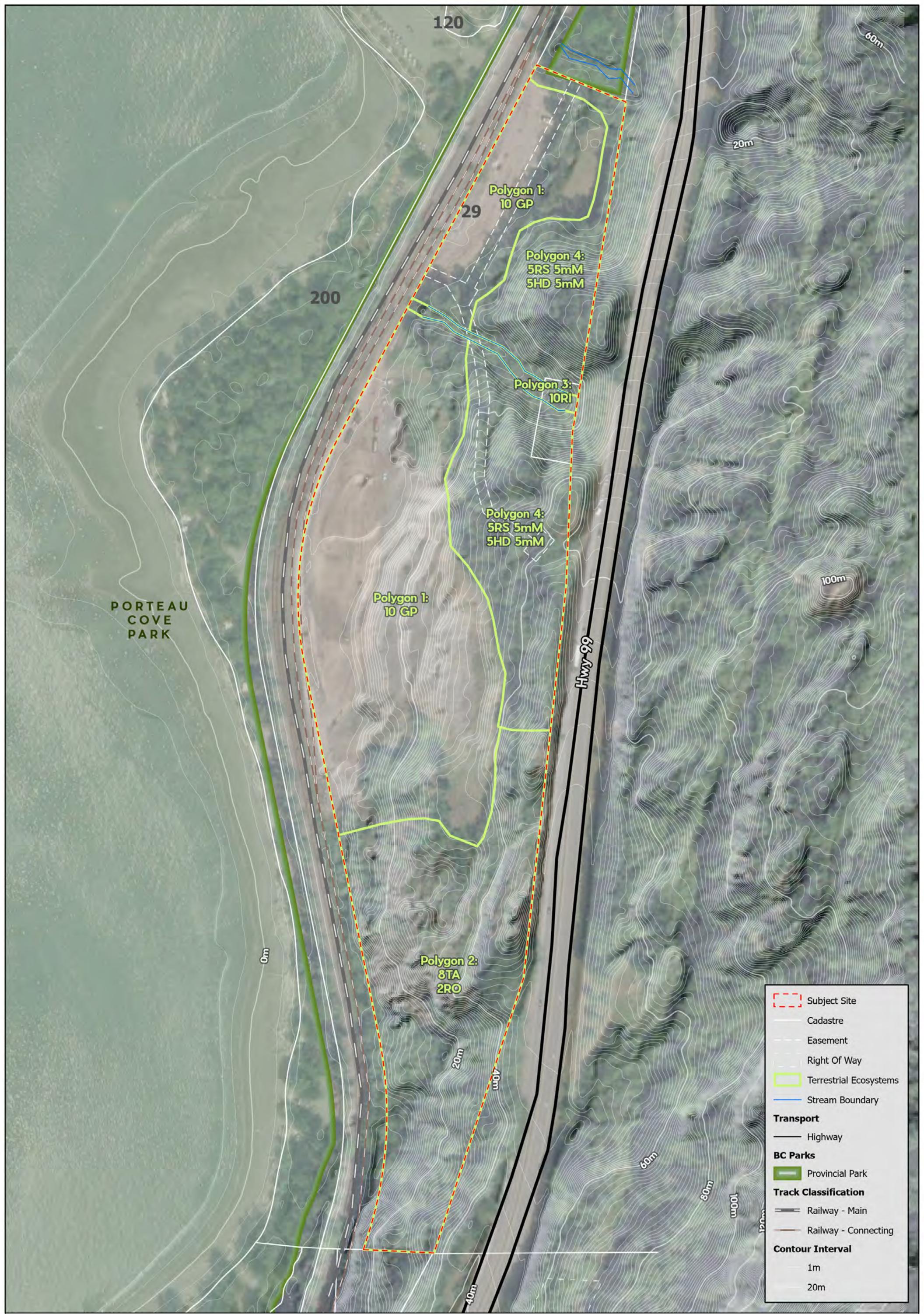
20m

GIS Cartographer: Oliver Chew
Date: 2023-08-02
CERG File #: 496-03-01
Projection: NAD 1983 UTM Zone 10N

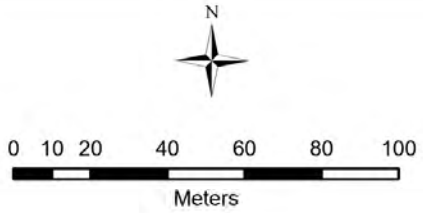


Map 2 - Streamside Protection and Enhancement Areas

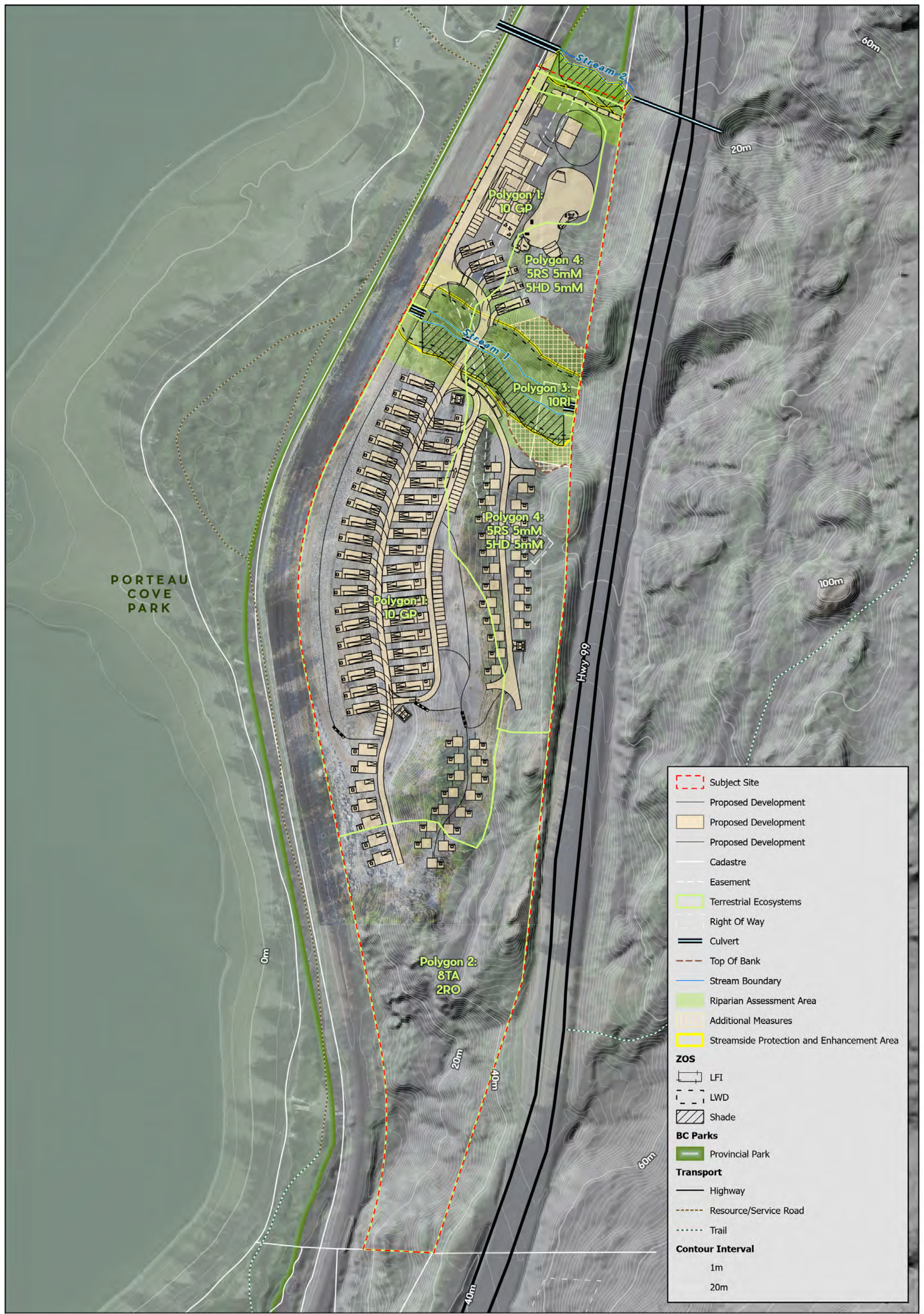
Porteau Cove Campground
Porteau Cove
British Columbia



GIS Cartographer: Oliver Chew
Date: 2023-08-02
CERG File #: 496-03-01
Projection: NAD 1983 UTM Zone 10N



Map 3 - Terrestrial Ecosystems
Porteau Cove Campground
Porteau Cove
British Columbia



Subject Site

Proposed Development

Proposed Development

Cadastre

Easement

Terrestrial Ecosystems

Right Of Way

Culvert

Top Of Bank

Stream Boundary

Riparian Assessment Area

Additional Measures

Streamside Protection and Enhancement Area

ZOS

LFI

LWD

Shade

BC Parks

Provincial Park

Transport

Highway

Resource/Service Road

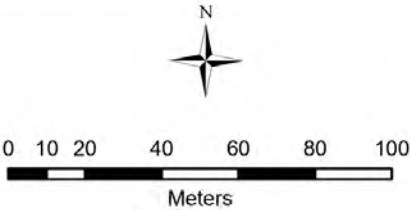
Trail

Contour Interval

1m

20m

GIS Cartographer: Oliver Chew
Date: 2023-08-10
CERG File #: 496-03-01
Projection: NAD 1983 UTM Zone 10N



Map 4 - Proposed Campground Development

Porteau Cove Campground
Porteau Cove
British Columbia



3 Environmental Constraints

3.1 SLRD Area D OCP

As the subject site is in the Squamish-Lillooet Regional District (SLRD) in Electoral Area D, the plans and rezoning are to align with the objectives and policies of the SLRD Electoral Area D Official Community Plan (OCP) Bylaw 1135, 2013 (SLRD, 2023a).

3.1.1 Riparian Protection Development Permit Area

Included in the SLRD Area D OCP is Section 7.2: Riparian Protection Development Permit Area (SLRD, 2023a). This applies to all mapped and unmapped streams in the SLRD. It consists of a Riparian Assessment Area, which includes a 30 m strip of land on both sides of the waterbody as measured from the natural boundary. Due to the presence of a 60 m wide or greater ravine at this site, a strip on both sides of the waterbody measured from the natural boundary to a point that is 10 m beyond the top of the ravine bank was assessed. Further, a Riparian Protection Development Permit is needed to conduct development activities within the Riparian Assessment Area. Examples of development activities include but are not limited to: the disturbance of soils, alteration or removal of vegetation, construction of buildings or structures, or the creation of roads (SLRD, 2023a). The RAPR assessment form completed for the subject site is included in Appendix A.

Additionally, Section 7.2.8 (m) of the SLRD OCP states:

“7.2.8 (m) For development within the Howe Sound East Sub Area, prior to any construction activities within the riparian areas for any creek crossings, have targeted surveys conducted by a QEP for the following species at risk:

- *Northern red-legged frog, western toad, and coastal tailed frog; and*
- *Northern rubber boa.*

If any are found, appropriate mitigation measures will be determined.”

No species at risk were identified on the subject site during ecological site surveys. Targeted surveys for reptile and amphibian species at risk will be conducted by a Qualified Environmental Professional (QEP) prior to land clearing activities on the subject site. See Section 3.4.1 of this report for further information on rare and endangered wildlife species.

3.1.2 The Environmental Protection Development Permit Area

Section 7.3: The Environmental Protection Development Permit Area is also included in the SLRD Area D OCP (Bylaw 1135, 2013). These permit areas are designated for the protection of the environment and ecosystems, and to preserve ecological diversity. There are three (3) Area Guidelines:

“7.3.7 Marine Shoreline Area Guidelines... specifically refers to the area 30 meters upland (backshore) of the natural boundary of the sea.”

The subject site is not located within 30 m of the natural boundary of the sea (Map 1).



“7.3.8 Wildlife Habitat Areas Guidelines... include all mapped wildlife species at risk critical habitat areas, and mature red listed ecological communities at risk”

The subject site does not contain mapped wildlife species at risk habitat areas (CDC iMap, 2023) or mature red listed ecological communities.

“7.3.9 The Ecological Sustainability Area Guidelines...pertains to the entire Furry Creek Neighbourhood, Britannia South Neighbourhood, and Porteau Cove Neighbourhood.”

The subject site is included in the Ecological Sustainability Area Guidelines. These address development permit requirements for the entirety of the project that must be met by the developer at its commencement. Included in the Ecological Sustainability Area Guidelines are the following requirements:

“(a) Development and construction of the property should follow guidelines and recommendations outlined in: Environmental Best Management Practices for Urban and Rural Land Development (BC MOE, 2014, or latest version). This includes best management recommendations for storm water, pollution prevention and wildlife ecosystem management.”

Environmental best management practices as defined by BC MOE (2014) will be followed during campground development.

“(b) An invasive species survey and management plan that incorporates the recommendations included in this report should be developed by a QEP and implemented for the subject property. The plan should be prepared prior to any land clearing or earthworks.”

A site-specific invasive species management plan was completed for the subject site, and is included in Appendix B.

“(c) Development of a Stormwater Management Plan and a Sediment Erosion and Control Plan for site preparation, construction, and post-construction. Minimizing land disturbance in areas subject to possible erosion during seasonal periods of high rainfall.”

At this time, the project does not have a Stormwater Management Plan or Sediment and Erosion Control Plan. Lionsgate will complete this for the subject site if it is required by SLRD during the development permitting stage.

“(d) The extensive BC Hydro Rights-of-way, particularly in the Furry Creek Neighbourhood, provide potential opportunities to create bio-ponds for stormwater detention, bio- treatment and infiltration.”

There are no BC Hydro right of ways running through the subject site.

“(e) The effects of shading on common property (i.e. the beach to the seaward side of the Waterfront Lands) should be considered for building siting and heights.”

This is not applicable for the subject site due to its distance from Howe Sound (Map 1).

3.2 Physical Environment

3.2.1 Climate

The climate in the study area presents no obvious constraints or concerns with respect to development.

3.2.2 Geology

Assessment of geological conditions of the site is outside the scope of this IER; soils on the subject site will be addressed under a separate geotechnical report, if required.

3.2.3 Geomorphology

The geomorphology of the subject site poses no obvious constraints to development.

3.2.4 Hydrology

Hydrology of the site does not pose a constraint to development of the site. No development should occur within the Streamside Protection and Enhancement Areas (SPEAs) on the subject site.

3.3 Terrestrial Environment

3.3.1 Soils

Assessment of geological conditions of the site is outside the scope of this IER; soils on the subject site will be addressed under a separate geotechnical report if required.

3.3.2 Vegetation

The vegetation on the subject site outside of protected riparian areas does not present any obvious constraints or concerns to development.

There are no known occurrences of any plant species at risk in the subject site, nor were any observed during the site investigations. Two plant species at risk were listed as having the potential to be present on the site due to elevation and site habitat conditions:

- Roell's brotherella
- Alaska holly fern

Roell's brotherella

Roell's brotherella grows in rotten wood in cool to moist mixed deciduous and coniferous forest, usually at low elevations along valley margins on slopes, stream terraces and swampy floodplains; often in remnant second growth (COSEWIC, 2010). These site conditions exist within Polygon 4 on the subject site, particularly within the riparian area of Unnamed Stream 1.



If development is to occur within the forested area of Polygon 4, a targeted search should be conducted by a QEP prior to land clearing. If the bryophyte is observed growing within rotten wood on the subject site, the wood should be carefully relocated to an adjacent area with no planned disturbance.

Alaska holly fern

Alaska holly fern grows in moist to mesic shady forests and rock outcrops in lowland coastal forests (MOE, 2023). These site conditions exist within Polygons 2 and 4 on the subject site. No disturbance is anticipated within Polygon 2, as the steep talus field is not desirable for campground development. If development is to occur within the forested area of Polygon 4, a targeted search should be conducted by a QEP prior to land clearing. If the fern is observed within an area of planned disturbance, it should be carefully relocated to an adjacent area with no planned disturbance.

3.3.2.1 Rare and Endangered Ecological Communities

The subject site contains two red listed ecological communities within Polygon 4. However, with regards to ecological communities, large tracts of undisturbed plant communities are considered ecologically more important than disturbed / fragmented second growth communities. The value of the ecological communities on the subject site is reduced by habitat fragmentation from surrounding highway 99 and the aggregate quarry, and by their occurrence in second growth young forest. The ecological communities on the subject site do not pose a constraint to development.

3.4 Wildlife and Wildlife Habitat

All trees on the subject site provide potential nesting sites for a range of bird species. The *BC Wildlife Act* states:

A person commits an offence if the person, except as provided by regulation, possesses, takes, injures, molests or destroys

- (a) A bird or its egg,
- (b) The nest of an eagle, peregrine falcon, gyrfalcon, osprey, heron or burrowing owl or,
- (c) The nest of a bird not referred to in paragraph (b) when the nest is occupied by a bird or its egg.

Development on the subject site may be constrained by the *Wildlife Act* if tree removal occurs during the nesting bird season of April 1 to September 1, or if any raptor nests are found on the site. Should tree removal occur within the nesting bird season, a songbird nesting survey should be conducted by a QEP in the proposed clearing area and an appropriate buffer zone to avoid contravention of the *Wildlife Act*.

3.4.1 Rare and Endangered Wildlife Species

There are no known occurrences of any wildlife species at risk on the subject site, nor were any observed during the site investigations. The following species have the potential to use the subject site based on existing habitat conditions:



Reptiles and Amphibians

- Western Toad
- Northern Red-legged Frog
- Northern Rubber Boa

Birds

- Common Nighthawk
- Evening Grosbeak
- California Gull
- Western Screech-Owl
- Black Scoter
- Double-crested Cormorant
- Band-tailed Pigeon
- Purple Martin

Invertebrates

- Clodius Apollos, *claudianus* subspecies

Mammals

- Townsend's Big-eared Bat
- Silver-haired bat
- Hoary Bat
- Californian Myotis
- Long-eared Myotis
- Long-legged Myotis
- Yuma Myotis

Western Toad, Northern Red-Legged Frog, and Clodius Apollos

Western toads breed in a variety of habitats, typically in slow moving waters along the margin of lakes, ponds, and streams. During breeding season, large numbers tend to congregate at waterbodies and actively search for mates. They then migrate between breeding habitat and non-breeding upland habitat, including a large variety of habitats such as grasslands, meadows, and many different forest types from sea level to the alpine. They are known to migrate up to 1 km from their breeding areas (BC MOE, 2023). Best management practices recommend maintaining a 30 m core area from the high water mark of any watercourse (BC MOE, 2014b). As the proposed development plan will protect the riparian setbacks, this habitat will be protected, and it is expected that the development would have minimal impact on western toads that may occur on the subject site.

Habitat for northern red-legged frogs includes a variety of permanent and temporary freshwater bodies adjacent to areas having significant forest cover and emergent vegetation (BC MOE, 2015). Suitable terrestrial habitat includes dense riparian vegetation that maintains cool and moist conditions, loose soils, coarse woody debris, and leaf litter (BC MOE, 2015b). Many of these habitat features are found in the riparian area on the subject site. Although young frogs can be found up to 500 m from the breeding sites (BC MOE, 2015b), best management practices for red-legged frogs recommend protecting habitat up to 30-150 m from the high water mark (BC MOE, 2014b). As the proposed development plan will protect the riparian setbacks, this habitat will be protected, and it is expected that the development would have minimal impact on the red-legged frogs that may occur on the subject site.



Clodius Apollos (*Clodius Parnassian claudianus*) occur in moist habitats in the riparian areas of lowland streams (BC MOE, 2023). It is possible that this freshwater species may occur within the streams onsite. The aquatic areas will not be directly impacted by the proposed development and water quality of the streams will be protected. The proposed works are therefore not expected to impact this species.

A search for western toads, northern red-legged frogs, and Clodius Apollos should be conducted prior to vegetation disturbance onsite, and if any are found, they should be relocated outside of the work area. If development is to occur on site, protecting the aquatic and riparian area on the subject site via the RAPR protective setbacks will retain aquatic and riparian foraging features for these three species at risk (SAR).

Northern Rubber Boa

Northern rubber boas are frequently found near loose, tiered rocks in forests and clearings in humid mountainous regions or dry lowland areas and are sometimes found in disturbed areas. Specific habitats are required for thermoregulation and overwintering, which include loose soils suitable for burrowing, leaf litter, woody debris, loose rocks, outcrops, and talus slopes (BC MOE, 2016). The talus field within Polygon 2, and large woody debris and leaf litter, within Polygon 4 on site may provide such suitable habitat.

The Management Plan for the Northern Rubber Boa (BC MOE, 2016) includes a threat classification table in which it is stated that while the threat of any impact would be high, residential and commercial development have a negligible impact on the species. The low threat rating is due in part to the widespread distribution of the species, which counters localized disturbances. As the proposed development could directly impact individuals of the species, if present at the site, it is recommended that a targeted search for rubber boas be conducted by a QEP prior to any vegetation clearing and grubbing activities that may occur within Polygon 4. If any are found, they should be relocated outside of the work area. No development is anticipated within Polygon 2, as the steep talus field is not desirable for campground development.

Band-tailed Pigeon, Evening Grosbeak, and Common Nighthawk

These SAR bird species have the potential to use habitat on the subject site due to the second growth forest on the site within Polygon 4.

The band-tailed pigeon arrives in its northern habitat between March-May and leaves between August-October (COSEWIC, 2021). Nesting habitat tends to occur in low elevation coniferous and mixed forests and woodlands. Foraging can occur in cultivated areas, suburban gardens and parks. The band-tailed pigeon has the potential to nest in trees located on or in close proximity to the subject site, as well as engage in foraging activities on the site.

Evening grosbeak utilizes mixed forest for foraging and potentially nesting (COSEWIC 2016). The common nighthawk nests on the ground on rocky outcrops and dry open areas, which are present on the subject site (COSEWIC, 2018).

If development is to occur on the subject site, a search should be conducted for common nighthawk ground nests in open, undisturbed areas. If tree or wood debris is cleared during the nesting window of mid-March to mid-August, a bird nest survey should be conducted by a QEP. The bird nest survey will



identify any band-tailed pigeon or evening grosbeak nests on the site, and all active nests will be protected from development impacts with an appropriate buffer zone.

Black Scoter, California Gull, Double-crested Cormorant, and Purple Martin

All of these bird species, associated with aquatic habitat, have the potential to use the subject site due to its proximity to Howe Sound.

The black scoter and the California gull occupy mostly coastal waters, and less commonly, large inland lakes and rivers (BC MOE, 2023). Black scoter nests are located near lakes and pools on grassy or bushy tundra and in northern taiga. California gulls breed in colonies in interior North America, and generally only overwinter on the Pacific coast (BC MOE, 2023). As such, no nests for either species are anticipated on the subject site, only foraging habitat.

Double-crested cormorant habitat includes lakes, ponds, rivers, lagoons, swamps, coastal bays, marine islands and seacoasts. They nest in colonies, on the ground or in trees in freshwater situations, and on coastal cliffs, generally directly adjacent to water. As such, no nests are anticipated on the subject site, only foraging habitat.

The purple martin occupies a wide variety of habitats, including open and partly open situations, frequently near water or around towns (BC MOE, 2023). They breed in enclosed areas, such as bird boxes and tree cavities. If development is to occur on the subject site, a search should be conducted for purple martin nests in potential tree cavities of any trees to be removed.

Western Screech Owl, Townsend's Big-eared Bat, Silver-haired bat, Hoary Bat, Californian Myotis, Long-eared Myotis, Long-legged Myotis, and Yuma Myotis

Western screech owl and all of the bat / myotis species listed above have the potential to use the subject site, as they all could use cavities within trees to nest or roost (COSEWIC, 2012 & 2013). Trees within Polygon 4 could provide habitat for these species if suitable cavities exist within the larger western redcedars and Douglas firs. Prior to any proposed tree removal on the subject site, a cavity nest / roost search should be conducted by a QEP of the mature trees on site if they are proposed to be removed.

3.5 Valued Ecosystem Components

3.5.1 Wildlife Trees

No nests were observed on the subject site. Unless wildlife trees on the subject site contain nesting birds or nests of raptors, as described under the *Wildlife Act*, they are not a constraint to development. The wildlife trees identified provide low wildlife value characteristics.

3.5.2 Coarse Woody Debris

Coarse woody debris (CWD) within the subject site presents valuable habitat to species of small mammals, reptiles, and amphibians, including some species at risk. It is recommended that any medium to large pieces of CWD within the areas to be developed are relocated into the adjacent forested areas.

3.5.3 Wildlife Movement Corridor



Development in the subject site poses no concerns to wildlife movement corridors as it is fragmented by surrounding highway and railway properties. The aquatic area which provides a small-scale movement corridor will be protected by the associated RAPR setbacks.

3.6 Aquatic Environment

The watercourses identified on and adjacent to the subject site and associated riparian SPEAs are inherently protected by the RAPR of the BC *Riparian Areas Protection Act*. No disturbance of vegetation or soil within the SPEA is permitted under the RAPR.

Unnamed Streams 1 and 2 have associated Riparian Assessment Areas (RAA) and SPEAs as they connect by surface flow to fish bearing waters (Howe Sound) or have the potential to contain fish when wet. Cascade implemented the provincial standard detailed assessment for the RAPR to determine the SPEA setbacks for the two watercourses on and adjacent to the subject site, as displayed on Map 2 (also presented in Appendix A). Bunbury & Associates Land Surveying Ltd., a BC registered land surveyor, completed a survey of the stream boundaries marked on the site by Cascade's QEPs (Map 2). The survey data of the stream boundary was utilized by Cascade's GIS team to delineate the SPEA setbacks as per provincial methodology, and is displayed in Map 2. Note that Cascade recommends the additional measures that no development occur below the ravine top of bank of Unnamed Stream 1 (Map 2).

Current land uses within the SPEA for Unnamed Stream 1 include two gravel access roads, a large material pile, and a work area denuded of vegetation. Current land uses within the SPEA on the subject site for Unnamed Stream 2 include a gravel access road, and material piles. As the RAPR does not apply to mining activities, these uses were permitted under the mine permit (No. Q-7-66) (MFLNRORD, 2019). The RAPR does not apply to the maintenance of an area of existing human disturbance, if that area is not extended and the type of disturbance is not changed (Section 3.3.b, B.C. Reg. 178/2019). As such, maintenance of the existing road intrusions into the SPEA is allowed under the RAPR, as long as the roads are not widened, paved, or extended within the SPEA. Apart from the existing human disturbance, proposed development plans are entirely outside of the SPEAs (Map 4).

3.7 Socio-Economic Conditions

3.7.1 Cultural and Heritage Resources

Archaeological sites are protected under the *Heritage Conservation Act*, and should such a site be discovered during development of the subject site, works must be halted and the archaeology branch must be contacted immediately (archaeology@gov.bc.ca).



3.7.2 Other Undertakings in the Area

3.7.2.1 Timber Harvesting

Timber harvesting presents no obvious constraints or concerns for the development of the subject site.

3.7.2.2 Mining

Mining presents no obvious constraints or concerns for the development of the subject site. Consideration for the location of campsites in close proximity to an active mining site should take into account the safety and noise exposure of campers to heavy machinery and mining activities.

3.7.2.3 Recreation and Tourism

Recreation and tourism present no obvious constraints or concerns for rezoning or development of the subject site. Currently, the septic field, water tank, and waterlines onsite are used for the neighbouring Porteau Cove Provincial Park and Campground.

3.7.2.4 Anthropogenic Features

No anthropogenic features pose constraints to development of the subject site.

3.7.2.5 Adjacent Land Users

Adjacent land use does not restrict development within the subject site.



4 Conclusions and Recommendations

This report details the baseline conditions and identifies potential environmental constraints for the proposed campground development on the subject site. Based on the conditions observed on the site and the information reviewed, the site would be suitable for campground development subject to the following recommendations:

- 1) The SPEA of the watercourses on and adjacent to the subject site are inherently protected from new development by the RAPR. Any new residential, commercial or industrial development on the subject site must comply with the RAPR. An RAPR assessment report and proposed development plans would be required to be submitted to the provincial government and SLRD for approval once development plans are finalized. Existing structures and existing areas of human disturbance within the SPEA may be grandfathered under the RAPR for continued use. This exemption would only apply if maintenance or repairs were conducted on the original footprints of the structures, and the areas were maintained for their original use. Additionally, renovation and maintenance works on existing buildings within the SPEA must comply with the *Local Government Act* in order to be grandfathered by the RAPR.
- 2) No raptors nests were observed on the subject site. If a raptor nest is found during any potential development on the subject site, they are protected year-round, along with an appropriate buffer zone.
- 3) Land clearing activity conducted during the nesting bird season of mid-March to mid-August, must comply with Section 35 of the *Wildlife Act*, which forbids the destruction of nests occupied by a bird, its eggs, or its young. If vegetation clearing is to occur between mid-March to mid-August, a raptor and songbird nesting survey of the trees to be cleared and buildings must be conducted by a Qualified Environmental Professional (QEP). The survey will identify the location of any active bird nests including that of the species of risk listed to potentially occur on the subject site. Additionally, a search for common nighthawk nests should be conducted immediately prior to ground disturbance in open locations during the bird nesting window. Active birds' nests found during clearing must be adequately protected by a forested buffer as per Section 34 of the *Wildlife Act*. Pileated woodpecker nesting cavities are protected for a period of 36 months after the last active use of the nest
- 4) Prior to any land clearing, areas to be cleared should be surveyed by a QEP for potentially occurring plant and animal species at risk. If any are found, they should be relocated to similar habitat adjacent to the proposed development area.
- 5) If any mature trees or wildlife trees are planned for removal, targeted surveys should be conducted by a QEP in relation to the barn swallow, bat / myotis species, and purple martin, which may utilize tree cavities or suitable bark as roosting or nesting habitat.
 - a. If mature tree removal is planned between mid-March and mid-August, a survey should be conducted to search for any nests belonging to barn swallow or purple martins. If nests are found, works must be delayed until the birds have fledged.
 - b. Prior to planned mature tree removal at any time of the year, a roosting survey assessment should be conducted to ensure no roosts exist for bat or myotis species. If a



roost is found, a bat management plan should be produced by a QEP to ensure bat exclusion happens during the appropriate time window, usually November to March.

Based on the information reviewed and the site conditions observed, the following should minimize potential negative impacts on the site arising from development:

- Future development and construction on the subject site should follow guidelines and recommendations outlined in: *Develop with Care: Environmental Guidelines for Urban and Rural Land Development in British Columbia* (MOE, 2014) and *Land Development Guidelines for the Protection of Aquatic Habitat* (DFO, 1992). This includes best management recommendations for stormwater, pollution prevention, and wildlife and ecosystem management.
- All wildlife attractants, including food and other odorous materials, must not be left on site during development and must be secured in wildlife-proof locations anytime the site is unattended.
- In accordance with RAPR requirements, site preparation and construction works associated with any of the aforementioned mitigation measures should be monitored by a QEP.



5 References

- BC Ministry of Environment (BC MOE). 2023. BC Conservation Data Centre: BC Species and Ecosystems Explorer. <http://a100.gov.bc.ca/pub/eswp/>. Website accessed July 13, 2023.
- BC Ministry of Environment (BC MOE). 2017. Wildlife/Danger Tree Assessor's Course Workbook Parks and Recreation Sites Course Module.
- BC Ministry of Environment (BC MOE). 2016. Management Plan for the Northern Rubber Boa (*Charina bottae*) in British Columbia. Website: <http://a100.gov.bc.ca/pub/eirs/finishDownloadDocument.do?subdocumentId=10011>. Accessed on: August 3, 2023.
- BC Ministry of Environment (BC MOE). 2015. Management Plan for the Northern Rubber Boa (*Charina bottae*) in British Columbia. Website: <http://a100.gov.bc.ca/pub/eirs/finishDownloadDocument.do?subdocumentId=10011>. Accessed on: August 3, 2023.
- BC Ministry of Environment (BC MOE). 2014a. Develop with Care 2014 Environmental Guidelines for Urban and Rural Development in British Columbia.
- BC Ministry of Environment (BC MOE). 2014b. Management Plan for the Western Toad (*Anaxyrus boreas*) in British Columbia. Prepared by the Provincial Western Toad Working Group. Website: <http://a100.gov.bc.ca/pub/eirs/finishDownloadDocument.do?subdocumentId=9843>. Accessed on August 3, 2023.
- British Columbia, Province of. 1998. Field Manual for Describing Terrestrial Ecosystems. BC Min. Env. Land Prot., and BC Min. For. Land Manage. Handbook. No. 25.
- British Columbia, Province of. 2022. Aquifer #422. [AQ_00422_Aquifer_Factsheet.pdf](#). Accessed July 11, 2023.
- CDC iMap, 2023. <https://maps.gov.bc.ca/ess/hm/cdc/> Accessed on August 2, 2023.
- COSEWIC. 2021. COSEWIC Assessment and Status Report on the Band-tailed Pigeon (*Patagioenas fasciata*) in Canada. Committee on the Status of Endangered Wildlife in Canada. <https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/band-tailed-pigeon-2021.html>. Accessed August 3, 2023.
- COSEWIC. 2018. Common Nighthawk (*Chordeiles minor*): COSEWIC assessment and status report. Committee on the Status of Endangered Wildlife in Canada. Website: <https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/common-nighthawk-2018.html>. Accessed on: August 3, 2023

- COSEWIC. 2016. Assessment and Status Report on the Evening Grosbeak. Committee on the Status of Endangered Wildlife in Canada. https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/cosewic/sr_Evening%20Grosbeak_2016_e.pdf. Accessed on August 3, 2023
- COSEWIC. 2013. Little brown myotis (*Myotis lucifugus*): technical summary for emergency assessment. Committee on the Status of Endangered Wildlife in Canada. Website: <https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments/little-brown-myotis-technical-summary-2012.html>. Accessed on August 3, 2023
- COSEWIC. 2012. COSEWIC Assessment and Status Report on the Western Screech-Owl *kennicottii* subspecies *Megascops kennicottii kennicottii* and the Western Screech-Owl *macfarlanei* subspecies *Megascops kennicottii macfarlanei* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. Website: http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr_western_screech-owl_1012_e.pdf. Accessed on: August 3, 2023
- COSEWIC. 2010. COSEWIC Assessment and Status Report on the Roell's Brotherella Moss Brotherella roellii in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. Website: http://www.registrelep-sararegistry.gc.ca/virtual_sara/files/cosewic/sr_roells_brotherella_moss_0911_eng.pdf. Accessed on: August 3, 2023
- Demarchi, D.A. 1996. Ecoregions of British Columbia. Fourth Edition. British Columbia Wildlife Branch, Ministry of Environment, Lands and Parks, Victoria BC. Map (1:2,000,000).
- DFO. 1992. Land Development Guideline for the Protection of Aquatic Habitat <http://www.dfo-mpo.gc.ca/Library/165353.pdf>
- E-Fauna BC. 2018. Electronic Atlas of the Wildlife of British Columbia. <https://ibis.geog.ubc.ca/biodiversity/efauna/> Accessed August 1, 2023.
- Environment Canada. Climate Normals 1981 – 2010. Website: http://climate.weather.gc.ca/climate_normals/index_e.html. Accessed August 1, 2023.
- Government of Canada. 2019. Description of soil BCCNL~~~~N (CANNELL). <https://sis.agr.gc.ca/cansis/soils/bc/CNL/~~~~N/description.html>. Accessed July 11, 2023.
- Green, R.N. and K. Klinka. 1994. Field guide to site identification and interpretation for the Vancouver Forest Region. Land management handbook number 28. BC Ministry of Forests, Victoria, BC
- iMapBC. <http://www2.gov.bc.ca/gov/content/governments/about-the-bc-government/databc/geographic-data-and-services/imapbc>. Website accessed August 1, 2023.
- Luttmerding, H.A., 1971. Soil Survey of the Alta Lake Area. Soils Division of the British Columbia Department of Agriculture.



Ministry of Forests, Lands, Natural Resource Operations, and Rural Development (MFLNRORD). 2019. Riparian Areas Protection Regulation Technical Assessment Manual Methodology.

Monger, J.W.H. and J.M. Journeay. 1994. Guide to geology and tectonic evolution of the Southern Coast Mountains. Geological Survey of Canada. OpenFile, 2490, Vancouver, Canada.

Scheifer, E., M.A. Hassan, B. Menounos, C.P., Pelpola, and O. Slaymaker. 2010. Interdecadal patterns of total sediment yield from a montane catchment, southern Coast Mountains, British Columbia, Canada. *Geomorphology*. 1881, 207-212.

Squamish Lillooet Regional District (SLRD). 2023a. Official Community Plan Bylaw 1135, 2023. [slrd.civicweb.net/document/149848/](https://www.slrd.bc.ca/planning-building/mapping). Accessed July 11, 2023.

Squamish Lillooet Regional District (SLRD). 2023b. Mapping Website. <https://www.slrd.bc.ca/planning-building/mapping>.

6 Appendices



CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD



Appendix A: Riparian Areas Protection Regulation Form

FORM 1

Riparian Areas Protection Regulation - Qualified Environmental Professional - Assessment Report

Riparian Areas Protection Regulation: Assessment Report

Please refer to submission instructions and assessment report guidelines when completing this report.

Date August 10, 2023

I. Primary QEP Information

First Name	Todd	Middle Name	
Last Name	Hellinga		
Designation	A.Sc.T.	Company	Cascade Environmental
Registration #	41083	Email	thellinga@cerg.ca
Address	Unit 205 – 39480 Queens Way		
City	Squamish	Postal/Zip	V8B 0Z5
Prov/state	BC	Country	Canada
		Phone #	604-815-0901

II. Secondary QEP Information (use Form 2 for other QEPs)

First Name	Mehrdad	Middle Name	
Last Name	Zargari		
Designation	P.Eng.	Company	RM Tec Engineering
Registration #	43736	Email	mzargari@rmtec.ca
Address	#204-930 Harbourside Drive		
City	North Vancouver	Postal/Zip	V7P3S7
Prov/state	BC	Country	Canada
		Phone #	778-898-5235

III. Developer Information

First Name	Paul	Middle Name	
Last Name	Wood		
Company	Lionsgate Excavations Ltd.		
Phone #	604-307-2079	Email	paulwood@lgexcavation.com
Address	PO Box 392		
City	Whistler	Postal/Zip	V0N 1B0
Prov/state	BC	Country	Canada

IV. Development Information

Development Type	Campground		
Area of Development (ha)	3.06	Riparian Length (m)	104
Lot Area (ha)	7.27 ha	Nature of Development	New Campground Development
Proposed Start Date	January 2024	Proposed End Date	January 2027

V. Location of Proposed Development

Street Address (or nearest town)	Porteau Cove		
Local Government	SLRD	City	SLRD Area D
Stream Name	Unnamed watercourse draining to Howe Sound		
Legal Description (PID)	027-966-950	Region	Lower Mainland
Stream/River Type	Stream	DFO Area	28-4
Watershed Code	900-096930		
Latitude	49	33	5325
Longitude	-123	14	01235

Completion of Database Information includes the Form 2 for the Additional QEPs, if needed.
Insert that form immediately after this page.

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Section 1. Description of Fisheries Resources Values and a Description of the Development proposal

(Provide as a minimum: Species present, type of fish habitat present, description of current riparian vegetation condition, connectivity to downstream habitats, nature of development, specific activities proposed, timelines)

Property Conditions:

Lionsgate Excavations Ltd. (Lionsgate) plans to rezone their Property to allow for campground development. The Property is legally described as Lot: 1, District Lot: 1748, Group 1, New Westminster District Plan: BCP41560 Except Plan BCP46926, PID: 027-966-950. The Property measures 7.27 ha and is currently zoned as 'Rural Resource 3'. The centre point of the Property is located at 49.5570°N, -123.2364°W. The Property is currently used as an aggregate quarry, which contains several gravel roads, materials piles, and a septic field and water tank for the neighbouring provincial campground to the west. Lionsgate has owned the Property and operated it under a mine permit (No. Q-7-66) since 2022. Prior to that, it was co-owned as an aggregate mine since 2018, and previously a BC Rail mine used to supply rail ballasts (Personal Communications, Joe McInnis, 2023).

Since streams are located to the north of the Property and on the Property, a Riparian Areas Protection Regulation (RAPR) assessment is required, as per Section 7.2 of the Squamish Lillooet Regional District (SLRD) Electoral Area D Official Community Plan (OCP) Bylaw No. 1135-2013 (SLRD, 2023). The objectives of Section 7.2 Riparian Protection Development Permit Area are, in part "for the protection of the natural environment, its ecosystems, and ecological diversity" (SLRD, 2023). Lionsgate retained Cascade Environmental Resource Group (Cascade) to conduct a riparian assessment for the Property to accompany the rezoning application from 'Rural Resource 3' to 'Campground'. The purpose of the riparian assessment is to identify the Streamside Protection and Enhancement Areas (SPEA) and to provide recommendations for protection and enhancement of these areas during the rezoning process and preliminary planning for campground development. This RAPR submission will be updated once development plans are finalized.

Proposed Development:

The proposed campground development includes a common amenity greenspace, access roads, a reception/amenity building, a sani-dump station, an operations/maintenance building, 3 comfort stations, 6 group/family tent sites, 55 parking stalls, 42 RV campsites, 37 tent walk-in campsites, and 7 tent/car sites. Development plans are not yet finalized, and will be subject to an updated RAPR Assessment Report.

Methods:

Jordann Foster, R.P.Bio., Erin Schott, R.B.Tech., and Kristen Radosevic, B.I.T. of Cascade, assessed the stream on the Property on June 29, 2023 and assessed the stream to the north of the Property on August 1, 2023. The detailed assessment methodology was implemented for these streams. The high-water mark (HWM) and top of bank (TOB) were flagged, and later surveyed by Bunbury & Associates Land Surveying Ltd. (Bunbury). Vegetation type, channel width, gradient, and important riparian habitat characteristics were recorded.

Watercourse Description:Unnamed Stream 1:

Unnamed Stream 1 flows generally east to west through the Property. It originates on the Property from two large culverts (~2 m diameter) located just outside of the Property. These culverts convey the stream under highway 99. At its upstream end on the Property, the stream has steep ravine banks approximately 65 m wide. This ravine continues for 42 m until it reaches the onsite gravel road, where the stream is culverted through a large diameter culvert (~2.8 m diameter). Just below the culvert, there are pipes crossing the stream channel that convey drinking water to the neighbouring provincial campground to the west. At this point, the stream flows through the aggregate quarry, with a heavily denuded riparian area, until it leaves the Property through a third set of culverts (~0.8 m diameter) under an access road on the Property and the railway tracks, located off Property.

Flows in the stream are likely high during wet seasons, as a very scoured channel with bank erosion was evident during the survey in June 2023. However, it was dry when assessed, and likely non-permanent. The average channel width of the stream is 6.23 m, the average gradient is 6 %, and it has a cascade-pool morphology. Channel substrate consists of boulders, river cobble, small and large woody debris (LWD), and leaf litter. There is abundant LWD within the stream channel at its upstream end, where it has steep ravine banks. The stream is tenuously connected to fish-bearing water at its downstream end, where it flows onto a rocky beach that is a part of the Porteau Cove Provincial Campground on Howe Sound.

Unnamed Stream 2:

Unnamed stream 2, located to the north of the Property, flows generally east to west. It is conveyed adjacent to the Property from a large culvert (~2 m diameter) that runs under Highway 99. There are two pipes crossing the stream channel that convey water to the neighbouring property to the north. The stream then flows into a second set of culverts (~0.8 m diameter) at its downstream end. These culverts convey the stream under the site access road, the railway tracks, and the neighbouring Provincial Park access road, where they outlet into Howe Sound.

Flows in the stream are likely high during wet seasons, as a very scoured channel with bank erosion was evident during the survey in August 2023. However, it was dry when assessed, and likely non-permanent. The average channel width of the stream is 4.60 m, the average gradient is 2.3 %, and it has a riffle-pool morphology. Channel substrate consists of boulders, river cobble, small and large woody debris (LWD), and leaf litter. The stream is tenuously connected to fish-bearing water at its downstream end, where the culverts outlet onto a rocky beach that is a part of the Porteau Cove Provincial Campground on Howe Sound.

Existing Land Uses within the SPEAs:

Current land uses within the SPEA for Unnamed Stream 1 include two gravel access roads, a large material pile, and a denuded work area. Current land uses within the SPEA on the Property for Unnamed Stream 2 include a gravel access road, material piles and a septic field. As the Riparian Areas Protection Regulation does not apply to mining activities, these Property uses were permitted under the mine permit (No. Q-7-66) (MFLNRORD, 2019). The RAPR does not apply to the maintenance of an existing area of human disturbance, if that area is not extended and the type of disturbance is not changed (Section 3.3.b, B.C. Reg. 178/2019). As such, maintenance of the existing road intrusions into the SPEA are allowed under the RAPR, as long as the roads are not widened, paved or extended within the SPEA.

Fisheries Value:

Both streams are non-permanent and tenuously connected to Howe Sound at their downstream ends, where they flow into rocky beaches. Howe Sound is a fish-bearing waterbody with a large diversity of fish and marine wildlife species. During periods of the year when the streams contain water, they provide nutrients to downstream fish habitat and also have the potential to be fish rearing habitat.

Riparian Vegetation:Unnamed Stream 1:

Vegetation on the banks of Unnamed Stream 1, at its upstream end within the ravine, consists of big leaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), western hemlock (*Tsuga heterophylla*), and western redcedar (*Thuja plicata*) in the upper canopy. The understory contains dense vegetation within the ravine including salmonberry (*Rubus spectabilis*), thimbleberry (*Rubus parviflorus*), Pacific dogwood (*Cornus nuttallii*), vine maple (*Acer circinatum*), western swordfern (*Polystichum munitum*), Bracken fern (*Pteridium aquilinum*), deer fern (*Struthiopteris spicant*), and Pacific bleeding heart (*Dicentra formosa*). Minimal riparian vegetation is present at the downstream end, consisting of red alder, western redcedar, salmonberry, thimbleberry, western swordfern, and various invasive plant species.

Unnamed Stream 2:

The riparian vegetation on the southern bank of Unnamed Stream 2 is only about 1-5 m wide. Vegetation on the banks of Unnamed Stream 2 consists of big leaf maple, red alder, western hemlock, western redcedar, and Douglas fir (*Pseudotsuga menziesii*) in the upper canopy. The understory contains salmonberry, thimbleberry, vine maple, Pacific ninebark (*Physocarpus capitatus*), western swordfern, and Pacific bleeding heart (*Dicentra formosa*), and various bryophytes.

Invasive Species:Unnamed Stream 1:

Numerous invasive plant species are present on the Property, particularly in the disturbed areas of the aggregate quarry. Invasive plants observed within the SPEA for Unnamed Stream 1 were mainly located at the downstream extent, within the denuded SPEA. Invasive plants within the Unnamed Stream 1 SPEA include Himalayan blackberry (*Rubus armeniacus*), tansy ragwort (*Jacobaea vulgaris*), and St. John's wort (*Hypericum perforatum*). A site-specific invasive species management plan was created for the Property (Appendix A).

Unnamed Stream 2:

Himalayan blackberry was observed on the southern bank of Unnamed Stream 2.

References:

B.C. Reg. 178/2019, Riparian Areas Protection Regulation, <https://canlii.ca/t/5539/>. Accessed on July 10, 2023.

Ministry of Forests, Lands, Natural Resource Operations, and Rural Development (MFLNRORD). 2019. Riparian Areas Protection Regulation Technical Assessment Manual Methodology.

Squamish Lillooet Regional District (SLRD). 2023. Electoral Area D Official Community Plan. <https://slrd.civicweb.net/document/149848/>. Accessed on June 30, 2023.

FORM 1

Riparian Areas Protection Regulation - Qualified Environmental Professional - Assessment Report

Section 2. Results of Riparian Assessment (SPEA width)

Attach or insert the Form 3 or Form 4 assessment form(s). Use enough duplicates of the form to produce a complete riparian area assessment for the proposed development

2. Results of Detailed Riparian Assessment

Refer to Section 3 of Technical Manual

Date: June 29, 2023

Description of Water bodies involved (number, type)

Unnamed Stream 1, flowing east to west through the Property.

Stream	X
Wetland	
Lake	
Ditch	
Number of reaches	1
Reach #	1

Channel width and slope and Channel Type (use only if water body is a stream or a ditch, and only provide widths if a ditch)

Channel	Width(m)	Gradient (%)	
starting point	8.47	-	*12 channel width measurement taken*
upstream	11.29	5	I, <u>Todd Hellinga</u> , hereby certify that:
	7.99	-	a) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the <i>Riparian Areas Protection Act</i> ;
	8.28	28	b) I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Lionsgate</u> ;
	8.99	-	c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and
downstream	5.71	3	d) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.
	6.26	-	
	3.52	3	
	4.03	-	
	3.44	9	
	3.37	-	
	5.57	5	
Total: minus high/low	62.2	22	
mean	6.2 m	6%	
	R/P	C/P	S/P
Channel Type		X	

Site Potential Vegetation Type (SPVT)

	Yes	No	
SPVT Polygons		X	Tick yes only if multiple polygons, if No then fill in one set of SPVT data boxes
			I, <u>Todd Hellinga</u>, hereby certify that: a) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the <i>Riparian Areas Protection Act</i>; b) I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Lionsgate</u>; c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and d) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.
Polygon No:	1		Method employed if other than TR
SPVT Type	LC	SH	TR
			X

FORM 1

Riparian Areas Protection Regulation - Qualified Environmental Professional - Assessment Report

Zone of Sensitivity (ZOS) and resultant SPEA

Segment No:	1	If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons					
LWD, Bank and Channel Stability ZOS (m)	12.46						
Litter fall and insect drop ZOS (m)	15						
Shade ZOS (m) max	18.7	South bank	Yes	X	No		
Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)						
Ditch Fish Bearing	Yes		No		If non-fish bearing insert no fish bearing status report		
SPEA maximum	18.7	(For ditch use table3-7)					

Segment No:	2	If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons					
LWD, Bank and Channel Stability ZOS (m)	12.46						
Litter fall and insect drop ZOS (m)	15						
Shade ZOS (m) max	18.7	South bank	Yes		No	X	
SPEA maximum	15.0	(For ditch use table3-7)					

I, Todd Hellinga, hereby certify that:

- I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;
- I am qualified to carry out this part of the assessment of the development proposal made by the developer Lionsgate;
- I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and
- In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.

Comments

Unnamed Stream 1 flows east to west through the Property and contains both a northern and southern bank. The southern bank (Segment 1) has an associated Shade ZOS, and a maximum SPEA of 18.7 m. The northern bank (Segment 2) has a maximum SPEA of 15.0 m.

However, at its upstream extent, the stream has steep ravine banks on both sides for 42 m. As no development is recommended below the ravine TOB, the recommended additional measure, in the form of an added riparian setback extends to the ravine TOB, up to a maximum of 76 m wide measured from the HWM.

FORM 1

Riparian Areas Protection Regulation - Qualified Environmental Professional - Assessment Report

2. Results of Detailed Riparian Assessment

Refer to Section 3 of Technical Manual

Description of Water bodies involved (number, type)

Date: August 1, 2023

Unnamed Stream 2, located to the north of the Property.

Stream	X
Wetland	
Lake	
Ditch	
Number of reaches	1
Reach #	1

Channel width and slope and Channel Type (use only if water body is a stream or a ditch, and only provide widths if a ditch)

	Channel Width(m)	Gradient (%)	
upstream	5	30	
	8	2	
	5	4	
	5	2	
	6	2	
downstream	6	2	
	3	2	
	5	2	
	4	2	
	2.5	2	
Total: minus high/low mean	41.5	21	
	4.6 m	2.3%	
	R/P	C/P	S/P
Channel Type	X		

I, Todd Hellinga, hereby certify that:

e) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;

f) I am qualified to carry out this part of the assessment of the development proposal made by the developer Lionsgate;

g) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and

h) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.

Site Potential Vegetation Type (SPVT)

	Yes	No
SPVT Polygons		X

Tick yes only if multiple polygons, if No then fill in one set of SPVT data boxes

I, Todd Hellinga, hereby certify that:

e) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;

f) I am qualified to carry out this part of the assessment of the development proposal made by the developer Lionsgate;

g) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and

h) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.

Polygon No: 1

SPVT Type

LC	SH	TR
		X

Method employed if other than TR

FORM 1

Riparian Areas Protection Regulation - Qualified Environmental Professional - Assessment Report

Zone of Sensitivity (ZOS) and resultant SPEA

Segment No:	1	If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons					
LWD, Bank and Channel Stability ZOS (m)	13.8						
Litter fall and insect drop ZOS (m)	13.8						
Shade ZOS (m) max	13.8						
South bank	Yes	X	No				
Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)						
Ditch Fish Bearing	Yes	No	If non-fish bearing insert no fish bearing status report				
SPEA maximum	13.8	(For ditch use table3-7)					

I, Todd Hellinga, hereby certify that:

- e) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;
- f) I am qualified to carry out this part of the assessment of the development proposal made by the developer Lionsgate;
- g) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and
- h) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.

Comments

Unnamed Stream 2 is located to the north of the Property; the RAA is within the Property. The current SPEA on the Property is denuded with an existing access road, material piles, and a septic field. The existing riparian vegetation on the southern bank is approximately 1-5 m wide.

Section 3. Site Plan

Insert jpg file below

Site Plan



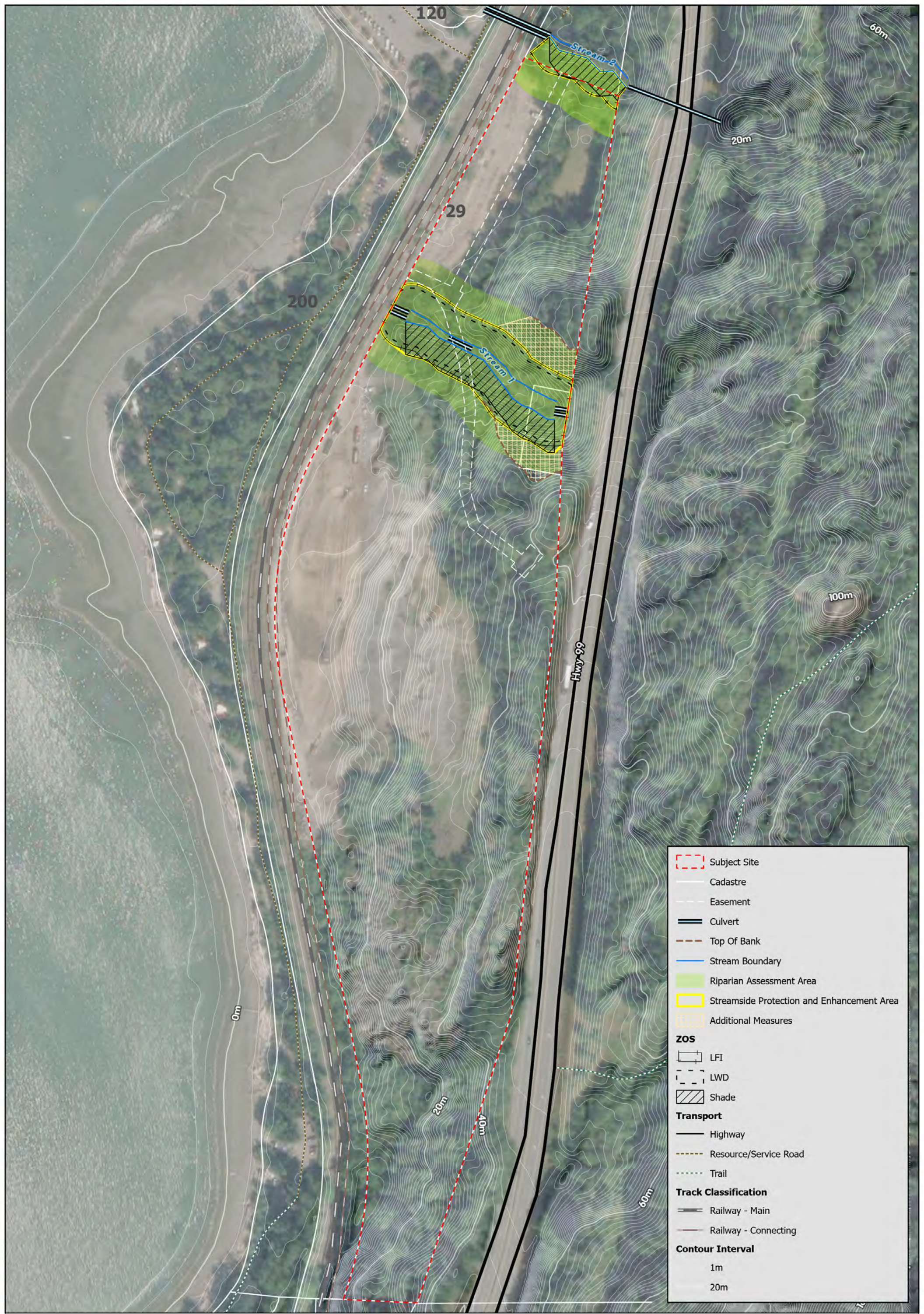
GIS Cartographer: Oliver Chew
 Date: 2023-07-10
 CERF File #: 496-03-01
 Projection: NAD 1983 UTM Zone 10N



0 0.5 1 2 3 4
 Kilometers

Map 1 - Location

Porteau Cove Campground
 Porteau Cove
 British Columbia



Subject Site

Cadastre

Easement

Culvert

Top Of Bank

Stream Boundary

Riparian Assessment Area

Streamside Protection and Enhancement Area

Additional Measures

ZOS

LFI

LWD

Shade

Transport

Highway

Resource/Service Road

Trail

Track Classification

Railway - Main

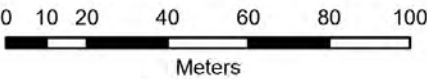
Railway - Connecting

Contour Interval

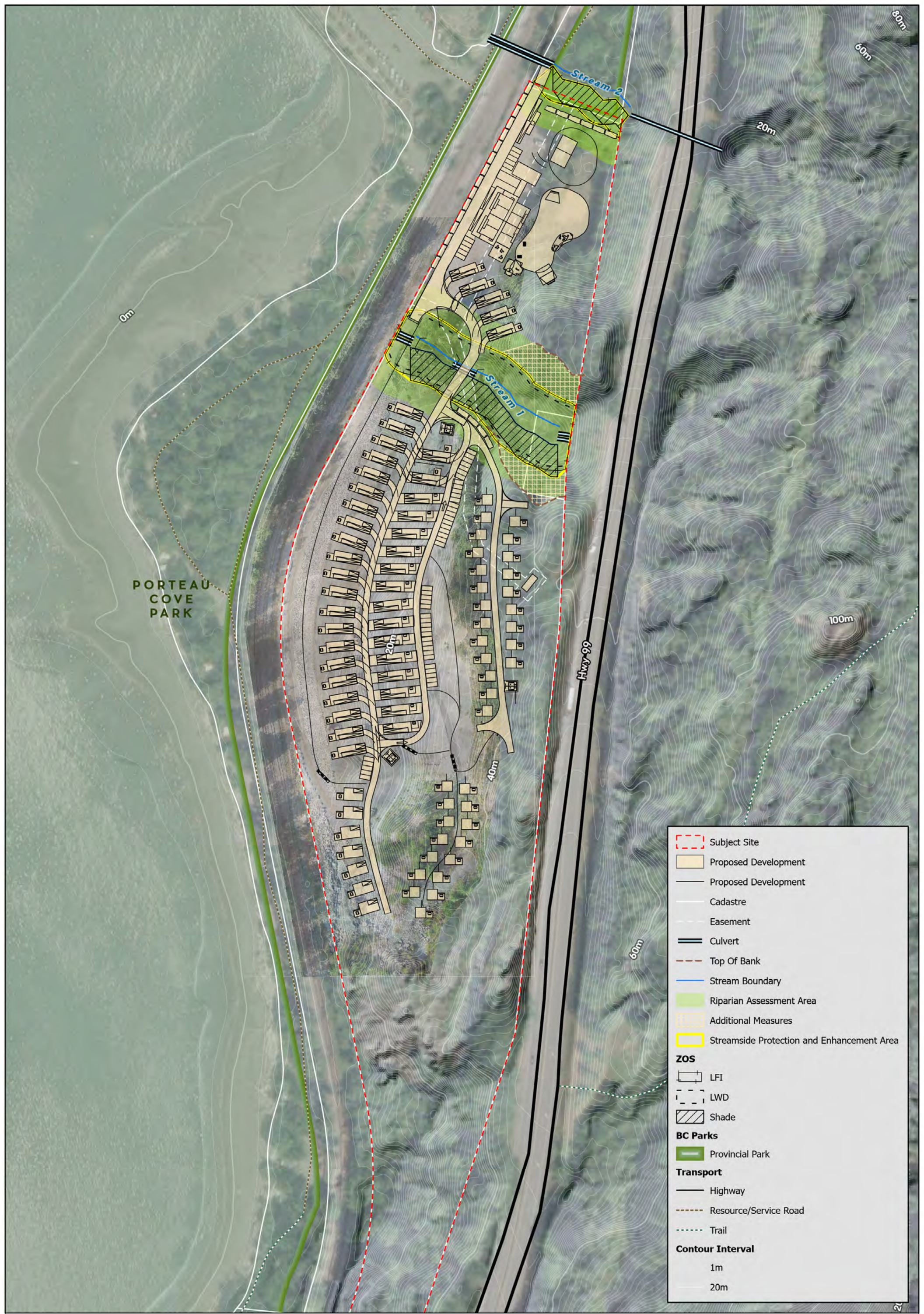
1m

20m

GIS Cartographer: Oliver Chew
Date: 2023-08-02
CERG File #: 496-03-01
Projection: NAD 1983 UTM Zone 10N



Map 2 - Streamside Protection and Enhancement Areas
Porteau Cove Campground
Porteau Cove
British Columbia



Subject Site

Proposed Development

Proposed Development

Cadastre

Easement

Culvert

Top Of Bank

Stream Boundary

Riparian Assessment Area

Additional Measures

Streamsides Protection and Enhancement Area

ZOS

LFI

LWD

Shade

BC Parks

Provincial Park

Transport

Highway

Resource/Service Road

Trail

Contour Interval

1m

20m

Section 4. Measures to Protect and Maintain the SPEA

This section is required for detailed assessments. Attach text or document files, as need, for each element discussed in Part 4 of the RAPR. It is suggested that documents be converted to PDF *before* inserting into the assessment report. Use your "return" button on your keyboard after each line. You must address and sign off each measure. If a specific measure is not being recommended a justification must be provided.

1. Danger Trees	This is currently the rezoning stage of development. A danger tree assessment will be completed once campground development plans are finalized. It is not anticipated that trees will need to be removed from the SPEAs. If there are any trees of concern in the future, a QEP should be obtained to confirm the tree(s) as a danger prior to any removal. Removal of Danger Trees within the SPEA would require replacement in accordance with the provincial Tree Replacement Criteria.
I, <u>Todd Hellinga</u> , hereby certify that: a. I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the <i>Riparian Areas Protection Act</i> ; b. I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Lionsgate</u> ; c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.	
2. Windthrow	A windthrow assessment will be completed once campground development plans are finalized. Tree clearing is not planned within or adjacent to the SPEAs, as such, windthrow is not anticipated to be a concern.
I, <u>Todd Hellinga</u> , hereby certify that: a. I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the <i>Riparian Areas Protection Act</i> ; b. I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Lionsgate</u> ; c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.	
3. Slope Stability	Slope stability is not a concern for development on the Property. See attached report in Appendix B, Slope Stability of the Lower Bench of the Proposed Campground, By RM TEC Engineering, dated June 12, 2023.
I, <u>Mehrdad Zargari</u> , hereby certify that: a. I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the <i>Riparian Areas Protection Act</i> ; b. I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Lionsgate</u> ; c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.	
4. Protection of Trees	No SPEA trees will be impacted by the proposed rezoning. All future development within the Property should be located outside of the SPEAs and above the top of bank. No clearing will occur below the top of ravine bank at the upstream portion of Unnamed Stream 1. Protection of trees in the SPEAs can be achieved by placement of sediment fence on the Unnamed Stream 1 SPEA boundary at its downstream portion, and along the vegetated boundary of Unnamed Stream 2.
I, <u>Todd Hellinga</u> , hereby certify that: a. I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the	

FORM 1

Riparian Areas Protection Regulation - Qualified Environmental Professional - Assessment Report

<i>Riparian Areas Protection Act;</i> b. I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Lionsgate</u>; c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.	
5. Encroachment	No further encroachment into the SPEAs will occur as a result of the proposed rezoning. Existing uses will continue within the denuded portions of the SPEAs (eg. roads and material fill). The westernmost (downstream) portion of the Unnamed Stream 1 SPEA will be enhanced through native planting above the culvert that is currently a gravel access road. At its upstream extent, the steep ravine banks of Unnamed Stream 1 will prevent encroachment into the SPEA. As no development is recommended below the ravine TOB, the recommended additional measure, in the form of an added riparian setback extends to the ravine TOB, up to a maximum of 76 m wide measured from the HWM. Post development, encroachment into the Unnamed Stream 1 SPEA will be discouraged by the steep ravine banks and by the vegetated barrier posed by the forest. Encroachment into Unnamed Stream 2 SPEA will be prevented through the use of construction fencing during construction and through permanent split rail fencing or a vegetated barrier post-construction.
I, <u>Todd Hellinga</u>, hereby certify that: a. I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the <i>Riparian Areas Protection Act</i>; b. I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Lionsgate</u>; c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.	
6. Sediment and Erosion Control	No sediment and erosion control issues are expected as a result of the proposed rezoning. An updated RAPR Assessment Report should be prepared once development plans are finalised.
I, <u>Todd Hellinga</u>, hereby certify that: a. I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the <i>Riparian Areas Protection Act</i>; b. I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Lionsgate</u>; c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.	
7. Stormwater Management	No stormwater management issues are expected as a result of the proposed rezoning. The future campground development will result in a marginal increase in the total impervious area of the Property from surfaces such as roof tops and access roads. Minimizing the impervious area of the development (i.e. permeable campsites, maintaining greenspace, gravel trails, etc.) will effectively decrease the stormwater impacts.
I, <u>Todd Hellinga</u>, hereby certify that: a. I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the <i>Riparian Areas Protection Act</i>; b. I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Lionsgate</u>;	

FORM 1

Riparian Areas Protection Regulation - Qualified Environmental Professional - Assessment Report

c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.		
<table border="1"> <tr> <td data-bbox="217 247 667 310"> 8. Floodplain Concerns (highly mobile channel) </td> <td data-bbox="667 247 1395 310"> There are no floodplain concerns for the Property. </td> </tr> </table>	8. Floodplain Concerns (highly mobile channel)	There are no floodplain concerns for the Property.
8. Floodplain Concerns (highly mobile channel)	There are no floodplain concerns for the Property.	
I, <u>Todd Hellinga</u>, hereby certify that: a. I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the <i>Riparian Areas Protection Act</i>; b. I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Lionsgate</u>; c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.		

Section 5. Environmental Monitoring

Attach text or document files explaining the monitoring regimen Use your "return" button on your keyboard after each line. It is suggested that all document be converted to PDF *before* inserting into the PDF version of the assessment report. Include actions required, monitoring schedule, communications plan, and requirement for a post development report.

No environmental monitoring is required for the rezoning application. Once future development plans are finalised, an updated RAPR Assessment Report should be prepared.

It is the proponent's responsibility to inform the QEP of the commencement date for development, and to ensure that all future construction activities comply with the requirements of the RAPR.

The monitoring schedule for the future development will include a site visit at the start of the construction phase of the project to ensure that staking and fencing of the SPEA boundary is complete. Additional site visits are required to be made by the QEP periodically throughout construction to ensure that the measures to protect the SPEA are implemented and maintained. A follow-up visit will be made at the completion of the construction so that the QEP can prepare a report to submit to RARNS. It is the responsibility of the client to notify the QEP upon completion of construction.

Should any development activities be non-compliant with the requirements detailed in this RAPR Assessment Report, the Riparian Areas Protection Regulation, the *Water Sustainability Act* or the federal *Fisheries Act* the non-compliant activities will be reported to the Ministry of Land, Water and Resource Stewardship and the Squamish-Lillooet Regional District in a timely manner.

Section 6. Photos

Provide a description of what the photo is depicting, and where it is in relation to the site plan.



Photo 1: Culverts (~2 m diameter) that convey Unnamed Stream 1 under highway 99 onto the Property.



Photo 2: Looking upstream at river cobble and boulders within the dry stream bed of Unnamed Stream 1 on the Property.

FORM 1

Riparian Areas Protection Regulation - Qualified Environmental Professional - Assessment Report



Photo 3: Looking at river left stream bank erosion indicative of heavy flows during the wet season in Unnamed Stream 1.



Photo 4: Looking downstream at the large culvert (~2.8 m diameter) that conveys Unnamed Stream 1 under the gravel access road for the aggregate quarry on the Property.

FORM 1

Riparian Areas Protection Regulation - Qualified Environmental Professional - Assessment Report



Photo 5: Looking downstream at water pipes crossing Unnamed Stream 1 on the Property that convey drinking water to the neighbouring provincial park to the west of the Property.



Photo 6: Looking downstream at two culverts (~0.8 m diameter) that convey Unnamed Stream 1 under a gravel access road on the Property and the railway tracks, located off Property.

FORM 1

Riparian Areas Protection Regulation - Qualified Environmental Professional - Assessment Report



Photo 7: Looking downstream at the Unnamed Stream 1 outlet into Howe Sound onto the provincial campground beach area. This is located on the neighbouring provincial campground property to the west.



Photo 8: Looking south at the aggregate quarry activities on the Property. The trees circled in red are the only riparian trees remaining within the Unnamed Stream 1 SPEA at the stream's downstream extent.

FORM 1

Riparian Areas Protection Regulation - Qualified Environmental Professional - Assessment Report



Photo 9: Looking east (upstream) at the large culvert that conveys Unnamed Stream 2 under Highway 99.



Photo 10: Looking west at the thin strip of riparian vegetation along the southern bank of Unnamed Stream 2. Note the gravel stockpile intrusion into the SPEA.

FORM 1

Riparian Areas Protection Regulation - Qualified Environmental Professional - Assessment Report



Photo 11: Looking west (downstream) at the two water pipes crossing Unnamed Stream 2.



Photo 12: Looking west (downstream) at the culvert that convey Unnamed Stream 2 under the Property access road, the railway tracks, and the Provincial Park access road.

FORM 1

Riparian Areas Protection Regulation - Qualified Environmental Professional - Assessment Report



Photo 13: Looking south at the Property access road where it crosses Unnamed Stream 2.



Photo 14: Looking north at the outlet of Unnamed Stream 2 into Howe Sound.

Section 7. Professional Opinion

Qualified Environmental Professional opinion on the development proposal's riparian assessment.

Date August 10, 2023

1. I/We Todd Hellinga, A.Sc.T and Mehrdad Zargari, P.Eng.

Please list name(s) of qualified environmental professional(s) and their professional designation that are involved in assessment.)

hereby certify that:

- a) I am/We are qualified environmental professional(s), as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;
- b) I am/We are qualified to carry out the assessment of the proposal made by the developer Lionsgate, which proposal is described in section 3 of this Assessment Report (the "development proposal"),
- c) I have/We have carried out an assessment of the development proposal and my/our assessment is set out in this Assessment Report; and
- d) In carrying out my/our assessment of the development proposal, I have/We have followed the specifications of the Riparian Areas Protection Regulation and assessment methodology set out in the minister's manual; AND

2. As qualified environmental professional(s), I/we hereby provide my/our professional opinion that:

- a) N/A the site of the proposed development is subject to undue hardship, (if **applicable, indicate N/A otherwise**) and
- b) ☒ the proposed development will meet the **riparian protection standard** if the development proceeds as proposed in the report and complies with the measures, if any, recommended in the report.

[NOTE: "Qualified Environmental Professional" means an individual as described in section 21 of the Riparian Areas Protection Regulation.]

Submission Instructions

Riparian Areas Protection Regulation – Qualified Environmental Professional – Assessment Report RAR-QEP-AR

Forms you will need to complete are

- Form 1 which has the database information, the description of the fisheries resources, development site plan, measures to protect and maintain the SPEA, and environmental monitoring.
- Form 2, if more QEPs are part of the project team.
- Either Form 3 the detailed assessment form(s) or Form 4 simple assessment form(s) which is for the results of the riparian assessment (SPEA width). Use enough copies of the form to complete the assessment of the site.
- Form 5 is the photo form(s). Duplicate for additional photos.

NB: Refer to Part 4 of the RAPR and the Technical Manual for detailed instructions on the information required for completing the Assessment Report.

A complete Riparian Assessment Report based on the template forms must be converted to a *single* Portable Document Format PDF file prior to uploading onto the Notification System.

The Assessment Report must be submitted complete with all information specified and posted to the notification system to be reviewed by the province. Upon approval notification will be provided to the local government.

Tips for working with MS Word Template Forms**Using the forms**

- Before beginning, print a hard copy of the form and the guidance files for reference
- Open the template
- Enter data into the shaded fields on the form
- Use TAB to move from one field to another; SHIFT-TAB to go in reverse
- Text and digital photos may be inserted from other applications
- The amount of text that can be entered in each box is limited and cannot be changed by the user; boxes with date information, for example, require input like: yyyy-mm-dd.

Saving the completed form

- Assign name to the completed form
- Save a word document (*.doc file)
- Do not overwrite the Template (*.dot file) with your completed form
- If you do overwrite the template, you can download a new copy from this web site

Section 8. Appendices

Appendix A: Invasive Species Management Plan



MEMORANDUM

DATE: July 7th, 2023
TO: Paul Wood & Reza Shahrestani, Lionsgate Excavations Ltd.
CC: Squamish-Lillooet Regional District Planning Department
FROM: Erin Schott, R.B.Tech IT., Jordann Foster, R.P.Bio., of Cascade Environmental Resource Group Ltd.
RE: Invasive Species Management Plan for the Porteau Cove Campground, SLRD Area D, BC
FILE #: 496-03-01

Cascade Environmental Resource Group Ltd. (Cascade) was retained by Lionsgate Excavations Ltd. (Lionsgate) to prepare an Invasive Species Management Plan (ISMP) for the proposed Porteau Cove Campground (PID: 027-966-950, Map 1). This plan documents the invasive species found onsite and provides a strategy for the treatment and removal of those species. A field investigation was conducted on June 29th, 2023 to document and map existing invasive species onsite (Map 2).

1 Introduction

Invasive species are introduced, or “non-native”, species that have adversely affected the regions they invade by incurring harmful or undesirable impacts on humans, animals, or ecosystems. Invasive plants establish quickly and easily, especially on disturbed sites, and often outcompete native plants. These plants may be introduced to the area by machinery and equipment transported to the site or may already exist in the area and opportunistically colonise areas cleared for construction/access. Unmanaged, invasive species can cause widespread negative economic, social, and environmental impacts.

There are several relevant acts and bylaws that account for invasive species management in the Squamish-Lillooet Regional District (SLRD): The BC Weed Control Act (BCWCA) and the SLRD Noxious Weeds Control Bylaw No. 1542-2018. The BCWCA imposes a responsibility on land occupiers to control designated noxious plants, in order to protect natural resources and industry from the negative impacts of non-native weeds. The BCWCA also applies to private forest lands, and land used for sorting and equipment storage. In cooperation with the Sea to Sky Invasive Species Council (SSISC), bylaw 1542 - 2018 (SLRD, 2018) states that no person shall plant noxious weeds on any property within the regional district. The bylaw also places responsibility on landowners and occupiers to control any noxious weeds found on the property (SLRD, 2018).

The Sea to Sky Invasive Species Council classifies invasive species into five management categories:

1. **Prevent:** species not found in the SSISC region (early detection and rapid response).
2. **Eradicate:** species is found in the region (early detection and rapid response).
3. **Contain:** species not found in entire region (keep species from spreading into non-infested areas).
4. **Strategic Control:** species is widespread (control measures to take place in high priority areas only).



5. **No Action:** species is widespread (site-scale control is ineffective or futile and/or these species have relatively low impact).
6. **Insufficient Information:** Not enough information to assign a management category. Carry out inventory and monitoring known locations.

The proposed Porteau Cove campground is located in Electoral Area D of the SLRD on a privately owned Property, which is zoned as Rural Resource 3 (RR3). The Property is approximately 7.27 ha and is located on the south side of Highway 99, directly adjacent to the existing Porteau Cove Provincial Campground. The Property is currently being used for aggregate extraction in alignment with the permitted uses of the RR3 zoning.

An invasive species survey was conducted on June 29th, 2023 by Jordann Foster, R.P.Bio., Erin Schott, R.B.Tech IT., and Kristen Radosevic, B.I.T. A total of 20 invasive plant species were noted within the Property. The individual species are described below and shown in Table 1 and Map 2.

Table 1: List of Invasive Species Observed on the Property

Common Name	Scientific Name	Invaded area	SSISC Classification
Tansy Ragwort	<i>Jacobaea vulgaris</i>	Few occurrences along the access road.	Eradicate
Broad-leaved peavine	<i>Lathyrus latifolius</i>	Single occurrence along the southwestern Property boundary.	Eradicate
Butterfly Bush	<i>Buddleja davidii</i>	Various locations throughout the Property. Along eastern access road towards southern section of the Property.	Contain
Bull thistle	<i>Cirsium vulgare</i>	Single occurrences along eastern access road towards the southern section of the Property.	Strategic Control
Foxglove	<i>Digitalis purpurea</i>	Found consistently throughout the Property.	Strategic Control
St. Johns wort	<i>Hypericum perforatum</i>	Widespread throughout the Property.	Strategic Control
Oxeye daisy	<i>Leucanthemum vulgare</i>	Sound near the southern section of the Property.	Strategic Control
Common tansy	<i>Linaria vulgare</i>	Single occurrence on the southwest side of the Property, near the train tracks.	Strategic Control



Himalayan Blackberry	<i>Rubus armeniacus</i>	Found consistently throughout the Property.	Strategic Control
Cutleaf evergreen blackberry	<i>Rubus laciniatus</i>	Location along the eastern boundary of the septic field.	Strategic Control
Small-flowered touch me not	<i>Impatiens parviflora</i>	Large patch covering a stockpile mound west of the septic field.	Insufficient Information
Nipple wort	<i>Lapsana communis</i>	Found at various locations throughout the Property.	Insufficient Information
Prickly Sow thistle	<i>Sonchus asper</i>	Few single occurrences to the west of the septic field.	Insufficient Information
White Sweet Clover	<i>Melilotus alba</i>	Found along the western Property boundary.	No Action
Wall lettuce	<i>Mycelis muralis</i>	Found in various locations throughout the Property.	No Action
Curled Dock	<i>Rumex crispus</i>	Found on a stockpile mound west of the septic field.	No Action
Sticky Ragwort	<i>Senecio viscosus</i>	Found consistently throughout the Property.	No Action
Dandelion	<i>Taraxacum officinale</i>	Found in various locations throughout the Property.	No Action
White clover	<i>Trifolium repens</i>	Found in various locations throughout the Property.	No Action
Mullein	<i>Verbascum thapsus</i>	Found in various locations throughout the Property.	No Action

* Source: SSISC, 2023.



GIS Cartographer: Oliver Chew
 Date: 2023-06-30
 CERF File #: 496-03-01
 Projection: NAD 1983 UTM Zone 10N



0 0.5 1 2 3 4
 Kilometers

Map 1 - Location

Porteau Cove Campground
 Porteau Cove
 British Columbia

CODE ON MAP	SPECIES
BP	BROAD-LEAVED PEAVINE
HBB	HIMALAYAN BLACKBERRY
TW	TANSY RAGWORT
CD	CURLED DOCK
CLB	CUT LEAFED BLACKBERRY
BT	BULL THISTLE
SJW	ST JOHNS WORT
BB	BUTTERFLY BUSH
FG	FOXGLOVE
OD	OXEYE DAISY
CT	COMMON TANSY

Subject Site

Cadastre - DataBC

Railway - Main

Railway - Connecting

BC Parks

Provincial Park

Invasive Species

Butterfly Bush

Himalayan Blackberry

Mixed

St Johns Wort

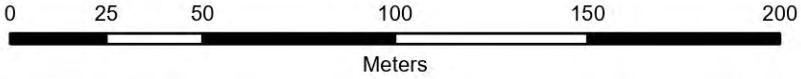
Tansy Ragwort

Contour Interval

1m

20m

GIS Cartographer: Oliver Chew
Date: 2023-07-04
CERG File #: 496-03-01
Projection: NAD 1983 UTM Zone 10N



Map 2 - Invasive Species

Porteau Cove Campground
Porteau Cove
British Columbia



2 Invasive Species

2.1 Eradicate

Tansy ragwort

Jacobaea vulgaris

Tansy ragwort is a biennial or short-lived perennial native to Europe and was introduced into North America in the 1900's through contaminated hay supplies. This plant grows in areas with well-drained soil and full or partial sun (SSISC, 2023). Tansy ragwort mainly reproduces by seed, spreading them primarily through the wind, but they can also be spread by people, water, animals, and livestock. Seeds can remain viable in the soil for up to 15 years and tilling or any disturbance to the area can allow these seeds to germinate. Vegetative propagation can also occur, where crown buds, root fragments and intact roots can grow new regenerated shoots (SSISC, 2023).

This noxious weed is also known to be toxic to livestock in cumulative doses and is known to reduce overall productivity in livestock areas. Liver damage can be possible in some animals that are particularly susceptible to its toxins (SSISC, 2023).



Photo 1: An example of tansy ragwort mature plant on the Property. June 29, 2023.



Photo 2: An example of a tansy ragwort rosette on the Property. June 29, 2023.

Broad-leaved peavine

Lathyrus latifolius

Broad-leaved peavine is a perennial that originates from the Mediterranean and was brought to North America mainly as a showy ornamental due to its large, beautiful flowers, but had also been used for erosion control measures. As most members of the legume family, broad-leaved peavine is a trailing/climbing plant that prefers areas of partial or full sun, with moderately dry soils. Peavine mainly reproduces through rhizomes, producing buds from lateral shoots in the spring and dying back in the winter. It can reproduce by seed as well by launching its mature seeds up to 9m away from the original plant (SSISC, 2023).

Broad-leaved peavine has ecological impacts as well as health impacts to both humans and wildlife. It forms large dense patches that quickly overtakes and outcompetes native herb and low-lying shrub species. Additionally, due to its climbing nature, this species can also choke out larger shrub species and even trees (SSISC, 2023). For humans and wildlife, the fruit and leaves contain toxic compounds that, if ingested in large enough quantities, can cause lathyrism which is an incurable neurological disorder that affects the muscles of the legs (Wroblewski, 2014).



Photo 3: An example of broad-leaved peavine leaves and stem on the Property. June 29, 2023.



Photo 4: An example of broad-leaved peavine flowers. June 29, 2023.

2.2 Contain

Butterfly bush

Buddleja davidii

Butterfly Bush is a pioneer species and takes hold quickly in disturbed areas. It can also be found growing along nutrient rich coastal forest edges and in riparian areas but is well adapted to flourish in challenging growing conditions as well. Butterfly bush forms dense thickets, which crowd out native vegetation and may alter soil nutrient concentrations. Contrary to its suggestive name, butterfly bush is detrimental to butterfly larvae as it does not provide a food source and, therefore, can reduce butterfly populations (SSISC, 2023).

Butterfly bush spreads both vegetatively and by seed. New shoots can form from the root stock or from broken branches and cut stems. Seeds and plant fragments can be spread by wind, water, humans, or machines. Butterfly bush can produce seeds in its first year of growth and produce up to 40,000 seeds at maturity, seeds can stay viable in the soil for 3-5 years (SSISC, 2023).



Photo 5: An example of butterfly bush leaves and stem found on the Property. June 29, 2023.



Photo 6: An example of a mature butterfly bush on the Property. June 29, 2023.

2.3 Strategic Control

Bull thistle

Cirsium vulgare

Bull thistle is native to Europe and Asia and is believed to have been introduced through seed contaminants. Like most thistles, bull thistle produces gum-drop shaped flower that is usually purple in color. Bull thistle is completely covered in spines, from the base to the tips of its deeply lobed alternating leaves. These plants can grow up to 2 m tall and have a short taproot with small lateral roots extending laterally to aid in its spread (SSISC, 2023).

Bull thistle produces a high number of seeds causing it to spread rapidly, thus reducing biodiversity as it becomes established. Due to its spiny nature and large lateral growth, this species can often create barriers to movement for humans and for wildlife (SSISC, 2023).



Photo 7: An example of bull thistle occurrence on the Property. June 29, 2023.



Photo 8: An example of bull thistle found on the Property. June 29, 2023.



Foxglove

Digitalis purpurea

Foxglove is a biennial or short-lived perennial that outcompetes native plants due to the natural succession process. The plant produces flowers and seeds in its second year of growth and a single plant can produce up to 5000 seeds per year. Seeds are dispersed by wind, water, contaminated soils, and gardening equipment.

Foxglove leaves, flowers, and seeds contain a chemical called glycoside digitoxin which can be highly toxic to humans and animals. If ingested, foxglove can cause serious harm and death. Additionally, if this plant comes into contact with skin, it can cause irritation (SSISC, 2023).



Photo 9: An example of foxglove stem and lowers found on the Property. June 29, 2023.



Photo 10: An example of foxglove leaves and seed formation found on the Property. June 29, 2023.



Common St. John's Wort

Hypericum perforatum

St. John's wort is a perennial medicinal herb native to North Africa, Europe, and western Asia. It is characterized by bright yellow, 5-petal flowers that grow in clusters of up to 100. St. John's wort can grow up to 1m tall with multiple stems coming from a single plant. To help with identification, the leaves can be held up to the light to reveal transparent dots. It spread through seed dispersal and vegetatively through its root system. Each plant can produce up to 100,000 seeds, which can stay viable in the soil for up to 10 years (SSISC, 2023).

Although it has medicinal benefits, St. John's wort reduces biodiversity for native species. It is toxic to livestock and contact with its sap can cause skin irritation in humans (SSISC, 2023).



Photo 11: An example of St. Johns wort flowers found on the Property. June 29, 2023.



Photo 12: An example of a cluster of St. Johns wort found on the Property. June 29, 2023.

Oxeye daisy

Leucanthemum vulgare

Oxeye daisy is a perennial forb that is native to Europe. The leaves are serrated, and lance shaped that alternate and become smaller as they go up the stem. Stems are usually singular and unbranched, but sometimes branch at the very top. Oxeye daisy thrives in a wide range of environments, but is most commonly found in grasslands, pastures, meadows, or roadsides.

It can spread through seed production or vegetatively through its root system. Since oxeye daisy is such an aggressive invader, it has large impacts on pastures and grasslands by reducing native forage species and overall native species diversity. Many grazing animals will consume oxeye daisy, but it has been known to give milk produced by livestock that consume this plant an off flavour.



Photo 13: An example of a cluster of oxeye daisy in bloom found on the Property. June 29, 2023.



Photo 14: An example of senescing oxeye daisy patch found on the Property. June 29, 2023.



Common Tansy

Tanacetum vulgare

Common tansy is a perennial forb native to Europe, Asia, and Siberia, that was brought over to North America as a medicinal plant. Tansy has bright yellow button flowers with no petals and can grow almost 2 m tall. Its leaves are deeply lobed and serrated and grow alternately up the stem. It prefers dry areas with lots of sun and well-draining soils but can grow very well in wet, coastal habitats (SSISC, 2023).

Common tansy propagates both by seed and vegetatively through its rhizomes. A single plant can produce as many as 50,000 seeds which can stay viable in the soil for around 25 years, making their seed banks very extensive. Because of this, tansy easily outcompetes native species and causes displacement of forage in pastures. In addition, this plant is toxic to both humans and animals, and can affect the honey from bees (SSISC, 2023).



Photo 15: An example of common tansy found on the Property. June 29, 2023.



Himalayan Blackberry

Rubus armeniacus

Himalayan blackberry is said to originate from either Armenia or Northern Iran, and potentially parts of Western Europe and was introduced to North America in the late 1800's as a cultivated crop. Once established, it dominates at lower elevations in areas such as ditches, wastelands, pastures, and most disturbed areas (SSISC, 2023).

Himalayan blackberry is one of the most aggressively growing invasive plant species in the Sea to Sky corridor. With thick canes, sharp thorns, and extensive root systems, Himalayan blackberry quickly outcompetes important native vegetation and alters native habitat (SSISC, 2023). Dense growth also restricts wildlife access to watercourses and limits recreational access.



Photo 16: An example of a Himalayan blackberry cane found on the Property. June 29, 2023.



Photo 17: An example of a Himalayan blackberry patch found on the Property. June 29, 2023.



Cut-leaf Evergreen Blackberry

Rubus laciniatus

Cut-leaf evergreen blackberry is an evergreen shrub that was introduced to North America from Europe for fruit production. It is characterized by long upright or arched canes that are covered in thorns with serrated dark green, deeply divided leaves with 5 leaflets. Like its two counterparts, Himalayan and trailing blackberry, it produces edible dark berries that ripen later in the summer (SSISC, 2023).

Cut-leaf blackberry reproduces vegetatively and through seed production. The seeds are usually spread through animals by the ingestion of berries and then excreting the seeds later away from the parent plant. Cut-leaf blackberry can spread through their long canes, once either the tip or a section of the cane touches the ground, roots can form and grow a new plant. These features make cut leaf blackberry an aggressive invader, outcompeting native vegetation, reducing biodiversity, invade stream banks reducing access to waterbodies for wildlife (SSISC, 2023).



Photo 18: An example of the leaves and canes of cut leaf evergreen blackberry found on the Property. June 29, 2023.



Photo 19: A closer example of cut leaf evergreen blackberry leaves. June 29, 2023.



3 Invasive Species Management Techniques

The objective of this management plan is to address the safe removal and disposal of invasive species from the Property, so that they are not spread within site or offsite in the process of invasive removal. All invasive species will be removed from the Property during the proposed campground development.

The following paragraphs provide species-specific and site-specific recommendations for removal methodology for each species. Invasive plant material, including vegetation and soils with root matter or seeds, should be kept separate from clean organics. All invasive plant material onsite can be disposed of at the Squamish landfill. However, invasive species contaminated soils cannot be disposed of at the Squamish landfill and must be taken to an appropriate facility in Vancouver. A list of these facilities can be found when searching for invasive species disposal on the Metro Vancouver website (<http://www.metrovancouver.org/>). Additionally, please refer to the Invasive Species Council of BC for more information on the best practices for removal of various invasive species (<https://bcinvasives.ca/resources/tips/>).

3.1 Removal of Invasive Species on the Property

Invasive plant material and the soils containing invasive species within the development footprint can be removed by hand or by excavation. Care must be taken to ensure that the material is not spread during removal by ensuring that the excavator bucket and trucks are not overfilled, and that hand tools and machinery are cleaned of invasive material following removal and prior to leaving the Property. Alternately, areas on the Property that are being infilled with additional soil can be left untreated as the additional soil placement on top of the invasive species will aid in mitigating additional growth and spread of those species. However, these areas must be monitored for any signs of regrowth and any invasive species found that are outlined in this report should be subsequently removed.

Tansy Ragwort

Tansy ragwort can be treated both chemically and mechanically. Mechanical removal is more effective on smaller infestations, chemical treatment is most effective on larger infestations. Tansy ragwort is only effectively removed by hand if the entire root system is removed with the stems. Hand removal may need to be repeated frequently if any regrowth occurs from seeds or leftover root matter (SSISC, 2023).

Broad-leaved peavine

Broad-leaved peavine can be treated both mechanically and chemically. Infestations can be hand-pulled or cut; however, this method is only temporary as plants can re-grow from any remaining root fragments. Another option is covering the area with fabric, preferably impermeable, and left to sit for no less than two (2) years, with regular monitoring. Depending on the area and if there are other species growing within the peavine, this method may hinder the growth of those species as well (SSISC, 2023).

Butterfly Bush

Mechanical control is an effective way of controlling this species. Smaller plants can be hand-pulled, and larger plants can be cut near the base and stumps grubbed. If stumps cannot be removed and grubbed, plastic can be placed over the exposed stump to prevent regeneration (SSISC, 2023). Removal should take place in the summer before seed production begins. All removed plant material should be taken off site and disposed of properly.



Bull thistle

Mechanical treatment is the easiest and most effective method of control for bull thistle. Hand pulling or repeated mowing of small patches of bull thistle has proven to be effective (SSISC, 2023). However, since this plant only reproduces through seed, monitoring and repeated removal may be needed to ensure the population has been eradicated. Chemical treatment can also be effective but only while the bull thistles are still in rosette form or directly after mowing. A wide variety of herbicides, like aminopyralid, clopyralid, and glyphosate for example, are all effective at controlling bull thistle (SSISC, 2023).

Foxglove

Hand-pulling is proven to be the most effective and efficient method of control for this plant species. However, gloves are required for any hand pulling efforts to avoid skin contact with the toxic plant. When hand-pulling, ensure that the entire root is removed, and that the flowers are bagged. Refrain from shaking the plant when removing flowers, as seeds can be dispersed back into the soil (SSISC, 2023).

St. Johns wort

Chemical treatment is the most effective control method for St. John's wort. There are many different herbicides that are available for the treatment of St. John's wort. 2,4-D, aminopyralid, glyphosate, and metsulfuron are the most effective post emergence but pre-bloom. Mechanical treatment is not an effective control measure because of its shallow yet extensive root system that can extend 45 cm from the original plant. Plants will regrow from even a tiny amount of root matter left in the soil (SSISC, 2023). Although excavation could be an effective mechanical treatment method as it would remove much of the root system along with the plant.

Oxeye daisy

Both mechanical and chemical treatments can be used to control oxeye daisy. Before the plant begins to produce seeds, it can be dug out by hand. When doing so, ensure to remove as much of the root as possible. Additionally, mowing can be an effective method to reduce the production of seeds, but it should be completed again as it may stimulate plant growth. Effective herbicides to treat oxeye daisy include Clopyralid, metsulfuron methyl, and 2,4-D, depending on the specific situation (SSISC, 2023).

Common tansy

Mechanical removal is not a highly recommended method for controlling common tansy infestations. Since common tansy can cause skin irritation in humans, mechanical removal by hand-pulling should not be performed unless wearing personal protective equipment (PPE). Mowing will only cause tansy to increase its growth but can be a good way of controlling seed production. Chemical treatment is the most effective at controlling common tansy. Chemicals such as metsulfuron methyl and aminopyralid have proven to be the most effective (SSISC, 2023).

Himalayan Blackberry

Chemical treatment of blackberry species is not recommended as they are actively foraged by humans and wildlife. Himalayan blackberry on the Property should be treated before adjacent soils are disturbed (i.e. site preparation works). Mechanical control is recommended, where



blackberry should be cut low to the ground followed by the removal of the entire root-crown (SSISC, 2022). All plant material should be taken off site and disposed of properly and re-growth should be cut or mowed several times per year. The removal should take place as soon as possible, or in spring before the plant produced berries, with subsequent treatments throughout the growing season.

Metro Van BMP 2021 <http://www.metrovancouver.org/services/regional-planning/PlanningPublications/HimalayanBlackberryBMP.pdf>

Cutleaf evergreen blackberry

Chemical treatment of blackberry species is not recommended as they are actively foraged by humans and wildlife. Therefore, mechanical treatment is the recommended control method for this species. Blackberry canes should be cut near the base and then the root ball should be dug out, trying to remove as much root as possible (SSISC, 2023). All plant parts should be bagged and disposed of as invasive species. Excavation can also be an effective method for removal, but the soil will need to be disposed of as invasive species contaminated soil.

3.2 Disposal Guidelines

The disposal protocols for invasive plants vary depending on the species and on whether the material being disposed of contains only plant material or also the contaminated soils. Care should be taken not to spread these soils to other locations within the Property or to other properties during transport and disposal. All invasive species must be transported in an enclosed manner, either in bags or tarps to prevent further spread of the species. Any species removed by hand must be placed in garbage bags and sealed before disposal.

3.3 Invasive Plant Material

Invasive plant material can be disposed of at the Squamish landfill for a tipping fee. Large loads must go through the weighing scale and the attendant should be informed that invasive species are being disposed of. The attendant will provide instructions as to where to dispose of the invasive species. Note that 48-hour notice to the Squamish landfill is required prior to dropping off invasive plant material. **Soils** that contain invasive species **cannot** be disposed of at the Squamish landfill, see section 3.4 for invasive contaminated soil disposal.

For more information on the District of Squamish Landfill tipping fees and disposal protocol, please visit:

https://squamish.ca/assets/ENVIRONMENT/07929bb0b1/Invasive_plant_disposal_protocol_DOS_190819.pdf

3.4 Soils Contaminated with Invasive Species

The surface soils adjacent to the invasive plants will likely contain seed banks and remnant root material. Note that the Squamish landfill does not accept soils contaminated with invasive species, only the vegetated matter. The invasive-contaminated soil should be disposed by either deep onsite burial under a landscaped area or at an appropriate offsite disposal facility, which are limited within the District of Squamish. It is recommended that the proponent contact the following companies to plan for disposal (Table 2).



Table 2: Invasive Species Infested Soil Disposal Options

Facility	Contact	Location	Note
Saskay Earth Exchange Ltd.	(778) 801-1701	2650 Pitt River Rd, Port Coquitlam, BC	Accepts invasive infested soils. Call the facility for rates and soil testing requirements.
West Barr Contracting	Al Barr: (604) 892-9390	Lot 37, Plan VAP5201, District Lot 3186, Squamish, BC	Call ahead of time to plan for disposal.
Coast Aggregates	(604) 898-6005	2600 Centennial Way, Squamish, BC	Call ahead of time to plan for disposal.

4 Restoration Planting

Areas where invasive species are removed and that will remain undeveloped for at least one growing season should be seeded immediately with native vegetation to inhibit the re-growth of invasive species.

5 Conclusion

Invasive plant material and contaminated soils will be removed following the methodology described above from areas both within and potentially beyond the proposed development footprint. The careful removal and disposal of the invasive plants followed by ongoing monitoring will ensure that these species are not spread either on or offsite. If necessary, the subsequent restoration with native species of the area beyond the development footprint will result in an overall improvement in habitat quality.

Please do not hesitate to contact the undersigned should you have any questions or comments.

Prepared by:

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With support and review by:

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604-815-0901
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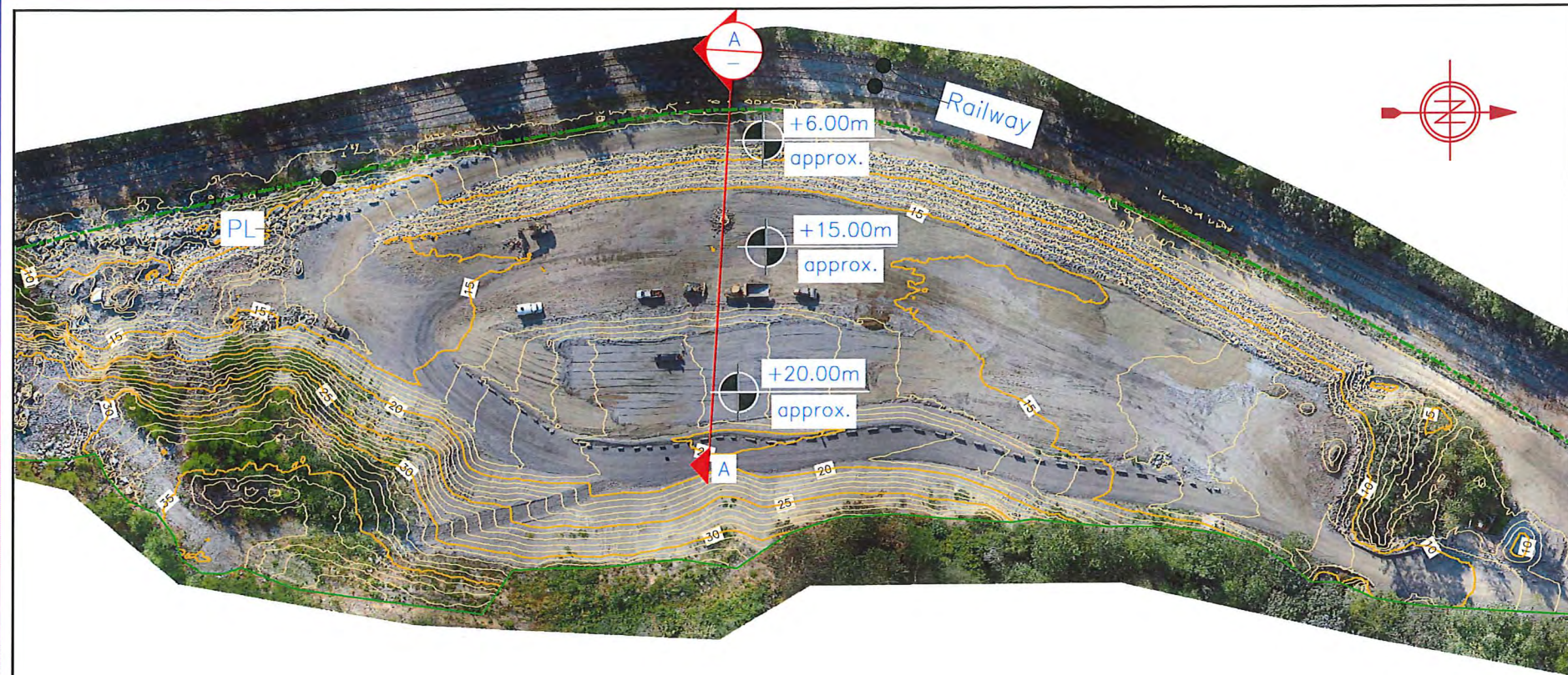
6 References

- BC Weed Control Act (BCWCA). 2022. Website:
https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/96487_01. Accessed on:
July 6, 2023.
- Squamish-Lillooet Regional District (SLRD). 2018. Noxious Weed Control Bylaw No. 1542-2018.
Website: <https://slrd.civicweb.net/document/100563/>. Accessed on: July 6, 2023.
- Squamish-Lillooet Regional District (SLRD). 2017. Invasive Species Management and Control Service
Establishment Bylaw No. 1541-2017. Website: <https://slrd.civicweb.net/document/100562/>.
Accessed on: July 7, 2023.
- Invasive Species Council of BC (ISCBC). 2022. Invasive Plants. Website:
<https://bcinvasives.ca/invasive-species/identify/invasive-plants/>. Accessed on: July 5, 2023
- Sea to Sky Invasive Species Council (SSISC). 2023. Invasive Species. Website:
http://www.ssisc.info/home/invasive_species. Accessed on: July 4, 2023.
- Wroblewski, M. T. (2014, November 21). *Is the Lathyrus Latifolius Edible?* Weekand.com. Website:
<https://www.weekand.com/home-garden/article/lathyrus-latifolius-edible-18021975.php>
Accessed on: June 30, 2023.
- Washington State Noxious Weed Control Board. 2013. Oxeye Daisy - *Leucanthemum vulgare*.
Website: <https://www.nwcb.wa.gov/weeds/oxeye-daisy>. Accessed on: July 4, 2023.

7 Useful Links

- BC Invasives Fact Sheets and other Resources:
<https://bcinvasives.ca/resources/publications/>
- BC Gov priority species
<https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/invasive-species/priority-species>
- Metro Van mgmt. lists
<http://www.metrovancouver.org/services/regional-planning/conserving-connecting/invasive-species/Pages/default.aspx>
- Spheres of Concurrent Jurisdiction- Environment and Wildlife Regulation:
https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/144_2004

Appendix B: Slope Stability Drawing

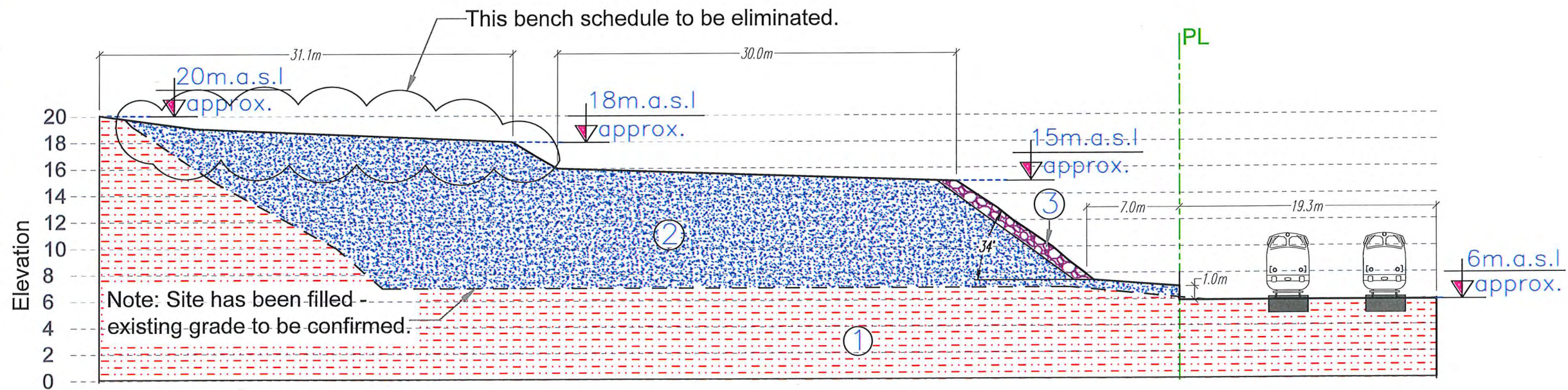


SITE PLAN
PORTEAU COVE PROPOSED CAMPGROUND **N.T.S**



KEY PLAN
N.T.S

Notes:
- All dimensions are in meter unless otherwise noted



EXISTING CONDITION OF THE PORTEAU COVE CAMPGROUND BENCHES
SECTION A-A (**N.T.S**)

RMTEC
ENGINEERING
www.rmtec.ca Email: info@rmtec.ca
#203 - 930 Harbourside Dr. North Vancouver, BC V7P 3S7

Reference:
- Slope Stability Analysis Report – Proposed Campground – Phase 1 (lower bench), Porteau Cove Quarry, Highway 99, BC, Issued by Frontera Geotechnical, #1364, dated October 19, 2022.
- Aerial Survey Drawings, Issued by Spitfire Drone Survey, PLAN SHOWING ORTHOPHOTO AND CONTOURS FROM DRONE LIDAR, Project Code: SAAXXX, Drawing#: S22055-001, Sheet 1 of 1 Rev: A, Dated: September 6, 2022
- Proposed Site Plan, Porteau Cove Campground, Plan and Sections issued by Mordoch Company, Project No. 20.03, Drawings #L-1.0, L 1.1, Issued for Review, Dated March 14, 2022

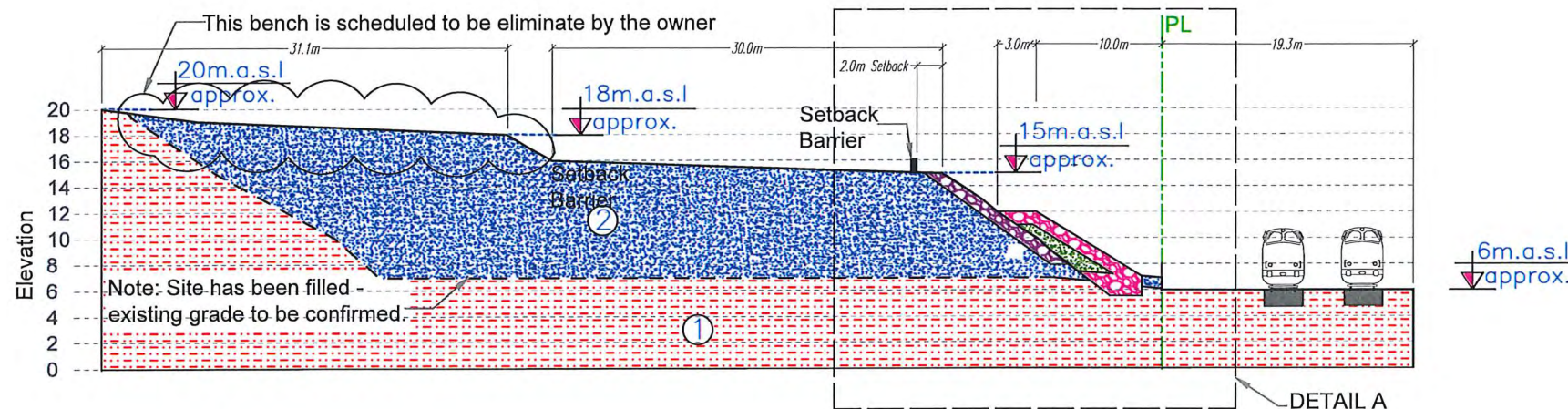
Permit Stamp

Stamp

REVISIONS		
No.	Date	Description

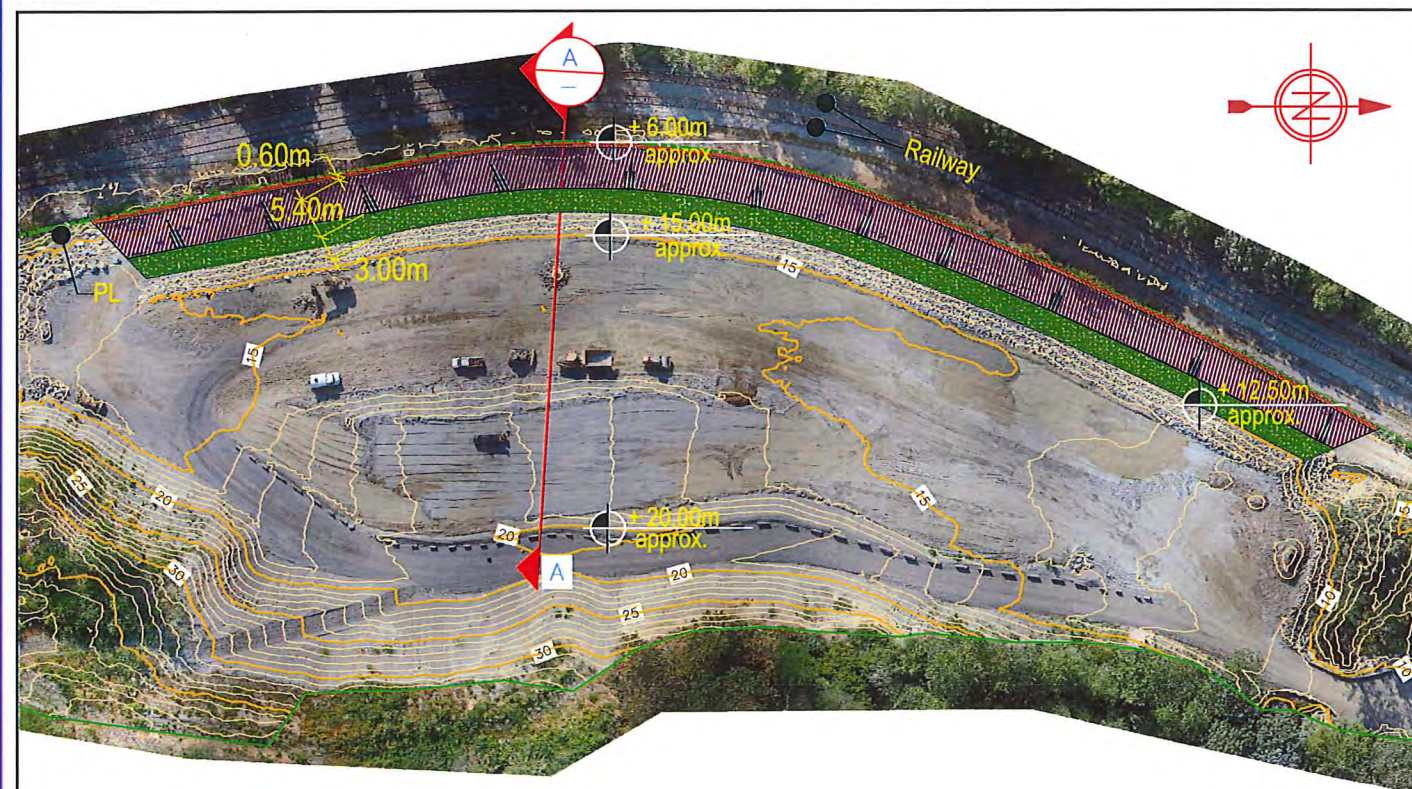
Client	LIONS GATE EXCAVATION LTD
Title	SLOPE STABILITY OF THE LOWER BENCH OF THE PROPOSED CAMPGROUND
Description	PLAN AND SECTIONS
Address	PORTEAU COVE QUARRY, HIGHWAY 99, BC

Job No.	230001	Date	12-June-23
Drawn By	F.P	Approved By	M.Z
Drawing Number	RM-23001-DG-001-00	Scale	AS SHOWN

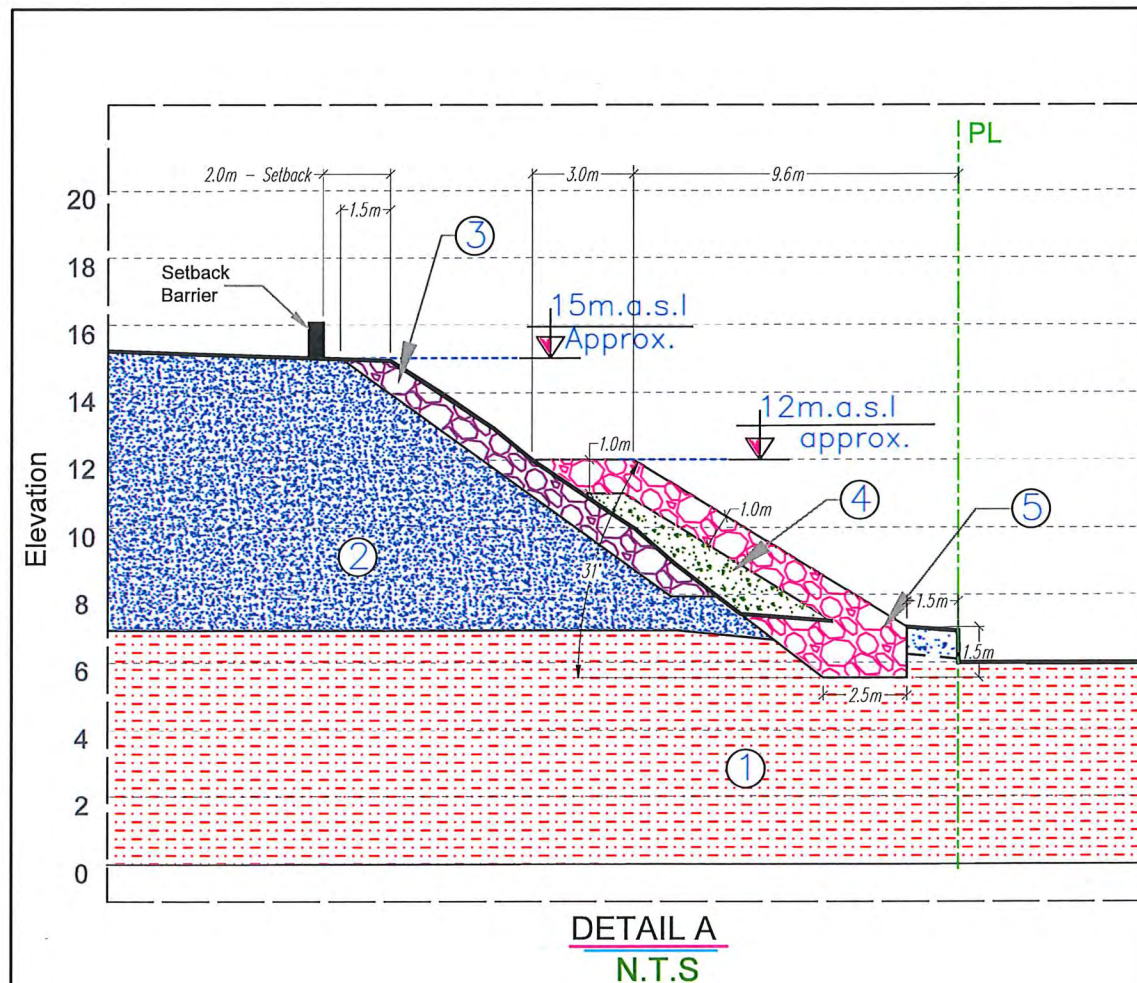


PROPOSED ADDITIONAL FILLED SLOPE
STABILITY OF LOWER BENCH -
PORTEAU COVE CAMPGROUND (N.T.S)

Material Type	Material Detail Description	Comments
1	Native material contains dense Sand and Gravel and Bed Rock.	As per the Referenced Geotechnical Report " Slope Stability Analysis Report – Proposed Campground – Phase 1 (lower bench), Porteau Cove Quarry, Highway 99, BC", Issued by Frontera Geotechnical,#1364, dated October 19, 2022. Soil strength properties were selected based on DCPT provided in the test hole login this report
2	Filled materials with Sand and Gravel, Compacted to Dense with intermeddled of thin silt layers,	As per the Referenced Geotechnical Report " Slope Stability Analysis Report – Proposed Campground – Phase 1 (lower bench), Porteau Cove Quarry, Highway 99, BC", Issued by Frontera Geotechnical,#1364, dated October 19, 2022. Soil strength properties were selected based on DCPT provided in the test hole login this report
3	Existing Rip Rap, Boulders and Large Cobbles with the thickness of almost 1.0m	As per the Referenced Geotechnical Report " Slope Stability Analysis Report – Proposed Campground – Phase 1 (lower bench), Porteau Cove Quarry, Highway 99, BC", Issued by Frontera Geotechnical,#1364, dated October 19, 2022. Soil strength properties were selected based on DCPT provided in the test hole login this report
4	New Fill Materials	Sand and Gravel, well-compacted to 95% standard proctor, RMTEC to review the compaction data. soil gradation chart should be reviewed prior to importing the soils to the site.
5	Rip Rap ; Boulders and Large Cobbles	Boulders and Large Cobbles, Rip Rap sizes to be confirmed by RMTEC Engineers before placing on the slope.



SITE PLAN
PORTEAU COVE PROPOSED CAMPGROUND
ELIMINATE BY THE OWNER N.T.S



RMTEC
ENGINEERING

www.rmtec.ca Email: info@rmtec.ca
 #203 - 930 Harbourside Dr. North Vancouver, BC V7P 3S7

Reference:

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Permit Stamp



REVISIONS		
No	Date	Description

Client	LIONS GATE EXCAVATION LTD
Title	SLOPE STABILITY OF THE LOWER BENCH OF THE PROPOSED CAMPGROUND
Description	PLAN AND SECTIONS
Address	PORTEAU COVE QUARRY, HIGHWAY 99, BC

Project No.	230001	Date	12-June-23
Drawn By	F.P	Approved By	M.Z
Drawing Number	RM-23001-DG-001-00	Scale	AS SHOWN