Tree Island Subdivision

Bio-inventory and Impact Assessment

Version 2

Prepared for:

Acciano Development Inc.
3747 Island Hwy S
Courtenay, BC, V9N 9T4

September 3, 2019

Prepared by:

Ecofish Research Ltd.

Photographs and illustrations copyright © 2019

Published by Ecofish Research Ltd., Suite F, 450 8th St., Courtenay, B.C., V9N 1N5

For inquiries contact: Technical Lead documentcontrol@ecofishresearch.com 250-334-3042

Citation:

Ballin, L., A. Newbury, R. Day, and J. Kurtz. 2019. Tree Island Subdivision Bio-inventory and Impact Assessment. Version 2. Consultant's report prepared for Acciano Development Inc. by Ecofish Research Ltd., September 3, 2019.

Certification: *Certified – stamped version on file*

Senior Reviewer:

Jayson Kurtz, M.Sc., P.Biol. #2576. R.P.Bio. #1081

Fisheries Biologist/ Project Manager

Technical Leads:

Leah Ballin, MSFM, R.P.Bio. #2537, R.P.F. #4873

Wildlife Biologist/ Terrestrial Ecologist

Rachel Day, M.Sc., P.Geo. #37677

Environmental Professional

Disclaimer:

This report was prepared by Ecofish Research Ltd. for the account of Acciano Development Inc. (Tree Island Yogurt). The material in it reflects the best judgement of Ecofish Research Ltd. in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, is the responsibility of such third parties. Ecofish Research Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions, based on this report. This numbered report is a controlled document. Any reproductions of this report are uncontrolled and may not be the most recent revision.

EXECUTIVE SUMMARY

Acciano Development Inc is proposing to subdivide a 6.9 ha parcel (the Project area) within an area zoned for industrial use on Bevan Road in Cumberland, BC. Acciano Development Inc. retained Ecofish Research Ltd. to complete a bio-inventory for the Project as per the requirements of the Corporation of the Village of Cumberland Official Community Plan Bylaw No. 990. The bio-inventory covers the entire Project area proposed to be subdivided and the impact assessment is specific to the administrative subdivision and servicing.

A desktop background review and reconnaissance-level site survey were completed in March 2019 by a professional geoscientist and a professional biologist/professional forester to identify Environmentally Valuable Resources (EVRs) and Environmentally Sensitive Areas (ESAs) that may be present on or within 100 m of the Project area. The results of the bio-inventory and impact assessment for the Project area are presented for terrain and soils, hydrology and water quality, fish and aquatic ecosystems, terrestrial ecosystems and plants, and wildlife and wildlife habitat.

Topography of the Project area is relatively smooth and flat with well drained soils. Surface water is expected to infiltrate through the soil towards the unconfined sand and gravel aquifer (Aquifer No. 417) underlying the Project area. There are no waterbodies (e.g., streams, wetlands) or aquatic ecosystem areas mapped on or within 100 m of the Project area and no surface or groundwater was observed during the site survey. The nearest aquatic ecosystem is a fish-bearing wetland approximately 340 m from the Project area boundary. Roadside ditches between the Project area and Bevan Road were dry during the site survey; however, it is possible that during extremely heavy rains, water from the Project area may shed to these ditches, and that these ditches may be connected to wetlands or streams.

The Project area was logged in 2014/2015 and currently supports vegetation characteristic of the provincially red-listed western hemlock – Douglas-fir / Oregon beaked moss ecological community; including relatively rare western white pine, however, the ecological value of the young vegetation remaining after logging is lower than if the vegetation was at a later seral stage. No plant species at risk are documented to occur in the Project area, and none are expected. No invasive species designated as noxious under the *BC Weed Control Act* were identified in the Project area; however, other non-native invasive species were detected in the Project area (e.g., Scotch Broom, bull thistle, oxeye daisy, dandelion and clover).

No wildlife species at risk or wildlife habitat features have been detected on or within 100 m of the Project area. Use of the Project area for foraging by Mule Deer and a few avian species was confirmed during the site survey. Some avian species may also use the Project area for nesting. Although no wildlife trails were observed, wildlife (e.g., Mule Deer, Roosevelt Elk) likely pass through this area as they travel between seasonal foraging and breeding habitats and water sources. No amphibians or reptiles were observed during the site survey; however, Western Toads and other amphibian species may migrate across or seek cover in downed wood or soil in the Project area.

No ESAs or EVRs requiring buffers were identified on or within 100 m of the Project area, thus no restricted development or buffer zones have been designated.

Overall, in the context of the Project area being recently logged, in the vicinity of an active waste management facility, adjacent to a busy gravel road and active gravel mine, and being located over 340 m from an aquatic ecosystem, sensitive terrestrial ecosystem, park or protected area, Project development is expected to have a relatively minimal impact on the larger watershed area. Standard construction environmental best management practices for a Project of this size and type are expected to adequately mitigate potential impacts.

Appendix A details how Bylaw No. 990 conditions for DPA#1 Connectivity areas have been met by the development design and this bio-inventory, and recommends conditions of the development.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF MAPS

LIST OF DRAWINGS

LIST OF APPENDICES

1. INTRODUCTION

Acciano Development Inc. is proposing to subdivide 6.18 ha of land (the Project/ Project area) on Bevan Road in Cumberland, BC (Map 1) into six properties. Acciano Development Inc. retained Ecofish Research Ltd. to complete a bio-inventory for the Project as per the Corporation of the Village of Cumberland (Village of Cumberland) Official Community Plan (OCP) requirements.

The subdivision includes the administrative creation of lots and physical servicing (i.e., installation of roads, power and water) of lots, as well as a greenway along Bevan Road (Drawing 1).

1.1. Bio-inventory Scope and Objectives

A bio-inventory is required for the Project under Bylaw No. 990 of the Village of Cumberland's OCP (VOC 2014a) and Develop with Care: Environmental Guidelines for Urban and Rural Land Development (MFLNRO 2014). The bio-inventory will contribute to the development permit application information required by the Village of Cumberland for permitting the Project. The bio-inventory and impact assessment cover the entire Project area proposed to be subdivided and serviced.

Specifically, the objectives of this bio-inventory are to:

- Describe the baseline environmental conditions of the proposed Project area;
- Assess the potential impacts of the proposed Project on environmentally valuable resources (EVRs) and environmentally sensitive areas (ESAs) including sensitive ecosystems and terrestrial ecosystems at risk, aquatic and riparian ecosystems, species at risk, and wildlife and wildlife habitat features;
- Determine mitigation measures to minimize potential Project impacts. Mitigation measures may include establishing protective buffers or working within timing windows to minimize effects associated with species' sensitive life history periods; and
- Assess the proposed development against DPA#1 Connectivity Area requirements.

1.2. Project Location and Zoning

The Project area is defined as Parcel 006-688-527 (Lot D), Section 34, Township 10, Comox District, located at approximately 10U 351569, 5501388, on Bevan Road in Cumberland, BC (Figure 1, Map 1, Drawing 1). Under the OCP, the Project area is zoned as an Industrial Area (Map C in the Official Community Plan) and is mapped as an Environmental Development Permit (DPA#1) Connectivity Area (Map E in the Official Community Plan) (VOC 2014b). The location and zoning of the Project area are summarized in Table 1.

1.3. Regional Ecological Context

The Project area falls within the Comox Valley Regional District (CVRD) and South Island Forest District, approximately 1 km northeast of Comox Lake and 5 km west of the Salish Sea. The Project area is approximately 2.5 km northwest of the developed urban core of Cumberland, BC and

approximately 500 m north of the Comox Valley Waste Management Centre, which includes the regional landfill (Map 1).

Environmentally, the Project area is within the Coastal Western Hemlock biogeoclimatic zone, Very Dry Maritime subzone, Eastern variant (CWHxm1) and the Nanaimo Lowlands Ecoregion. The CWHxm1 occurs at lower elevations (up to 700 m) on the east side of Vancouver Island and is characterised by warm, dry summers, and moist, mild winters with little snowfall (Green and Klinka 1994). Vegetation growth is constrained by water deficits over the long growing season. CWHxm1 zonal sites are typically dominated by Douglas-fir (*Pseudotsuga menziesii*), with western hemlock (*Tsuga heterophylla*) and some western redcedar (*Thuja plicata*). Dominant understory species of the CWHxm1 include salal (*Gaultheria shallon*), dull Oregon-grape (*Mahonia nervosa*), red huckleberry (*Vaccinium parvifolium*), step moss (*Hylocomium splendens*) and Oregon beaked moss (*Kindbergia oregana*).

The regional context of the Project area is summarized in Table 1.

Table 1. Project location and context.

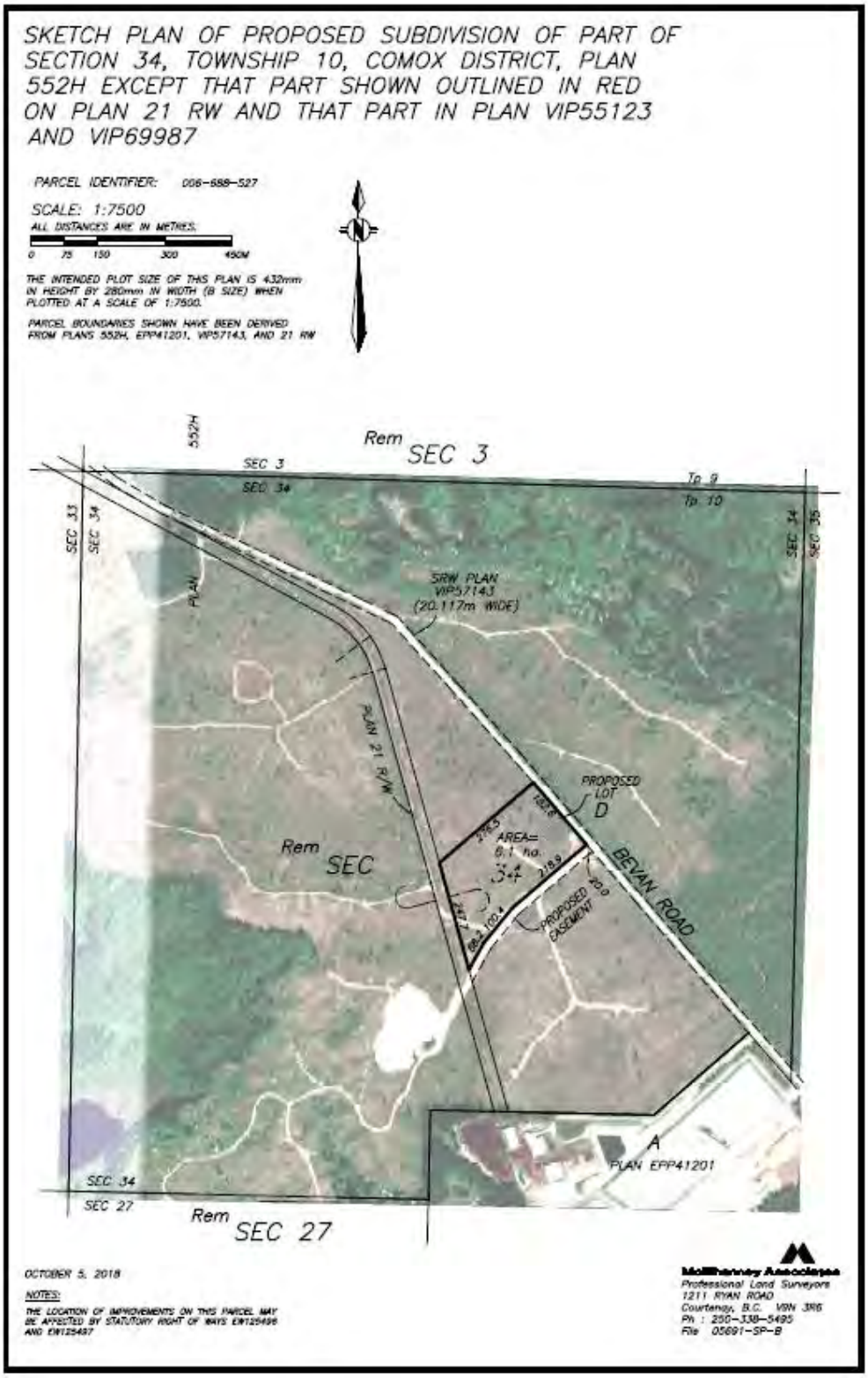
Parameter	Details
Location and Zoning	
Municipality	The Corporation of the Village of Cumberland
Parcel Identifier	006-688-527
Legal Property Description	Section 34, Township 10, Comox District
Area	6.9 hectares
Property Center Coordinates	UTM Zone 10U Easting 351569 Northing 5501388
Municipal Zoning	Industrial (I)
Development Permit Area	DPA#1 Environmental Protection DPA Connectivity Area
Regional Ecological Context	
Regional District	Comox Valley Regional District
Forest District	South Island Forest District
Ecoregion	Eastern Vancouver Island
Ecoprovince	Georgia Depression
Ecosection	Nanaimo Lowlands
Biogeoclimatic Zone	Coastal Western Hemlock Zone Very dry maritime eastern variant (CWHxm1)

1.4. Project Area-specific Context

The Project area-specific context, as investigated and described by LEA (2019) and Ryzuk Geotechnical (2019), and supported by Project specific work, is summarized here. The Project area is currently undeveloped, except for logging that occurred in approximately 1913 and 2014/2015. The Project area does not appear to have been used for illegal dumping and no contaminated site concerns were identified (Delaney, pers. comm. 2019).

To the west, the Project area is bounded by a railway right-of-way (ROW) that was used to transport coal from approximately 1849 to 1964, and on the far side of the ROW an active gravel pit has existed since approximately 2015. Thus, this gravel pit currently nearly abuts the Project area boundary. The remaining parcels surrounding the Project area are undeveloped except for logging that occurred from approximately 1996 to 2015. The road and associated laydown area to the south of the Project area were cleared and constructed between 2007 and 2012, and the adjacent lands, except for a narrow strip of trees on the opposite side of Bevan Road, were logged between 2004 and 2012 (CVRD 2019a).

Figure 1. Plan of Lot D of Section 34, Township 10, Comox District (McElhanney 2018; date of background imagery unknown).



Project Location

Legend

- Proposed Subdivision Lot
- Streams
- Parcel Boundary
- Parks and Protected Areas
- First Nation Reserve

MAP SHOULD NOT BE USED FOR LEGAL OR NAVIGATIONAL PURPOSES

0 1 2 km

Scale: 1:60,000

NO.	DATE	REVISION	BY
1	09/04/2019	1413_TRI_ProjectLocation_2019Apr05	CGA
2			
3			
4			
5			

Date Saved: 09/04/2019
Coordinate System: NAD 1983 UTM Zone 10N

ECOFISH RESEARCH

Map 1

Path: M:\Projects-Active\1413\MXD\Overview\1413_TRI_ProjectLocation_2019Apr05.mxd

2. REGULATORY CONTEXT

2.1. Municipal

The OCP for the Village of Cumberland, including Bylaw No. 990, is enabled by the provincial *Local Government Act* (2015). In the OCP, the Village of Cumberland designated environmental protection Development Permit Areas (DPA#1) (VOC 2014a). Specifically, DPA#1 identifies sensitive aquatic and terrestrial ecosystem areas, as well as connectivity areas, for which development restrictions apply. The OCP and *Local Government Act* require that any alteration to the land in a Development Permit Area is prohibited unless the owner first obtains a development permit from the Village of Cumberland. The application for a development permit in DPA#1 areas must include a bio-inventory following the procedures detailed in Develop with Care: Environmental Guidelines for Urban and Rural Land Development (MFLNRO 2014) and fulfill the general requirements and applicable habitat-specific supplemental requirements (i.e., for aquatic or terrestrial ecosystem areas or connectivity areas) in the OCP, as listed in Section 10.1.5 and Section 10.1.6, respectively. A detailed summary of these requirements and how they are addressed in this report is provided in Appendix A.

2.2. Provincial

Provincial environmental legislation that may be relevant to Project development includes the:

- *Wildlife Act* (1996) which contains provisions to generally protect wildlife and wildlife habitat, including prohibitions against destroying a bird or its egg, the nest of an Eagle, Peregrine Falcon, Gyrfalcon, Osprey, Heron or Burrowing Owl, or the nest of any bird when the nest is occupied by a bird or its egg.
- *Water Sustainability Act* (2014) which regulates water withdrawal and physical works in and about streams;
- *Riparian Areas Protection Act* (1997) which, if enabled by municipal legislation (in this case, Village of Cumberland Bylaw No. 990), regulates development adjacent to streams through the establishment of riparian buffers to protect aquatic habitats through the *Riparian Areas Regulation* (*RAR*); and
- *Weed Control Act* (1996) which requires land occupiers to control noxious weeds on their property.

2.3. Federal

Federal environmental legislation potentially relevant to Project development includes the:

- *Fisheries Act* (1985) which protects fish and fish habitat;
- *Migratory Birds Convention Act* (1994) (MBCA) which contains provisions to protect all migratory birds by prohibiting disturbance to nests or eggs and from polluting waters or areas frequented by migratory birds; and

- *Species at Risk Act* (2002) (SARA) which prohibits the destruction, harassment, capture or possession of species listed as threatened, extirpated or endangered and protects their critical habitat if it is on federal land, or if the species is aquatic or protected under the MBCA.

3. METHODS

For each of the subject areas below (terrain and soils, hydrology and water quality, fish and aquatic ecosystems, terrestrial ecosystems and plants, wildlife and wildlife habitat) the background review included a desktop review of documents previously developed for the Project (i.e., LEA 2019), and publicly available provincial databases, maps and reports.

A reconnaissance-level site survey was completed on March 26, 2019 by a professional geoscientist and a professional biologist/professional forester to identify EVRs and ESAs, including species at risk or of regional concern, sensitive ecosystems, hydrological features, fish and aquatic ecosystems, or geographical features that may be present in or within 100 m of the Project area as well as document the general environmental characteristics of the site. The survey was based on Develop with Care (MFLNRO 2014) and standard provincial methodologies for environmental data collection (MOF 2010). The entire Project area was surveyed for EVRs and ESAs and detailed environmental data were collected within three wildlife habitat plots (WHP) (Map 2). The locations of the three WHP were selected to be representative of the Project area. Within each WHP, data on site characteristics, soils, hydrology, vegetation, and wildlife use were collected, as outlined in the following sub-sections. Water quality was not assessed as there was no standing water or water within 0.5 m of the surface to assess.

3.1. Terrain and Soils

3.1.1. Background Review

Terrain and soils information available on iMapBC (DataBC 2019) and in background reports, including surficial geology and soils, was reviewed on and within 100 m of the Project area.

3.1.2. Reconnaissance-level Site Survey

Terrain and soil field surveys were conducted to provide an overview of the environmental condition of the site. The surveys included measurements of slope and aspect, and a description of microtopography and slope position. Soil pits/auger holes were dug to 30 cm depth. Soils were classified by standard metrics including: texture, colour (Munsell 2009), nutrient regime, moisture regime, coarse fragment content and organic layers. These metrics are indicators of the productivity of the site.

3.2. Hydrology and Water Quality

3.2.1. Background Review

Freshwater atlas (e.g., streams, wetlands, watershed boundaries) and aquifer data publicly available on iMapBC (DataBC 2019) and iMapCVRD (CVRD 2019a) and background reports were reviewed on and within 100 m of the Project area.

3.2.2. Reconnaissance-level Site Survey

A reconnaissance-level site survey was conducted to examine any site drainage features, water shedding, collecting and conveyance areas. Surface and groundwater sources and flow, or lack thereof, were identified. *In situ* water quality measurements were not taken as no water was present on site.

3.3. Fish and Aquatic Ecosystems

3.3.1. Background Review

Freshwater atlas (e.g., streams, wetlands) and fish distribution data publicly available on iMapBC (DataBC 2019) and iMapCVRD (CVRD 2019a) and background reports were reviewed on and within 100 m of the Project area.

3.3.2. Reconnaissance-level Site Survey

A reconnaissance-level site survey was conducted to search for any aquatic ecosystems, or connections to aquatic ecosystems within 100 m of Project area.

3.4. Terrestrial Ecosystems and Plants

3.4.1. Background Review

3.4.1.1. Ecosystems at Risk and Sensitive Ecosystems

Publicly available provincial and municipal databases were reviewed to identify at-risk terrestrial ecosystems that may occur in the Project area. The BC Conservation Data Center (CDC) database was searched for federally and provincially listed terrestrial forested ecosystems (ecological communities) at risk that are known to occur in the CVRD and CWHxm1 (CDC 2019a). Sensitive Ecosystem Mapping for the area conducted by the Canadian Wildlife Service (1991, 1999) and updated for the Comox Valley (2011, 2014) was reviewed (CVRD 2019a) to identify if any sensitive ecosystems are known to occur on, or within 100 m, of the Project area. Vegetation Resource Inventory (VRI) ecosystem mapping has not been completed for the area, and any Terrestrial Ecosystem Mapping (TEM) that may have been conducted by private forest companies is not publicly available. Historic orthophotographs were also reviewed to provide insight to the ecological and disturbance history of the Project area (CVRD 2019a).

3.4.1.2. Plant Species at Risk

The BC Species and Ecosystems Explorer (CDC 2019a) was searched for federally and provincially listed plant species at risk that occur in the CVRD CWHxm1.

3.4.1.3. Invasive Species

Provincial (i.e., Invasive Alien Plant Program, DataBC 2019) and municipal (CVRD 2019a) databases were searched for nearby occurrences of invasive plant species.

3.4.2. Reconnaissance-level Site Survey

3.4.2.1. Ecosystems at Risk and Sensitive Ecosystems

Ecosystems were characterized from WHP (plot) data and a walkthrough of the Project area as per provincial methods for describing terrestrial ecosystems and conducting ecosystem mapping (MOF 2010, RIC 2000) by a qualified terrestrial ecologist experienced in air photo interpretation and familiar with ecosystems in the CWHxm1. As the entire assessment area (the Project area plus 100 m buffer) was determined to be the same ecosystem (BEC zone, site series and vegetation community) and of a similar age class, no ecosystem mapping was conducted.

3.4.2.2. Plants Species at Risk

A reconnaissance-level site survey was conducted to identify potential plant species at risk and associated suitable habitat within the Project area. As the field survey was conducted just after snow melt, before herbaceous species would be expected to be detectable, the focus of the survey was to support an assessment of the likelihood of occurrence of plant species at risk in the Project area.

3.4.2.3. Invasive Plant Species

Invasive plant species were searched for within the Project area, and if found, density and distribution were recorded and the species was classified by control priority, as per provincial legislation (i.e., *BC Weed Control* Act) and provincial and regional guidance (i.e., Invasive Alien Plant Program and Coastal Invasive Species Committee).

3.5. Wildlife and Wildlife Habitat

3.5.1. Background Review

A list of wildlife species that are provincially or federally designated as at risk and potentially occur in within the CWH biogeoclimatic zone and Comox Valley Regional District (with the exception of marine and fully aquatic species) was compiled from the BC Species and Ecosystem Explorer (CDC 2019a). Wildlife species at risk and other species of regional importance were ranked for likelihood of occurrence within each assessment area, as per defined criteria below. The likelihood of occurrence ranking reflects publicly available wildlife occurrence data (i.e., CDC 2019a, DataBC 2019, E-Fauna BC 2019), personal communications, general knowledge acquired from working and living in the CVRD, and species-specific wildlife habitat suitability as assessed during the field surveys. Criteria are as follows:

- Confirmed. The species has been detected within the assessment area. Species presence information was observed during the field surveys and/or recorded from the desktop review.
- High. The current range and distribution of the species overlaps the assessment area. Highly suitable habitat is present within the assessment area; however, we have not detected the species directly during field visits or indirectly through the desktop review.

- Moderate. The current range and distribution of the species overlaps the assessment area. Sufficiently suitable habitat is present within the assessment area; however, we have not detected the species directly during field visits or indirectly through the desktop review.
- Low. The current range and distribution of the species overlaps or borders the assessment area; however, sufficiently suitable habitat is not present. We have not detected the species directly during field visits or indirectly through the desktop review.
- Negligible. The current range, distribution, or habitat requirements of the species do not overlap or border the assessment area. It is unlikely that the species is ever present within the assessment area.

Provincial and federal wildlife habitat designations (i.e., Critical Habitat for Federally-Listed Species at Risk, Ungulate Winter Ranges, and Wildlife Habitat Areas) were also reviewed for potential overlap with the Project area.

Wildlife species and habitat information collected during field surveys and the desktop review was evaluated to predict the likelihood of impacts of the proposed works. Moreover, the information collected and collated was used to characterize wildlife habitat and identify sensitive sites that may require special consideration during construction.

3.5.2. Reconnaissance-level Site Survey

Wildlife habitat suitability was considered for all species at-risk and informed the likelihood of occurrence rankings (Section 3.5.1). Targeted species-specific wildlife surveys were not considered necessary and were not conducted because of the relatively low quality of habitat and likelihood of occurrence and detection of wildlife species at risk during the survey period; however, any wildlife species or wildlife sign (e.g., tracks, scat) that were detected were recorded as incidental observations. The survey was scheduled to meet Project timelines and did not occur during the peak avian breeding season or amphibian migration period.

4. RESULTS

4.1. Terrain and Soils

4.1.1. Background Review

The topography of the Project area is described as relatively smooth and flat at an elevation of approximately 160 meters above sea level (LEA 2019, Ryzuk 2019).

Surficial geology is consistent for the entire Project area and consists of loamy sand of a glaciofluvial origin. These soils are classified as well drained, indicating that water is removed from the soil readily in relation to supply (DataBC 2019, Ryzuk 2019). A study of 24 test pits conducted by Ryzuk (2019) found all 2.3 m deep pits to be dry.

Based on the lithology of the nearest water well, located within 500 m of the Project area in the northern part of the landfill, sand with gravel is present from surface to a depth of 19.2 m below ground level (LEA 2019).

No coal was detected along the surface of the old railway ROW west of the Project area; however, there is potential for subsurface soil contamination from metals, polycyclic aromatic hydrocarbons (PAH), and light and heavy polycyclic aromatic hydrocarbons (LEPH/HEPH), in the vicinity of the entire old railway ROW (LEA 2019). The site is not considered a contaminated site (Delaney pers. comm. 2019).

4.1.2. Reconnaissance-level Site Survey

Field observations confirmed information collated during the background review (Appendix B, Appendix C). The Project area was observed to be relatively smooth and flat (Figure 2). Soils were typically light reddish-brown (7.5YR 3/4) with a thin layer of overlying organic matter (< 10 cm) (Figure 3). Soils were typically a sandy to silty loam with a high percentage of coarse fragments (65-85%). The soil nutrient regime was generally classified as medium and the moisture regime was classified as sub-mesic to mesic. Soils were observed to be slightly moist, likely associated with recent snow melt (within the week prior). A higher organic matter content in the upper layer (FH/Ah) and slightly coarser sand was observed in soils in the middle of the Project area.

Due to the flat nature of the Project area, it is expected to have high stability and low erosion potential.

Figure 2. Overview of general site topography on March 26, 2019.

Figure 3. Soil auger sample on March 26, 2019.

4.2. Hydrology and Water Quality

4.2.1. Background Review

There are no waterbodies (e.g., streams, wetlands) or aquatic ecosystem areas mapped on or within 100 m of the Project area (DataBC 2019a, CVRD 2019a, VOC 2014c). The east side of the Project area is within the First Supply Creek watershed (Puntledge Watershed) and the west side is within the Comox Lake watershed (DataBC 2019 and LEA 2019) (Map 2). The Project area does not lie within a mapped floodplain (DataBC 2019 and LEA 2019).

Waterbodies located near the Project area include a pond area approximately 400 m to the southwest at the landfill, a tributary of Black Lake approximately 340 m to the west, First Supply Creek approximately 375 m to the northeast, and Nellie Creek approximately 520 m to the east (LEA 2019) (Map 3). First Supply Creek and Nellie Creek are tributaries of Morrison Creek.

Current climate data for the Comox Lake watershed (which will include higher precipitation and lower temperatures than the Project area due to the Project area being located in the lower elevations and in the rain shadow of the watershed) compiled by the Pacific Climate Impacts Consortium (PCIC) report on climate change states that annual precipitation in the Comox Lake watershed is 2,700 mm. The heaviest precipitation occurs during the fall and winter months (October through March, when precipitation exceeds 250 mm/month), while drier conditions prevail during the summer (May through September, when precipitation is < 100 mm/month). The Comox Lake watershed experiences mild temperatures, with an annual average of 6°C and monthly temperatures that are

above freezing for the majority of the year, ranging from a high of approximately 15°C in July and August and dipping slightly below freezing only in December and January. Snowfall in the lower elevations of the watershed (including the Project area) is transient.

The Pacific Climate Impacts Consortium (PCIC) projected changes in average (mean) temperature, precipitation and several derived climate variables from the baseline historical period, 1961-1990, to the 2050's for the Comox Valley region (Schnorbus 2018). The annual mean temperature is predicted to increase by 1.5°C by the 2050's. Annual precipitation in predicted to increase by 6%, with much of that increase occurring in winter (5%), while summer precipitation is predicted to decrease by 17%. Increase in winter precipitation is expected to occur as rainfall, as snowfall is predicted to be reduced by 36% in winter and 52% in spring.

Surface water is expected to infiltrate rapidly through the soil towards the unconfined sand and gravel aquifer (Aquifer No. 417) underlying the Project area (LEA 2019, Ryzuk 2019). Aquifer No. 417 is classified as IIIA aquifer, indicating a low density and moderate to high productivity with a high vulnerability from surface sources (DataBC 2019). Aquifer No. 417 is approximately 14.9 km^2. The aquifer lies within the Capilano Sediments litho stratographic unit (glacially lain matrix, reddish-brown in colour with a coarse, sandy texture). Depth to water in the aquifer ranges from 2.44 to 20.42 m (DataBC 2019). Recharge to the aquifer is likely from precipitation (DataBC 2019). Nearby wells (No. 115760 and No. 115769), located at the Comox Waste Management Centre, indicate static water levels of 25.9 m and 19.5 m below top of casing, respectively. Due to the unconfined nature of Aquifer No. 417, there may be hydrologic connectivity with Aquifer No. 951, which underlies Morrison headwaters.

A groundwater well drilled by Drill Well Enterprises Ltd. exists in the northeast corner of the Project area (10U 351641 E, 5501543 N; Province of BC Well Identification Number 54689). Data from the well including a pump test conducted by Drill Well and groundwater quality analysis conducted by Maxxam are presented in Wedler (2019b). The well is not yet registered in the Provincial Groundwater wells database.

4.2.2. Reconnaissance-level Site Survey

No surface or groundwater was observed at the time of the reconnaissance-level site survey (Figure 2). As a result, no *in situ* water quality measurements were taken. No surface hydrological features (e.g., water shedding, collection and conveyance areas) were observed on the Project area. Surface water is expected to infiltrate through the well drained soil towards the unconfined aquifer. Roadside ditches between the Project area and Bevan Road were dry during the site survey; however, it is possible that during extremely heavy rains, water from the Project area may shed to these ditches, and that these ditches may be connected to wetlands or streams. It is expected that water would run west in the Bevan ditches to the low point of land at the provincially mapped watershed boundary and then infiltrate north towards First Supply Creek.

4.3. Fish and Aquatic Ecosystems

4.3.1. Background Review

There are no waterbodies (e.g., streams, wetlands) or aquatic ecosystem areas mapped on or within 100 m of the Project area (DataBC 2019, CVRD 2019a, VOC 2014b). The nearest aquatic ecosystem (and confirmed fish-bearing waterbody) is approximately 340 m from the Project area (DataBC 2019, CVRD 2019a).

4.3.2. Reconnaissance-level Site Survey

No surface water or evidence of ephemeral aquatic ecosystems were observed on or within 100 m of the Project area, with the possible exception of roadside ditches along Bevan Road, which were dry at the time of the survey (see Section 4.2.2).

4.4. Terrestrial Ecosystems and Plants

4.4.1. Background Review

4.4.1.1. Ecosystems at Risk and Sensitive Ecosystems

The Project area is situated in the CWHxm1 biogeoclimatic zone. All but one of the naturally occurring terrestrial ecosystems (ecological communities) in the CWHxm1 are considered at risk (red or blue-listed) (CDC 2019a). However, the conservation value of forested ecosystems increases as they mature to older structural stages (e.g., old growth forest vs. short shrub) and the vegetation composition trends towards the climax ecosystem which is more representative of the described ecological community (CDC 2019b).

Sensitive Ecosystem Inventory (SEI) mapping for the Comox Valley (CVRD 2019a) does not show any sensitive ecosystems on, or within 100 m of the Project area. The closest mapped sensitive ecosystems are wetlands located approximately 340 m northeast and southwest of the Project area (CVRD 2019a).

A review of historic orthophotographs confirm that the Project area has been subject to recent (2014/2015) logging activity (Section 1.4) (Map 2).

4.4.1.2. Plant Species at Risk

No plant species at risk are documented to occur on the Project area, and none are expected as most plant species at risk that are known to occur in the CWHxm1 and Comox Valley Regional District are associated with shallow soil and wetland ecosystems (CDC 2019a, Appendix D).

4.4.1.3. Invasive Plant Species

No invasive noxious plant species have been documented to occur on or within 100 m of the Project area. Spotted knapweed (*Centaurea stoebe* ssp. *micranthos*), which is considered noxious by the provincial *Weed Control Act*, is the only invasive plant species documented in the vicinity of the Project area. The nearest spotted knapweed occurrence is approximately 900 m southeast of the Project area along Bevan Road at the Comox Valley Waste Management Centre (CVRD 2019a, Map 1).

4.4.2. Reconnaissance-level Site Survey

4.4.2.1. Ecosystems at Risk and Sensitive Ecosystems

Results of the field survey confirmed that the entirety of the Project area, as well as a 100 m buffer surrounding the Project area, is comprised of the provincially red-listed western hemlock – Douglas-fir / Oregon beaked moss (*Tsuga heterophylla – Pseudotsuga menziesii / Eruhynchium*) ecosystem. This is the zonal (average) ecosystem that occurs in the CWHxm1 on sites with a very poor to medium nutrient regime and sub-mesic to mesic moisture regime. However, because the entirety of the Project area was recently logged (for the second time in recent history) and is in a shrub seral stage, with only a few residual standing young trees, the ecological value is lower than if the vegetation was at a later seral stage.

Vegetation on the Project area was mostly comprised of young planted and naturally regenerating trees (4-7 years old) and understory shrubs (30-50% cover), as well as herbs (8-20% cover) and mosses (25-35% cover). Some patches of young western redcedar, up to 2 m tall, and dispersed approximately 40-year-old western white pine (*Pinus monticola*) and western redcedar trees, up to 20 m tall (~1% cover), were retained during recent forest harvesting. The majority of the young planted and naturally regenerating trees were Douglas-fir, followed by western white pine, western hemlock and western redcedar. The shrub layer was dominated by salal, followed by Oregon grape and red huckleberry. The herb layer included trailing blackberry (*Rubus ursinus*), twinflower (*Linnaea borealis*), grasses and small sedges. The moss layer was dominated by step moss. It is of note that mature western white pine is rare in the CWH after a white pine blister rust spread through BC in approximately 1930 (Hunt 2009). The Project area supports an unusually high abundance of young specimens of the species. This species root systems are particularly sensitive and located close to the soils surface (MFLNRO 2019).

No ESAs were detected on or within 100 m of the Project area. Specifically, there were no mature terrestrial areas or aquatic ecosystem areas.

4.4.2.2. Plant Species at Risk

No plant species at risk were detected during the reconnaissance-level field survey. Furthermore, none of the plant species at risk present within the CVRD and CWHxm1 (Appendix D) are expected to occur within the Project area based on habitat characteristics observed in the field (i.e., young seral stage, zonal site series).

4.4.2.3. Invasive Plants

No invasive species designated as noxious under the *BC Weed Control Act* were identified in the Project area. However, Scotch broom (*Cytisus scoparius*), a species designated as 'strategic control' by the Coastal Invasive Species committee (CISC 2016), was detected on dry disturbed sites including along current and deactivated roads. The 'control' designation means that the species should be locally controlled when it poses a threat to sensitive ecosystems or other objectives such as ecosystem restoration. Bull thistle (*Cirsium vulgare*) and oxeye daisy (*Leucanthemum vulgare*), which have recently been removed from the Coastal Invasive Species committee priority lists, were detected sporadically

around the Project area, and along disturbed roadsides and other places with soil disturbance, respectively. Other non-native species that are not identified as priority invasive species such as dandelion and clover also occur in the Project area.

Invasive species surveys were conducted prior to leaf-out of most species. Therefore, an additional invasive species survey should be conducted during the growing season and prior to development proceeding (e.g., June) to identify whether other species currently exist in the Project area.

4.5. Wildlife and Wildlife Habitat

4.5.1. Background Review

4.5.1.1. Species at Risk and of Regional Concern

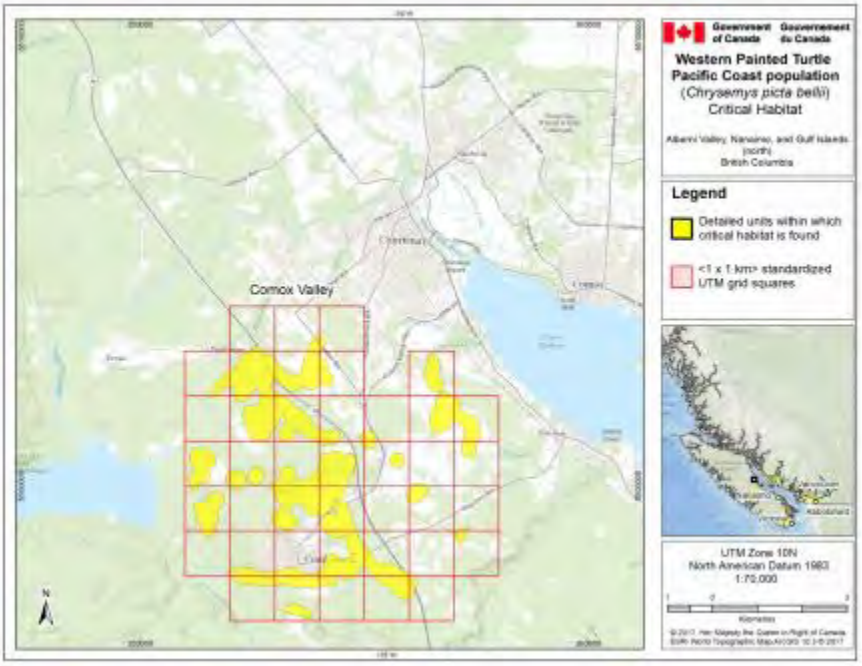
A list of wildlife species at risk and their likelihood of occurrence in the Project area is included in Appendix D.

Herpetofauna

There are no records of amphibian species at risk on or within 100 m of the Project area; however, two amphibian species at risk, Western Toad (*Anaxyrus boreas*) and Northern Red-legged Frog (*Rana aurora*), have been recorded within 5 km, along with other amphibian species that are not considered at risk (DataBC 2019).

There are no records of reptile species at risk on or within 100 m of the Project area; however, Western Painted Turtles (*Chrysemys picta*) have been documented within 5 km of the Project area (DataBC 2019) and critical habitat has been identified in several locations nearby (ECCC 2018), but not overlapping the Project area (Figure 4).

Figure 4. Mapped critical habitat for Western Painted Turtle (ECCC 2018).



Birds

There are no records of avian species at risk on or within 100 m of the Project area (DataBC 2019); however, several avian species at risk have been recorded within 5 km of the Project area. One avian species at risk, Common Nighthawk (*Chordeiles minor*), has been detected in nearby areas (English, pers comm. 2018) during a province-wide survey program. Common Nighthawks nest on the ground from mid-May to late July (BSC 2019). Western Screech-owls (*Megascops kennicottii kennicottii*), Northern Goshawks (*Accipiter gentilis laingi*), and Great Blue Herons (*Ardea herodias fannini)* have also been recorded within 5 km of the Project area. Western Screech-owls nest in cavities in deciduous and mixed wood riparian forests. Northern Goshawks nest and forage in mature and old-growth forest. Great Blue Herons usually nest colonially in mature trees. Therefore, there is no suitable nesting habitat for these species in the Project area. The closest Bald Eagle (*Haliaeetus leucocephalus*) nest (an EVR) is located approximately 900 m southeast of the Project area (WTSA 2019) (but there is no nesting habitat in the Project area) (Map 4).

Mammals

There are no records of mammal species at risk on or within 100 m of the Project area (DataBC 2019). Furthermore, no ungulate winter range or wildlife habitat areas have been legally designated or proposed in the vicinity of the Project area (DataBC 2019). However, it is expected that Elk (*Cervus elaphus roosevelti*) migrate north-south through the area as Comox Lake provides a movement obstacle for the species to the west and the Highway 19 provides an obstacle to the east.

Invertebrates

There are no records of invertebrate species at risk on or within 100 m of the Project area (DataBC 2019); however, one invertebrate species at risk, the Common Wood-nymph (*Cercyonis pegala incana*), has a moderate likelihood of occurring in the Project area based on known distribution and habitat requirements including roadsides and clearcuts (Appendix D). The foodplants of the larval Common Wood-nymph are thought to be grasses (E-Fauna BC 2019).

4.5.1.2. Wildlife Habitat Features

No wildlife habitat features have been provincially mapped on or within 100 m of the Project area (Wildlife Habitat Features Layer; DataBC 2019). Wildlife habitat features include structures that are critical to wildlife species such as nest sites or locally important mineral licks. Wildlife habitat features may include wildlife trees, dens or nest sites, mineral licks, basking sites, caves, cliffs, rocky outcrops, aquatic areas, or structures potentially used for bat or avian nesting or roosting.

No aquatic habitats are located on or within 100 m of the Project area (Sections 4.2.2 and 4.3.2).

4.5.2. Reconnaissance-level Site Survey

4.5.2.1. Species at Risk and of Regional Concern

Herpetofauna

No herpetofauna were detected during the field survey. The Project area and surrounding 100 m do not contain moderate or high value amphibian habitat such as wetlands, streams, abundant moist woody debris, or old-growth forest. The lack of surface water on the Project area makes it unsuitable for Western Painted Turtles or breeding Northern Red-legged Frogs and Western Toads. The Project area also does not contain mature forest habitat (including substantial leaf litter and coarse woody debris) required by Wandering Salamander (*Aneides vagrans*). Nevertheless, Western Toads and other amphibian species may migrate across or seek cover in downed wood or soil in the Project area.

Birds

No avian species at risk were detected in the Project area. One Pileated Woodpecker (*Dryocopus pileatus*) was observed feeding on one of the second growth (approximately 20 cm dbh) western redcedar on the Project area. Droppings at the base of the tree indicated the tree was used for perching by other avian species as well, indicating the value of these residual trees on the landscape. Several Bald Eagles and Common Ravens (*Corvus corax*) were observed in the Project area, likely attracted to the area by human food waste at the Comox Valley Waste Management Centre. None of the trees in the Project area were large enough to provide raptor or cavity nesting habitat. Dark-eyed Juncos (*Junco hiemalis*), a songbird that nests in short shrubs, were observed within suitable habitat in the project area. Habitat is likely suitable for Common Nighthawk nesting, however, it is unlikely to provide high to moderately suitable nesting habitat for other avian species at risk.

Mammals

No high or moderate value habitat for mammal species at risk was present in the Project area. Abundant Mule Deer (*Odocoileus hemionus*) sign was observed within the Project area indicating that Mule Deer likely forage on the young vegetation in the area. Roosevelt Elk may occasionally pass through or near the Project area. Although the Project area contains ungulate foraging habitat it has been recently logged and thus does not contain suitable winter foraging habitat or thermal cover, which is largely characterized by a snow-intercepting canopy and is considered to be limiting seasonal habitat for ungulates.

Invertebrates

It is unlikely that invertebrate species at risk would be detected without the use of targeted surveys, which were not conducted during the reconnaissance-level site survey. Nevertheless, clearcut and roadside habitat is not thought to be limiting for the one invertebrate species at risk with a moderate likelihood of occurring in the Project area, the Common Wood-nymph.

4.5.2.2. Wildlife Habitat Features

No significant wildlife habitat features were observed in the Project area and the Project area is not expected to contain any significant wildlife habitat features. The larger residual young standing trees in the Project area were observed to be used for avian foraging and perching (Section 4.5.2.1). No wildlife trails were observed during the reconnaissance-level site survey; however, wildlife likely pass through this area as they travel between seasonal foraging and breeding habitats and water sources.

5. IMPACT ASSESSMENT FOR THE SUBDIVISION AND INSTALLATION OF SERVICING

The development permit application to subdivide Lot D into six properties (Map 2, Drawing 1) involves the administrative exercise of subdivision and land development for installing services (i.e., water, sewer, road access to lots, road drainage) (Wedler 2019), as well as dedication and construction of a greenway. The total area of the subdivision is planned to be 6.18 ha, with the total area of asphalt planned to be 2,742 m^2, with servicing installation requiring ground disturbance to a maximum depth of 2 m with an average depth of 1.2 m, and an asphalt pumphouse of 3 m x 5 m. In addition, a greenway path is planned to run along Bevan Road as requested by the Village as the park dedication. The total greenway area is planned to be 886 m^2. As the Project area is within an area zoned as DPA#1 Connectivity area, the development is assessed against relevant bylaw requirements in Appendix A.

At this stage in design development, general potential impacts from the construction and operation of services can be well predicted and general mitigations are provided. Once the servicing contracts have been awarded and detailed designs confirmed, detailed mitigations for some potential impacts must be confirmed and written into future plans, such as an Erosion and Sediment Control Plan and detailed site plans, as per Appendix A to be in compliance with Bylaw No. 990. A summary of potential

impacts of installing servicing for each of the five environmental resource categories is provided below.

5.1. Terrain and Soils

Terrain and soils may be lost, altered or degraded through soil removal, vegetation clearing and grubbing, regrading, excavating, infilling and compaction from machinery and vehicles associated with installation of servicing, construction of roads, and the greenway. Standard mitigation measures to minimize these impacts include minimizing site disturbance outside of the permanent footprint, stockpiling top soils for use in reclamation, and decompacting, rehabilitating and revegetating areas within the temporary construction footprint as soon as possible after construction.

As the Project area is flat, and installation of servicing will not result in ground disturbance below a depth of 2 m, with most servicing at a depth of 1.2 m, Ryzuk (2019) recommended that if trenching is done at a ratio of 1:1 (horizontal: vertical) the potential for erosion or slope instability is low. However, an Erosion and Sediment Control (ESC) will be developed and followed for this work.

Soil may also be contaminated through accidental spills of fuels or other hazardous materials. Standard mitigation measures to minimize the risk of accidental spills include double containment of hazardous materials stored in stationary equipment capable of holding 110% of the fluid contents, maintaining a large spill kit on site and immediately cleaning up accidental spills, placing a containment tray under machinery and vehicles not in use for an extended period of time, and ensuring equipment arrives on site in a clean condition and is well maintained to be free of leaks.

Specific potential impacts and conceptual mitigations are provided in Table 2.

Based on the implementation of prescribed mitigation measures and the scale and location of the anticipated works and activities associated with Project construction and operation, no residual impact to ESAs or EVRs is anticipated. Soil alteration is expected to be limited to the Project area and there is only a low likelihood of accidental spills of fuels or other hazardous materials.

Table 2. Potential impacts and conceptual mitigations for terrain and soils.

Environmentally Valuable Resource	Potential Impact	Effect Pathway	Mitigation	Residual Impact	Relevant Legislation and Best Management Practices
Soils	Soil loss, alteration or degradation, soil erosion	Clearing, grubbing, regrading, excavating, infilling, and soil compaction from machines and vehicles	Clearing, grubbing, site regrading, excavating, infilling and other site disturbance will be minimized to the extent possible, especially outside of the permanent footprint of impervious surfaces. The area of machine use will be minimized to the extent possible, especially outside of the permanent footprint of impervious surfaces. Top soils will be stockpiled separately and used to cover exposed mineral soils and for onsite landscaping during site reclamation, if applicable. Stockpiled soils will be covered during wet weather. A sediment and erosion control plan will be developed and implemented for all ground works. Temporarily disturbed areas will be rehabilitated and revegetated, as soon as possible. Rehabilitation will include decompacting soils that were compacted within the temporary construction footprint, if applicable.	Soil alteration within the permanent Project footprint	Develop with Care (MFLNRO 2014)

Table 2. Continued.

Environmentally Valuable Resource	Potential Impact	Effect Pathway	Mitigation	Residual Impact	Relevant Legislation and Best Management Practices
Soils (continued)	Soil contamination	Accidental spills of fuels or hazardous materials	Accidental spills onto soil or vegetation will be immediately cleaned using appropriate methods and materials (all contaminated soil will be excavated and removed from site to a certified treatment facility with chain of custody documents kept). A large spill kit will be available on site. Stationary equipment containing hazardous fluids will be in double containment capable of holding 110% of the fluid contents. Machines and vehicles not in use for an extended time will have a containment tray placed under the engine. Equipment will arrive on site in a clean condition and will be well maintained and free of fluid leaks.	Low likelihood of accidental spills contaminating soil	Develop with Care (MFLNRO 2014)

5.2. Hydrology and Water Quality

No watercourses occur on the property; however, hydrology and water quality may be altered through impacts to the aquifer and aquatic ecosystems that may be connected to the Project area by surface or subsurface hydrological pathways.

There may be surface connection between the Project area and aquatic ESA's through roadside ditches. The total asphalt area of proposed roads is 2,742m^2. Although the infiltration rate is expected to be very high (Ryzuk 2019, Lewkowich 2019), during extremely heavy rains, water may be shed from roads in the Project area into roadside ditches adjacent to Bevan Road. Water from these ditches is expected to run northwest towards First Supply Creek. Similarly, potential impacts to the aquifer include an alteration of the infiltration rate or ground water flow patterns resulting from the alteration of landscape slopes and the construction of impervious surfaces. Roadside ditches installed in the Project area will be designed to maximize infiltration thus minimizing the amount of water that leaves the Project area through surface pathways. The specific performance target for onsite rainwater capture and control will be to maintain pre-development flows from the subdivision up to the 5-year design storm. It is proposed that road drainage be managed with rock filled French drains. These have the complimentary effects of providing detention of run-off from the roads, treatment of the rain run off, and detention with infiltration into surrounding soils. Standard mitigation measures to minimize these impacts include managing rainwater in accordance with provincial and federal BMPs (MWLAP 2002a,b, DFO undated). It is also recommended that the Water Balance Model Express online tool, developed for the CVRD (2019b), be consulted to identify specific Low Impact Development (LID) design features that will minimize impacts to hydrology and water quality, such as rain gardens, infiltration swales and chambers. Existing groundwater hydrology will be maintained to the extent possible and natural hydrological patterns will be restored where practicable. The amount of runoff from roads expected to run off the Project area and infiltrate on site should be provided prior to construction and the potential effects of the calculated amount of runoff assessed.

The aquifer and aquatic ecosystems may also be impacted through pollution of ground or surface water resulting from stormwater run off or accidental spills during construction or operation. To avoid potential impacts from accidental spills or wastewater runoff, any concrete or other toxic runoff during construction will be contained and collected so that it does not enter any roadside ditch and any runoff into ditches connected to wetlands or streams will meet BC Approved Water Quality Guidelines for Aquatic Life, Wildlife and Agriculture (MOECCS 2018). An Erosion and Sediment Control Plan will be developed and implemented during construction. All infrastructure will meet or exceed Village requirements including installation of oil-grit separators in storm drains positioned to catch water from all hard-surfaced areas to mitigate potential contamination of the aquifer. This infrastructure is demonstrated to capture 90% of total suspended solids (TSS) and hydrocarbons in the first (most contaminated) storm after prolonged dry periods and all of the TSS and hydrocarbons in subsequent rain events.

Aquatic ecosystems potentially connected during extremely heavy rains to roadside ditches adjacent to the Property may be impacted through the introduction of sediment as a result of clearing, grubbing, regrading, excavating and infilling. To minimize these impacts, standard erosion and sediment control measures will be implemented to control source erosion and prevent sediment from entering roadside or railway ditches. If surface water is present in ditches adjacent to the Project area and these ditches are connected to aquatic ecosystems an Erosion and Sediment Control (ESC) Plan should be developed and implemented. Mitigation measures in the ESC may include minimizing the amount of disturbed ground at any one time and quickly providing surface protection (e.g., mulch, vegetation). In addition, stockpiled soil will be covered with a secured tarp or plastic to prevent runoff, as well as to avoid colonization by invasive plant species. Mitigation measures implemented to minimize impacts to terrain and soils will also minimize impacts to hydrology and water quality.

Water servicing for the property will initially be from an existing well (# 54689) drilled on the property into aquifer 417. This is an unconfined aquifer in the Comox Lake Watershed. This aquifer may be connected to an adjacent aquifer which feeds the Morrison Headwaters, an ecologically sensitive system. Water will not be withdrawn from the well at this phase except for testing. Furthermore, a provincial *Water Sustainability Act* permit is required for future groundwater use from this well. The Province will require confidence that watershed level effects are low before issuing a permit. The permit application for well use cannot be submitted until the property is transferred to the applicant.

Specific potential impacts and conceptual mitigations are provided in Table 3.

Based on the implementation of prescribed mitigation measures and the scale and location of the anticipated works and activities associated with Project construction and operation, minimal residual impact to ESAs or EVRs is anticipated. Soil alteration is expected to be limited to the Project area and there is only a low likelihood of accidental spills of fuels or other hazardous materials. Potential impacts to water infiltration and flow are expected to be small and there is low likelihood of accidental spills that may contaminate ground or surface water. Little to no water is expected to be withdrawn from the aquifer.

Table 3. Potential impacts and conceptual mitigations for hydrology and water quality.

Environmentally Valuable Resource	Potential Impact	Effect Pathway	Mitigation	Residual Impact	Relevant Legislation and Best Management Practices
Aquifer and aquatic ecosystems			Mitigation measures implemented to minimize impacts to terrain and soils will also minimize impacts to hydrology and water quality.		Develop with Care (MFLNRO 2014)
	Pollution of ground water (i.e., aquifer) or surface water	Wastewater discharge during construction or operation	Development and Adherance to an Erosion and Sediment Control Plan (ESC)	Low likelihood of accidental spills or other pollution contaminating ground water or surface water	Federal *Fisheries Act,* Provincial *Water Sustainability Act*
			Any runoff from the site will meet BC Approved Water Quality Guidelines for Aquatic Life, Wildlife and Agriculture before entering any ditch that may be connected to a watercourse or other aquatic feature.		BC Approved Water Quality Guidelines: Aquatic Life, Wildlife and Agriculture (MOECCS 2018)
			Any concrete or other toxic runoff will be contained and collected so that it does not enter any ditch that may be connected to a stream or wetland.		
		Accidental spills of fuels or hazardous materials	Any spills will be contained and cleaned up immediately.		

Table 3. Continued.

Environmentally Valuable Resource	Potential Impact	Effect Pathway	Mitigation	Residual Impact	Relevant Legislation and Best Management Practices
Aquifer and aquatic ecosystems (continued)	Introduction of sediment to surface water bodies	Earthworks including clearing, grubbing, regrading, excavating, and infilling	If there is surface water in roadside or railway ditches (any time of year) and these are connected to a stream or wetland, then an Erosion and Sediment Control Plan (ESC) will be developed and implemented to prevent sediment contributions to local streams (depending on connectivity to streams, storm water systems and season of construction). Emphasis will be on source erosion control by minimizing the amount of disturbed ground at any one time and quickly providing surface protection with vegetation, mulch etc. Stockpiled soil will be covered with a secured tarp or plastic to prevent runoff.	Low likelihood of sediment entering streams or wetlands	

Table 3. Continued.

Environmentally Valuable Resource	Potential Impact	Effect Pathway	Mitigation	Residual Impact	Relevant Legislation and Best Management Practices
Aquifer (continued)	Alteration of infiltration rate and flow patterns	Alteration of landscape slopes and construction of impervious surfaces	Rainwater will be managed in accordance with provincial and federal BMPs (MWLAP 2002, DFO undated). The Water Balance Model Express online tool, developed for the Comox Valley Regional District, will be consulted to minimize impacts to hydrology and water quality. This will include managing rainwater on site and maintaining pre-development drainage flows to the extent possible (i.e., effort will be made to infiltrate 90% or more of mean annual rain water within the footprint of the lot using Low Impact Development (LID) BMP's such as permeable paving, rain gardens, infiltration swales and chambers. Existing groundwater hydrology will be maintained to the extent possible. Natural hydrology patterns will be restored where practicable.	Relatively minor impact to water infiltration and flow	Stormwater Planning: A Guidebook for British Columbia (MWLAP 2002) Standards and Best Practices for Instream Works: Urban Stormwater Management (DFO undated)
Aquifer	Alteration of water level in aquifer or adjacent aquifers	Withdrawal from aquifer	No water will be withdrawn from aquifer at this phase.	None	*Water Sustainability Act*

5.3. Fish and Aquatic Ecosystems

There are no expected impacts to fish and aquatic ecosystems. Mitigation measures implemented to minimize impacts to hydrology and water quality (Table 3) will also minimize impacts to fish and aquatic ecosystems, which are potentially connected by surface flows to roadside ditches between the Project area and Bevan Road during extremely heavy rains, and to adjacent watersheds through subsurface flows.

5.4. Terrestrial Ecosystems and Plants

Potential impacts to an at risk ecological community includes habitat loss and/ or disturbance and colonization by invasive species. Within the servicing construction footprint, the shrub stage (approximately five years old) of the provincially red-listed western hemlock – Douglas-fir / Oregon beaked moss ecological community will be cleared. Some young western white pine trees (approximately 40 years old), which are not provincially or federally designated as at risk, but are relatively rare due to a historic pathogen epidemic will also be cleared within the construction footprint. Standard BMPs and mitigation measures, including retaining older trees within temporary clearing areas where feasible and revegetating temporary clearing areas with native vegetation as soon as possible, will minimize potential impacts. Areas temporarily disturbed during installation of servicing will be revegetated with native local seed mix or stock if they will not be further developed within a year or before the rainy season (i.e., October-April) to mitigate invasive species colonization and runoff. The risk of colonization of invasive species from machinery, vehicles or crew member belongings will be minimized by standard construction BMPs, such as ensuring machinery and construction crews entering and leaving the site are free of soil and vegetation that may contain invasive plant species or their seeds. If noxious weeds (as per the *BC Weed Control* Act) or high priority weeds (as per the Coastal Invasive Species Committee (CISC 2016)) colonize the Property they will be controlled as per the *Weed Control Act* and BMPs. Mitigation measures implemented to minimize impacts to terrains, soils, hydrology and water quality will also minimize impacts to terrestrial ecosystems and plants.

Specific potential impacts and conceptual mitigations are provided in Table 4.

Based on the implementation of prescribed mitigation measures, the scale and location of the anticipated works and activities associated with Project construction and operation, and the current condition of habitat on the Property, no residual impact to ESAs or EVRs is anticipated. Habitat loss will be limited to the Project area and there is only a low likelihood of introduction of invasive species, or spread of invasive species currently established on and around the Property due to Project construction or operation.

Table 4. Potential impacts and conceptual mitigations for terrestrial ecosystems and plants.

Environmentally Valuable Resource	Potential Impact	Effect Pathway	Mitigation	Residual Impact	Relevant Legislation and Best Management Practices
At risk ecological communities and plants			Mitigation measures implemented to minimize impacts to terrains, soils, hydrology and water quality will also minimize impacts to terrestrial ecosystems and plants.		
	Disturbance and/ or loss of the provincially red-listed western hemlock - Douglas-fir/ Oregon beaked moss ecological community Loss of young western white pine (relatively rare but not considered at risk)	Clearing, grubbing, regrading, excavating, infilling, and soil compaction from machines and vehicles	Provincial BMPs (MFLNRO 2014) will be followed to the extent practical to minimize impacts. Project design will minimize Project footprint. Where vegetation clearing is required, mature trees and western white pine will be retained wherever possible. Machine operations and construction activities will be conducted in a manner that minimizes impacts to vegetation, with the intent that vegetation will only be cleared from sites required for construction use.	Loss of young provincially red-listed western hemlock - Douglas-fir / Oregon beaked moss ecological community and western white pine within the Project footprint and minimized disturbance in temporarily disturbed areas	Develop with Care (MFLNRO 2014)

Table 4. Continued.

Environmentally Valuable Resource	Potential Impact	Effect Pathway	Mitigation	Residual Impact	Relevant Legislation and Best Management Practices
At risk ecological communities and plants (continued)	Disturbance and/ or loss of the provincially red-listed western hemlock - Douglas-fir/ Oregon beaked moss ecological community Loss of young western white pine (relatively rare but not considered at risk) (continued)	Clearing, grubbing, regrading, excavating, infilling, and soil compaction from machines and vehicles (continued)	Machinery will avoid roots of retained trees where possible and temporary fencing will be placed around retained trees to protect root structures (MFLNRO 2014). Specifically, disturbance should be minimized within at least the extent of the trees branches (i.e., the tree's drip line), or within a radius 18 times the tree trunk diameter at breast height. Temporary fencing will be bright orange or another highly visible colour with a minimum height of 1.2 m and supported by poles a maximum distance of 2.5 m from one another. Tree protection plans will be communicated to the construction crew. Use of root barriers and retaining walls will be used as needed to prevent tree-infrastructure conflicts. Coarse woody debris and organic materials will be stockpiled and used for onsite landscaping during site reclamation, if applicable.		

Table 4. Continued.

Environmentally Valuable Resource	Potential Impact	Effect Pathway	Mitigation	Residual Impact	Relevant Legislation and Best Management Practices
At risk ecological communities and plants (continued)	Disturbance and/ or loss of the provincially red-listed western hemlock - Douglas-fir/ Oregon beaked moss ecological community Loss of young western white pine (relatively rare but not considered at risk) (continued)	Clearing, grubbing, regrading, excavating, infilling, and soil compaction from machines and vehicles (continued)	Organic debris may be piled for burning. Some piles may be left unburned to serve as wildlife habitat where feasible. If debris piles are burned, burning will be of short duration (i.e., < 72 hours) and will be carried out in accordance with permits obtained for that purpose. Debris pile burning would also require a Fire Preparedness Plan to be prepared that outlines measures that must be followed during burning. Other debris disposal options that may be considered include: removal, chipping, scattering or burying. Construction waste will be removed from the site and recycled or appropriately disposed of. Temporarily disturbed areas will be rehabilitated and revegetated with native vegetation, as soon as possible, where feasible.		*Environmental Management Act* Open Burning Smoke Control Regulation

Table 4. Continued.

Environmentally Valuable Resource	Potential Impact	Effect Pathway	Mitigation	Residual Impact	Relevant Legislation and Best Management Practices
At risk ecological communities and plants (continued)	Colonization by invasive species	Introduction of invasive species from machinery, vehicles or crew member clothing	All excavators and other equipment will be pressure washed to removal all soil and vegetation before arriving at site to avoid introducing invasives. Invasive plants and soil contaminated with the weeds and roots will be removed and disposed of at the landfill or buried under adequate fill (i.e. 3-5 m depending on species). If noxious or high priority invasives plants (BC Weed Control Act or Coastal Invasive Species Committee respectively) are already present, machines will be pressure washed before demobilizing from the site. Exposed soil will be densely planted as soon as practical or covered (i.e., with weed barrier and mulch). An invasive species survey should be conducted in the growing season prior to construction to document invasive species and any management recommendations made by a QEP, as well as post construction to verify that no species were introduced.	Low likelihood of introduction of invasive species or spread of invasive species currently established on and around the Property	Provincial *Weed Control Act;* Coastal Invasive Species Committee (CISC 2016)

5.5. Wildlife and Wildlife Habitat

Potential impacts to wildlife and wildlife habitat include disturbance or accidental mortality of wildlife, and human-wildlife conflict. Amphibians, reptiles, birds and/or their eggs and/or nests, and other small wildlife with low motility may be destroyed through accidental physical impact during vegetation clearing or from machinery, vehicles or workers. To minimize these potential impacts vegetation clearing and maintenance and potential debris pile burning will not occur during the breeding bird season (March 15 – August 31), if feasible. If not feasible, pre-clearing nest and small wildlife sweeps will be conducted and protective buffers maintained around active nests, as directed by a QEP. If amphibians or reptiles are encountered within the construction area and are at risk of physical impact they will be salvaged and relocated to habitat of equal or higher quality. All terrestrial and semi-aquatic wildlife are at risk of accidental mortality or harm from Project vehicles along roads and may be subject to the effects of accidental spills of fuels or hazardous materials. Standard construction BMPs will minimize this risk (e.g., Project vehicles will follow posted speed limits and use caution). Mitigation measures implemented to minimize impacts to terrain, soils, hydrology, water quality, terrestrial ecosystems and plants will also minimize impacts to wildlife and wildlife habitat.

Wildlife habitat alteration will occur from construction and operation of the facility. Impacts will be partially mitigated by minimizing facility lighting, using wildlife friendly fencing where appropriate for wildlife to pass, and minimizing ground disturbance.

The Project is situated in an area that may be frequented by large mammals including Mule Deer, Roosevelt Elk, Cougars (*Puma concolor)* and American Black Bears (*Ursus americanus*) which may interact and come into conflict with facility workers. All wildlife observations and encounters in the Project area will be reported to the QEP. Speed limits within the Project area will be below 20 km/hr. To minimize the risk of human-wildlife conflict, landscaping will be designed so that cover is not available for large mammals near areas of human activity. In addition, all bear/ wildlife attractants on site will be stored indoors or in animal-proof waste containers and plants that may attract bears, such as berry producing shrubs and fruit-bearing trees, will not be planted in the Project area.

Specific potential impacts and conceptual mitigations are provided in Table 5.

Based on the implementation of prescribed mitigation measures, the scale and location of the anticipated works and activities associated with Project construction and operation, and the current condition of habitat in the Project area, no residual impact to ESAs or EVRs is anticipated. Habitat loss is expected to be limited to the permanent Project footprint and there is only a low likelihood of wildlife mortality through physical impact, accidental spills of hazardous materials and human-wildlife conflict.

Table 5. Potential impacts and conceptual mitigations for wildlife and wildlife habitat.

Environmentally Valuable Resource	Potential Impact	Effect Pathway	Mitigation	Residual Impact	Relevant Legislation and Best Management Practices
Wildlife and Wildlife Habitat			Mitigation measures implemented to minimize impacts to terrain, soils, hydrology, water quality, terrestrial ecosystems and plants will also minimize impacts to wildlife and wildlife habitat.		
Birds and bird nests	Disturbance or mortality to birds and/or their eggs and/or nests (as defined by relevant legislation)	Clearing of vegetation or disturbance from nearby construction activities	Vegetation clearing and maintenance and debris pile burning will not occur during the breeding bird season (March 15 - August 31), when feasible. If not feasible, pre-clearing nest sweeps will be conducted and protective buffers maintained around active nests, as directed by a QEP, prior to the removal or clearing of vegetation.	Low likelihood of mortality to birds and/ or their eggs and/ or of nesting habitat	Provincial *Wildlife Act* and *Wildlife Amendment Act,* Federal *Species at Risk Act*, Federal *Migratory Bird Act;* Develop with Care (MFLNRO 2014)
Amphibians, reptiles and small mammals	Mortality of amphibians, reptiles or other small wildlife with low motility	Accidental physical impact from machinery, vehicles or workers	Amphibian, reptile and small mammals will be discouraged or salvaged from the footprint of the proposed facility and relocated to habitat of the same or better quality prior to vegetation clearing or earthworks. Exclusion fencing may be installed around the work area, as directed by a QEP, to prevent the re-introduction of small terrestrial wildlife species into the work area following the salvage. If wildlife migrations through Property (e.g., Western Toad) are encountered, a QEP will be retained direct mitigations.	Low likelihood of mortality to amphibians, reptiles and small mammals	Provincial *Wildlife Act* and *Wildlife Amendment Act,* Federal *Species at Risk Act*

Table 5. Continued.

Environmentally Valuable Resource	Potential Impact	Effect Pathway	Mitigation	Residual Impact	Relevant Legislation and Best Management Practices
General wildlife	Mortality or harm to wildlife	Accidental physical impact from machinery, vehicles or construction crew members	Construction and crew vehicles will follow posted speed limits. If wildlife are encountered on the road they will be provided with ample time and space to move off of the road before the vehicle proceeds.	Low likelihood of mortality to wildlife	Provincial *Wildlife Act* and *Wildlife Amendment Act,* Federal *Species at Risk Act*
		Accidental spills of fuels or hazardous materials into aquatic habitat	Runoff from the site must meet BC Guidelines for Aquatic Life before entering any ditch that may be connected to a watercourse or aquatic feature.		Federal *Fisheries Act*, Provincial *Water Sustainability Act,* BC Guidelines for Aquatic Life
	Habitat alteration	Change of use of habitat due to facility	Lighting will be designed to provide the minimum necessary for safety purposes and to minimize light intrusion throughout the parcel. Fencing should be designed according to the guidelines described in A Landowners Guide to Wildlife Friendly Fences: How to Build Fence with Wildlife in Mind, Montana Fish Wildlife and Parks, if it is intended for wildlife to pass through the area. The minimum amount of area will be disturbed as practicable including the building footprint, roads and pathways. Thus, habitat structures and connectivity to adjacent lands will be maintained as practicable.		Develop with Care (MFLNRO 2014)

Table 5. Continued.

Environmentally Valuable Resource	Potential Impact	Effect Pathway	Mitigation	Residual Impact	Relevant Legislation and Best Management Practices
General wildlife (continued)	Human-wildlife conflict	Conflict arising from interaction of human workers and/or materials with large mammals that may frequent or pass through the area including Mule Deer, Roosevelt Elk, Cougars and American Black Bears.	Landscaping will be designed so that cover is not available for large mammals near areas of human activity.	Low likelihood of human-wildlife conflict	
		Wildlife (especially American Black Bear) may be attracted to food products or waste, and vegetation planted on the Property.	All bear attractants on site will be stored indoors or in animal-proof waste containers. Plants that may attract bears, such as berry producing shrubs and fruit-bearing trees, will not be planted on the Property.		

6. CLOSURE AND NEXT STEPS

This report fulfills the requirement of a bio-inventory for the Project area to be subdivided, as per the Village of Cumberland's OCP requirements (Bylaw 990; VOC 2014a) and Develop with Care (MFLNRO 2014).

Appendix A provides an assessment of how the development Project and this bio-inventory meet DPA#1 bylaw requirements for a Connectivity Area and should be used alongside the referenced sections of this report to guide formation of permit conditions, if issued.

Overall, in the context of the Project area being recently logged, in the vicinity of an active waste management facility, adjacent to a busy gravel road and active gravel mine, and being located over 340 m from an aquatic ecosystem, sensitive terrestrial ecosystem, park or protected area, land development for servicing is expected to have a relatively minimal impact on the larger watershed area as detailed in Section 5. No ESAs or EVRs requiring buffers were identified on or within 100 m of the Project area, thus no restricted development or buffer zones have been designated.

REFERENCES

BSC (Bird Studies Canada). 2019. Nesting Calendar Query Tool: Region A2. Available online: http://www.birdscanada.org/volunteer/pnw/rnest/. Accessed on April 4, 2019.

CDC (BC Conservation Data Center). 2019a. BC Species and Ecosystems Explorer. Available online at: http://a100.gov.bc.ca/pub/eswp/. Accessed on April 4, 2019.

CDC (BC Conservation Data Center). 2019b. FAQ: Can mid-seral stages contribute to conservation of ecosystems at risk? Available online at: https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/conservation-data-centre/explore-cdc-data/faq#ecological_communities. Accessed on April 4, 2019.

CISC (Coastal Invasive Species Committee). 2016. Coastal ISC Priority Invasive Plant List. Available online at: https://www.coastalisc.com/images/Plants/2016_Coastal_ISC_Priority_Plant_List_web.pdf. Accessed on April 8, 2019.

CVRD (Comox Valley Regional District). 2019a. iMap 3.1. Available online at: http://imap2.comoxvalleyrd.ca/imapviewer/. Accessed on March 26, 2019.

CVRD (Comox Valley Regional District). 2019b. Water Balance Model Express. Available online at: https://comox.waterbalance-express.ca/. Accessed on April 11, 2019.

DataBC. 2019. iMapBC. Available online at: https://maps.gov.bc.ca/ess/hm/imap4m/. Accessed on March 3, 2018.

DFO (Department of Fisheries and Oceans Canada). Undated. Standards and Best Practices for Instream Works: Urban Stormwater Management. Available online at: http://www.env.gov.bc.ca/wld/instreamworks/downloads/UrbanStormwater.pdf. Accessed on April 11, 2019.

EC (Environment Canada). 1996. Technical Pollution Prevention Guide for the Dairy Processing Industry. Available online at: http://publications.gc.ca/collections/collection_2015/ec/En83-6-1996-11-eng.pdf. Accessed on April 10, 2019.

ECCC (Environment and Climate Change Canada). 2018. Recovery Strategy for the Western Painted Turtle (*Chrysemys picta bellii*) Pacific Coast Population in Canada [Proposed]. *Species at Risk Act* Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. 2 parts, 31 pp. + 59 pp.

E-Fauna BC. 2019. Electronic Atlas of the Wildlife of British Columbia. Available online at: http://ibis.geog.ubc.ca/biodiversity/efauna/. Accessed on April 4, 2019.

Environmental Management Act Open Burning Smoke Control Regulation. B.C. Reg. 145/93 O.C. 481/93. Available online at: http://www.bclaws.ca/civix/document/id/complete/statreg/145_93. Accessed on April 11, 2019.

Fisheries Act (R.S.C., 1985, c. F-14). Available online at: https://laws-lois.justice.gc.ca/eng/acts/f-14/. Accessed on April 4, 2019.

Green, R.N. and K. Klinka. 1994. A Field Guide for Site Identification and Interpretation for the Vancouver Forest Region. Land Management Handbook Number 28. Province of British Columbia, Ministry of Forests. Available online at: https://www.for.gov.bc.ca/hfd/pubs/docs/Lmh/Lmh28.htm. Accessed on April 3, 2017.

Hunt, R.S. 2009. History of western white pine and blister rust in British Columbia. The Forestry Chronicle. July/August 2009, Vol 85 (4). Available online at: https://pubs.cif-ifc.org/doi/pdf/10.5558/tfc85516-4. Accessed on April 10, 2019.

LEA (Lewkowich Engineering Associates Ltd.). 2019. Phase I Environmental Site Assessment. Proposed Lot D, Bevan Road, Cumberland, BC. Consultant's reported prepared for Tree Island Yogurt. January 15, 2019.

Local Government Act [RSBC 2015]. 2015. Available online at: http://www.bclaws.ca/civix/document/id/lc/statreg/r15001_00. Accessed on April 4, 2019.

McElhanney (McElhanney Consulting Services Ltd.). 2018. Sketch plan of proposed subdivision of part of Section 34, Township 10, Comox district. Drawing prepared by McElhanney Consulting Services Ltd in October 2018.

MFLNRO (BC Ministry of Forests, Lands and Natural Resource Operations). 2014. Develop with Care. Available online at: https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/best-management-practices/develop-with-care. Accessed on April 4, 2019.

MFLNRO (BC Ministry of Forests, Lands and Natural Resource Operations). 2019. Western white pine. Available online at: https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/silviculture/tree-species-selection/tree-species-compendium-index/western-white-pine. Accessed on April 8, 2019.

Migratory Birds Convention Act, S.C. 1994. Available online at: https://laws-lois.justice.gc.ca/eng/acts/M-7.01/page-1.html. Accessed on November 01, 2018.

MOE (BC Ministry of Environment). 2019. Urban Stormwater Management BMPs. Available online at: http://www.env.gov.bc.ca/wld/instreamworks/urbanstormwater.htm. Accessed on April 10, 2019.

MOECCS (BC Ministry of Environment and Climate Change Strategy). 2018. BC Approved Water Quality Guidelines: Aquatic Life, Wildlife and Agriculture. Water Protection & Sustainability Branch. March 2018. Available online at: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/wqgs-wqos/approved-wqgs/wqg_summary_aquaticlife_wildlife_agri.pdf. Accessed on April 11, 2019.

MOF (BC Ministry of Forests). 2010. Field Manual for Describing Terrestrial Ecosystems 2nd Edition. Land Management Handbook 25. Victoria BC. Available online at: http://www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh25/Lmh25_ed2_(2010).pdf. Accessed on March 26, 2019.

Munsell (Munsell Color). 2009. Munsell Soil Color Charts; With Genuine Munsell Color Chips. 68 p.

MWLAP (BC Ministry of Water, Land and Air Protection). 2002a. Stormwater Planning: A Guidebook for British Columbia. Available online at: https://www.toolkit.bc.ca/resource/stormwater-planning-guidebook-british-columbia. Accessed on April 10, 2019.

MWLAP (BC Ministry of Water, Land and Air Protection). 2002b. Environmental Best Management Practices for Urban and Rural land Development in British Columbia. Available online at: http://www.env.gov.bc.ca/wld/documents/bmp/urban_ebmp/urban_ebmp.html. Accessed on April 10, 2019.

RIC (Resources Inventory Committee). 2000. Standard for Terrestrial Ecosystem Mapping (TEM) – Digital Data Capture in British Columbia. Province of British Columbia: Ecosystem Technical Standards and Database Manual. Available online at: https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/nr-laws-policy/risc/tem.pdf. Accessed on November 5, 2018.

Riparian Areas Protection Act Riparian Area Regulation B.C. Reg. 376/2004. O.C. 837/2004. Available online at: http://www.bclaws.ca/civix/document/id/complete/statreg/376_2004. Accessed on April 4, 2019.

Riparian Areas Protection Act. [SBC 1997] Chapter 21. Available online at http://www.bclaws.ca/civix/document/id/complete/statreg/97021_01. Accessed on April 4, 2019.

Ryzuk (Ryzuk Geotechnical Engineering and Materials Testing). 2019. Proposed Dairy Facility – Bevan Road, Cumberland BC. Consultant's report dated April 4, 2019.

Schnorbus, M.A. 2018. Climate change impacts on hydrology for the Comox Lake watershed. Report prepared for the Comox Valley Regional District by the Pacific Climate Impacts Consortium, Victoria, BC. April 2018.

Species at Risk Act, S.C. 2002, c.29. Available online at: http://laws-lois.justice.gc.ca/PDF/S-15.3.pdf. Accessed on April 4, 2019.

VOC (Corporation of the Village of Cumberland). 2014a. Village of Cumberland Official Community Plan Bylaw No. 990. Available online at: https://cumberland.ca/wp-content/uploads/2014/03/Bylaw-990-OCP-2014-03-20-proposed-amendments-OPT.pdf. Accessed on January 30, 2019.

VOC (Corporation of the Village of Cumberland). 2014b. Map of Development Permit Areas. Available online at: https://cumberland.ca/wp-content/uploads/2013/07/Map-C-Development-Permit-Areas-Overview.pdf. Accessed on April 10, 2019.

VOC (Corporation of the Village of Cumberland). 2014c. Development Permit Area Guidelines. Available online at: https://cumberland.ca/wp-content/uploads/2012/05/DPA1-Evironmental-Protection.pdf. Accessed on January 30, 2019.

Water Sustainability Act [SBC 2014] Available online at: http://www.bclaws.ca/civix/document/id/complete/statreg/14015. Last accessed March 5, 2019.

Wedler (Wedler Engineering LLP. 2019. Civil Servicing Review Proposed 7 Lot Subdivision – Bevan Road, Cumberland, BC. Consultant's letter to Scott Diguistini on May 14, 2019.

Weed Control Act [RSBC 1996] Chapter 487. Available online at: http://www.bclaws.ca/civix/document/id/complete/statreg/96487_01#section2. Accessed on April 4, 2019.

Wildlife Act, R.S.B.C 1996. Available online at: http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/00_96488_01. Accessed on April 4, 2019.

WTSA (Wildlife Tree Stewardship Atlas). Available online at: http://cmnmaps.ca/wits/. Accessed on April 4, 2019.

Personal Communications

Delaney, Coleen. 2019. Contaminated Sites Officer, BC Ministry of Environment and Climate Change Strategy. Email communication with Scott DiGuistini titled Site 4623 - Bevan Road (Former Mine Site), Cumberland on August 30, 2019.

English, Phalina. 2018. Post-doctoral Research Biologist, Simon Fraser University. In person communication with Leah Ballin, Ecofish Research Ltd in October 2018.

PROJECT MAPS

TREE ISLAND

Wildlife Habitat Plots

Legend

- Wildlife Habitat Plot
- Proposed Subdivision Lot
- Parcel Boundary

* The locations of the Proposed Subdivision Lot and Parcel Boundary are approximate.

MAP SHOULD NOT BE USED FOR LEGAL OR NAVIGATIONAL PURPOSES

0 50 100 m

Scale: 1:2,000

NO.	DATE	REVISION	BY
1	03/09/2019	1413_TRI_WildlifeHabitatPlots_3167_20190903	CGA
2			
3			
4			
5			

Date Saved: 03/09/2019
Coordinate System: NAD 1983 UTM Zone 10N

ECOFISH RESEARCH

Map 2

Path: M:\Projects-Active\1413\MXD\Overview\1413_TRI_WildlifeHabitatPlots_3167_20190903.mxd

TREE ISLAND

Watersheds and Adjacent Waterbodies

Legend

- Well Location
- Proposed Subdivision Lot
- Major Contour
- Minor Contour
- Parcel Boundary
- Streams
- Watersheds

* The locations of the Proposed Subdivision Lot and Parcel Boundary are approximate.

MAP SHOULD NOT BE USED FOR LEGAL OR NAVIGATIONAL PURPOSES

0 100 200 400 600 800 m

Scale: 1:15,000

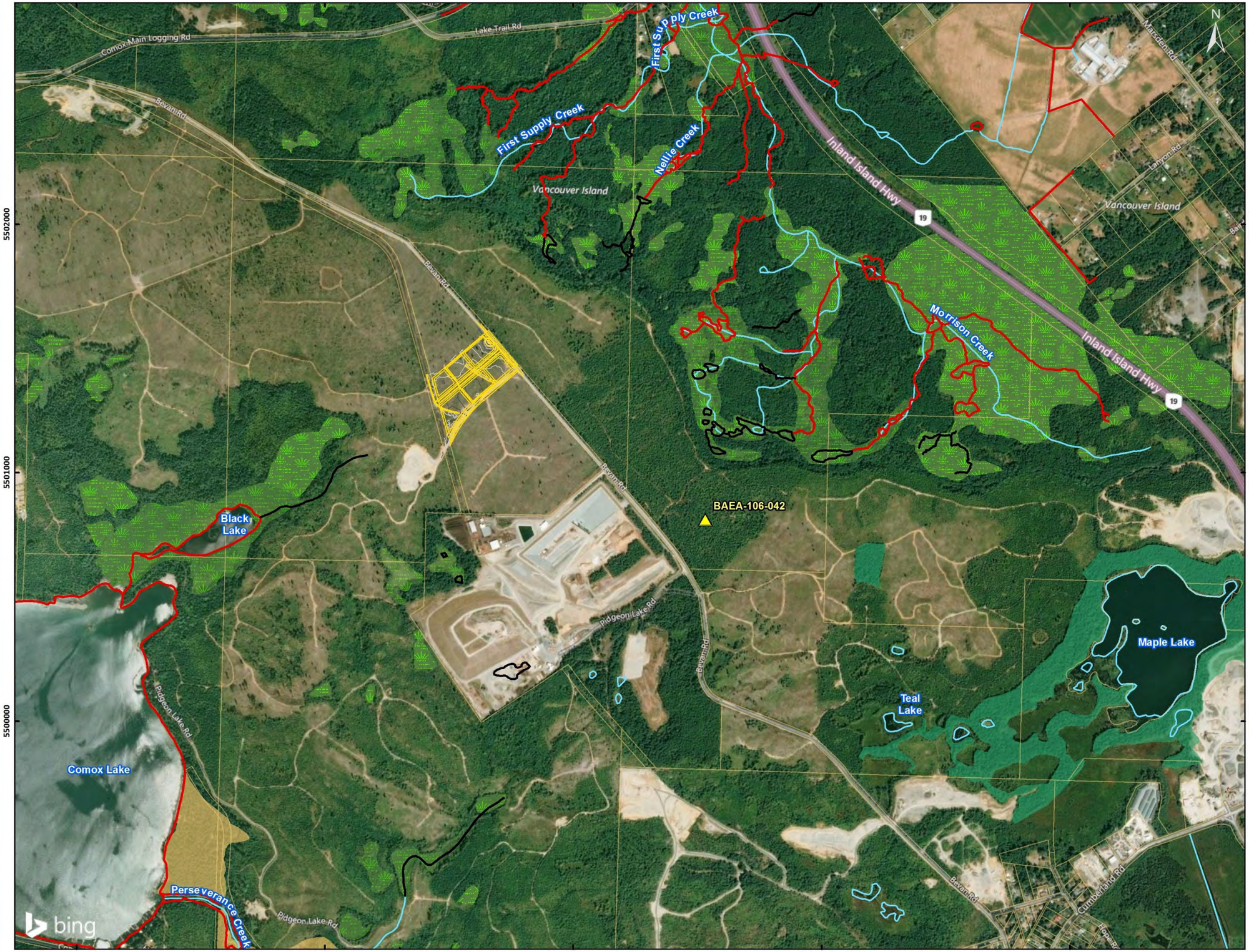
NO.	DATE	REVISION	BY
1	03/09/2019	1413_TRI_TerrestrialMaps_2019Apr04	CGA
2			
3			
4			
5			

Date Saved: 03/09/2019
Coordinate System: NAD 1983 UTM Zone 10N

ECOFISH RESEARCH

Map 3

Path: M:\Projects-Active\1413\MXD\Overview\1413_TRI_TerrestrialMaps_2019Apr04.mxd



TREE ISLAND

Terrestrial and Aquatic Features

Legend

- Proposed Subdivision Lot
- Major Contour
- Minor Contour
- Bald Eagle Nest

Confirmed and Unknown Fish Presence

- Fish presence
- Unknown Fish Presence

Sensitive Ecosystem Inventory

- Wetland
- Riparian
- Older Second Growth Forest
- Streams
- Parcel Boundary

MAP SHOULD NOT BE USED FOR LEGAL OR NAVIGATIONAL PURPOSES

0 100 200 400 600 800 m

Scale: 1:15,000

NO.	DATE	REVISION	BY
1	03/09/2019	1413_TRI_TerrestrialMaps_3167_20190710	CGA
2			
3			
4			
5			

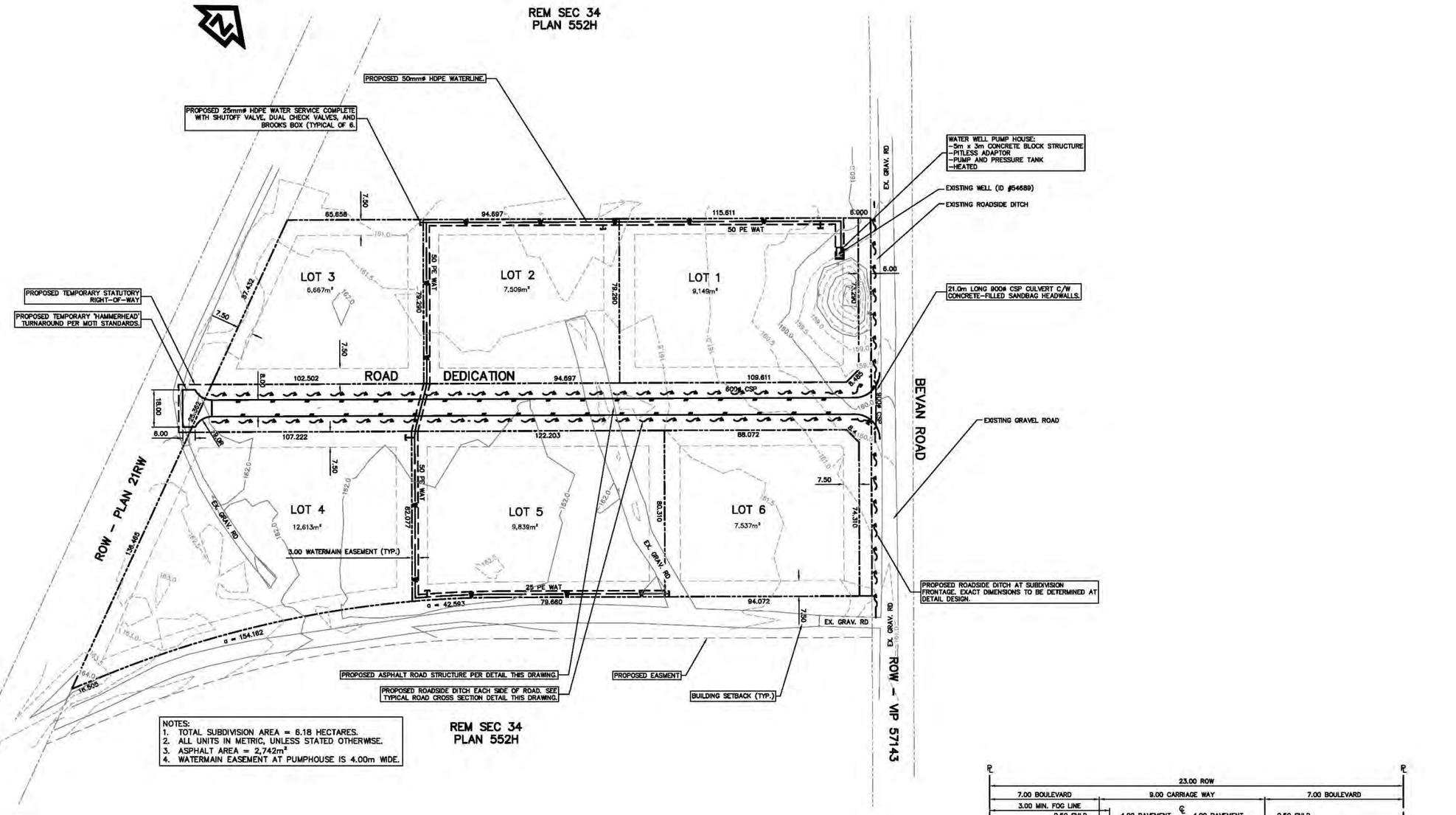
Date Saved: 03/09/2019
Coordinate System: NAD 1983 UTM Zone 10N

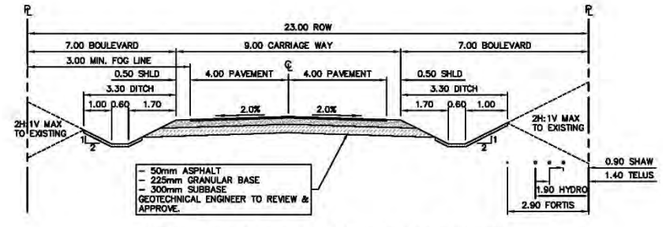
ECOFISH RESEARCH

Map 4

Path: M:\Projects-Active\1413\MXD\Overview\1413_TRI_TerrestrialMaps_3167_20190710.mxd

DRAWINGS





TYPICAL 'SUBDIVISION' ROAD CROSS SECTION
SCALE: N.T.S.

REV	DESCRIPTION	YYYY-MM-DD	BY	REV	DESCRIPTION	YYYY-MM-DD	BY
A	ISSUED FOR CONCEPTUAL REVIEW	2019-01-16	SBH	H	REVISED LOT LAYOUT	2019-07-11	TJD
B	UPDATED PER CLIENT COMMENTS	2019-01-17	SBH	I	ADDED EXISTING TOPOGRAPHY	2019-08-27	TJD
C	REVISED LOT LAYOUT	2019-03-07	TJD				
D	REVISED LOT LAYOUT	2019-03-13	TJD				
E	REVISED LOT LAYOUT	2019-03-26	TJD				
F	REVISED LOT LAYOUT	2019-03-29	TJD				
G	ISSUED FOR PRELIMINARY COSTING	2019-04-18	TJD				

LEGAL: |

BM/ TBM:

PROJ. MGR. ARC
DESIGN/DRAWN TJD
PEER REVIEWED
HORIZ. SCALE AS SHOWN
VERT. SCALE N/A

WEDLER ENGINEERING
www.wedler.com

THE WEDLER GROUP
- Abbotsford 1.604.746.0300
- Chilliwack 1.604.792.0651
- Courtenay 1.250.334.3263
- Surrey 1.604.588.1919

TREE ISLAND YOGURT
NEW YOGURT FACILITY & SUBDIVISION
BEVAN ROAD, CUMBERLAND, BC

PROPOSED SUBDIVISION LOT LAYOUT

DRAWING NO. V18-0316/A-01 OF 1
LOCAL GOVERNMENT FILE
PHASE
REVISION H

N:\18\V18-0316A - New Yogurt Facility - Tree Island\Design\- Current Drawing Files\V18-0316A.dwg 2019/8/27 03:38:27 PM tduerden

2019 - WEDLER ENGINEERING LLP - ALL RIGHTS RESERVED - THIS DOCUMENT IS PROTECTED BY COPYRIGHT LAW AND MAY NOT BE REPRODUCED IN ANY MANNER, OR FOR ANY PURPOSE, EXCEPT BY WRITTEN PERMISSION OF COPYRIGHT HOLDER.

PROGRESS PRINT - NOT FOR CONSTRUCTION

APPENDICES

Appendix A. Village of Cumberland Bylaw 990 requirements and how they are addressed in this report

LIST OF TABLES

Table 1. Development Permit Area #1 Environmental Protection Guidelines – General Requirements.

OCP Section	DP Language	Addressed in this report	Status
10.1.5	**DPA#1 EP Guidelines – General Requirements**		
1	Biological site inventory (bio-inventory) according to the procedures described in Develop with Care 2012 - Environmental Guidelines for Urban and Rural Land Development in British Columbia, Appendix B and amendments hereto, prepared by the Ministry of Forest Lands and Natural Resource Operations.	Develop with Care (2012, 2014) was followed for the current study, as per Section 1.1.	Complete
2	The bio-inventory should be prepared by a qualified professional biologist together with other professionals of different and relevant expertise, as the project warrants.	The report was prepared by qualified professional biologists, a professional forester and a professional geoscientist and reviewed by a senior professional biologist with expertise in wildlife and terrestrial ecology, hydrology, hydro-geology and geology, and construction environmental management, as per the report cover.	Complete
	If wetlands and riparian areas exist within the development area, hydrologists and hydro-geologists should be consulted to ensure the proper hydrological function is maintained within these ecosystems.	No wetlands or riparian areas are present in or within 100 m of the Project area, as per Section 4.2.	Complete
	A professional geoscientist should be consulted if there is erosion potential or slope instability.	There is low potential for erosion or slope instability, as determined by geoscientists (Ecofish, Ryzuk Geotechnical), as per Section 4.1 and 5.1.	Complete
	The consultant or team of consultants should have an understanding of wildlife biology—especially for species at risk, geomorphology, environmental assessment, and development planning in British Columbia, specific expertise in the wildlife species, wildlife habitat, and ecosystems of the West Coast region is highly preferred.	The consultant team has an understanding of wildlife biology—including for species at risk, geomorphology, environmental assessment, and development planning in British Columbia, and specific expertise in the wildlife species, wildlife habitat, and ecosystems of the West Coast region.	Complete

[1]Interpretation: 'Complete' means that the condition has been addressed and no further work is required, this may be because the work is complete and no further work is required or because any risk to potential ESA's/EVR's is low. 'N/A' means that the condition does not apply because the site conditions that the condition applies to are not present on site, '-' means that the condition does not require action or a commitment at this time; have been appropriately mitigated; 'Partial - future phase' means that bio-inventory requirement has been met for the current phase but needs to be reviewed in a future phase in consideration of detailed development design when sufficient design detail becomes available to fully address the condition; 'Future phase' means that the detailed development design is required to address the condition. 'Not Required' means this has been specifically stated by Village staff.

Table 1. Continued.

OCP Section	DP Language	Addressed in this report	Status
10.1.5	**DPA#1 EP Guidelines – General Requirements**		
3	The bio-inventory shall:		
	a) Be in accordance with Develop with Care 2012: Environmental Guidelines for Urban and Rural Land Development in British Columbia (DWC) or most current edition, and with reference to Appendix B: Bio-inventory Terms of Reference.	Develop with Care (2012, 2014) was followed for the current study, as per Section 1.1.	Complete
	b) Locate the parcel relative to watershed area(s) and describe the hydrological features of the parcel—including water shedding, collecting and conveyance areas.	A map of the Project area relative to the watershed areas is provided in the Project Maps section at the end of the report and the hydrological features of the land are described in Section 4.2.	Complete
	c) Examine the natural environmental features within the parcel—including rare and threatened plant communities, endangered species listed under the *Provincial Wildlife Act* and the Federal *Species At Risk Act* (SARA) and any identified critical habitats for those species, and other important habitat features.	The natural environmental features of the Project area are examined within the report, as per Section 4.4 and 4.5.	Complete
	d) Provide a description and map(s) showing the boundaries of Environmentally Sensitive Areas—including 30.0 metres from the natural boundary of terrestrial areas, and 30.0 meters from the natural boundary of watercourses, wetlands and lakes, and 30.0 meters from the top of the bank of a watercourse, where a bank is within 15.0 meters of the natural boundary of the watercourse). Determine the restricted development and buffer zones on the parcel through an explanatory, reference or legal survey plan prepared by a BC Land Surveyor that shows these boundaries (refer to Section 4, Table 4.1 Develop With Care for recommended target buffer distances for biodiversity conservation).	No Environmentally Sensitive Areas were detected within the Project area, nor are any Terrestrial or Aquatic Ecosystem Areas identified in the OCP, as per Section 5. Therefore, no restricted development or buffer zones are necessary to protect ESAs in the Project area or within 100 m of the Project boundary.	Complete
	e) Examine the impact of the proposed development on the soils, vegetation, watercourses, wildlife, and hydrology in all restricted development and buffer zones; and provide development pattern and servicing recommendations to minimize these impacts.	No restricted development or buffer zones identified in the Project area, as per Section 5.	N/A
	f) Examine pre-development water quality and quantity on the site and provide mitigation and enhancement strategies to maintain pre-development water quality and quantity for the restricted development zones and buffer areas.	Groundwater quality data provided by Maxxam is presented in Wedler (2019b) and regional precipitation water quantity is described, as per Section 4.2. No surface or groundwater (examined to 2.3 m depth) observed during Ecofish or Ryzduk survey, thus no surface water quality or quantity data collected, as per Section 4.2, nor are restricted development zones or buffers exist within the Project area or within 100 m of the Project area, as per Section 5. Some pre-development water quantity data can be derived from the well pump test data that was collected during construction of the well as per Wedler 2019b.	Complete

[1]Interpretation: 'Complete' means that the condition has been addressed and no further work is required, this may be because the work is complete and no further work is required or because any risk to potential ESA's/EVR's is low. 'N/A' means that the condition does not apply because the site conditions that the condition applies to are not present on site, '-' means that the condition does not require action or a commitment at this time; have been appropriately mitigated; 'Partial - future phase' means that bio-inventory requirement has been met for the current phase but needs to be reviewed in a future phase in consideration of detailed development design when sufficient design detail becomes available to fully address the condition; 'Future phase' means that the detailed development design is required to address the condition. 'Not Required' means this has been specifically stated by Village staff.

Table 1. Continued.

OCP Section	DP Language	Addressed in this report	Status
10.1.5	**DPA#1 EP Guidelines – General Requirements**		
3	The bio-inventory shall:		
	g) Examine the impact of the proposed development on the larger watershed area(s) including watercourses, habitat connectivity, water quality and quantity upstream and downstream, and possible cumulative hydrological impacts that may result; and provide development pattern and servicing recommendations to minimize them.	Section 5 of the bioinventory report provides an examination of the impact of the current proposed development on the natural environment in the Project area and the greater watershed. The potential impacts of the proposed development on the larger watershed are expected to be low. The potential impacts on groundwater recharge and/or watercourses > 100 m from the property as a result of impervious surfaces due to development are expected to be low. Infiltration capacity in the Project area is already high and infrastructure will be designed to maximize iniltration. However there is potential for stormwater runnoff into existing ditch systems located on Bevan Road and into downstream waterbodies, especially for a storm larger than a current 5-year storm. Runoff is expected to flow to the northwest (i.e., First Supply Creek/ Puntledge watershed) based on 1 m contours. Water quality and quantity effects from runoff will be mitigated with stormwater infrastructure designed to Village standards, development of an Erosion and Sediment Control plan and adoption of other current best management practices, as per Section 5.2. No water is expected to be withdrawn at this phase thus watershed level effects from water withdrawal were not assessed, however, they will be assessed by the Province and project biologists as a component of the Water Sustainability Act application process. Wildlife may cross the Project area, however, the Project area does not contain known specific characteristics favorable for wildlife to use as a corridor as compared to the surrounding area. Impacts assessed and recommendations provided in Sections 5.4 and 5.5.	Complete
	h) Recommend appropriate timing of works associated with development in order to minimize impacts to wildlife during migration, breeding, birthing, and rearing seasons.	All work will be completed outside of the breeding bird season (March 15 - August 31) in order to minimize impacts to wildlife. If work cannot be completed outside of the breeding bird season, then pre-clearing nest and small wildlife sweeps will be conducted and protective buffers maintained around active nests, as directed by a QEP. Recommendations for appropriate timing of works, and associated mitigations, are provided in Sections 5.5.	Complete

[1]Interpretation: 'Complete' means that the condition has been addressed and no further work is required, this may be because the work is complete and no further work is required or because any risk to potential ESA's/EVR's is low. 'N/A' means that the condition does not apply because the site conditions that the condition applies to are not present on site, '-' means that the condition does not require action or a commitment at this time; have been appropriately mitigated; 'Partial - future phase' means that bio-inventory requirement has been met for the current phase but needs to be reviewed in a future phase in consideration of detailed development design when sufficient design detail becomes available to fully address the condition; 'Future phase' means that the detailed development design is required to address the condition. 'Not Required' means this has been specifically stated by Village staff.

Table 1. Continued.

OCP Section	DP Language	Addressed in this report	Status
10.1.5	**DPA#1 EP Guidelines – General Requirements**		
4	The detailed bio-inventory is used to create the site plan. The site plan and development design must include:		
	a) Detailed drawings or plans clearly describing the proposed structures and the materials and type of construction to be employed, including a cross section of the proposed structure and its layout on the ground;	The conceptual and design drawings of the subdivision are included in the 'Drawings' section of the bio-inventory.	Complete
	b) A detailed description of existing structures near the proposed structure or area of work;	No structures are currently present on or in the vicinity of the Project area. The closest structure is the waste management facility, located approximately 500 m to the southwest of the Project area, and gravel roads which abut the north and east sides of the Project area, as per Section 1.3 and 1.4.	Complete
	c) A detailed drawing or plan clearly describing any area of the removal of rock, gravel, or soil;	Groundworks will be conducted for servicing the subdivision, as per the 'Drawings' section of the report. Detailed designs for the removal of rock, gravel and soil are not provided at this time.	Complete
	d) The reason and purpose of the work;	The purpose of work is to subdivide and service the land, as described in Section 1.	Complete
	e) The name of the contractor, if any, who will do the work;	The contractor has not yet been identified.	Not Required
	f) Time required for completion in calendar days;	The time required for completion of subdivision and servicing development has not yet been identified.	Not Required
	g) Any further information required by the Village to ensure compliance with this bylaw, including construction design or structural details of any part of the proposed works;	Design drawings for the subdivision including for servicing are provided in the 'Drawings' section of the bio-inventory. The Village has not requested additional information at the time of submission of this report.	Partial - future phase
	h) A description of how environmental protection DPA requirements will be met, and how any issues identified in the bio-inventory will be mitigated, and how recommended mitigation measures will be achieved;	Description of how DPA requirements will be met and recommendations for mitigations are provided in Section 5 of the bio-inventory and in this table.	Complete
	i) Any replanting prescription for vegetation in disturbed areas that is prescribed by the bio-inventory report;	No replanting prescriptions are provided at this time, however revegetation of temporarily disturbed areas, including for greenway construction, should be done as soon as practicable following disturbance to minimize colonization of invasive species.	Not Required
	j) A copy of any applicable federal and provincial approvals.	Provincial approvals will be required for potable water through the *Water Sustainability Act* for water extracted from the ground, and sewer through the *Waste Management Act*. The WSA application will be submitted following acquisition of the Project area by the applicant (estimated as September 30, 2019), as required by the province. Further, no water will be withdrawn at this phase.	Future phase

[1]Interpretation: 'Complete' means that the condition has been addressed and no further work is required, this may be because the work is complete and no further work is required or because any risk to potential ESA's/EVR's is low. 'N/A' means that the condition does not apply because the site conditions that the condition applies to are not present on site, '-' means that the condition does not require action or a commitment at this time; have been appropriately mitigated; 'Partial - future phase' means that bio-inventory requirement has been met for the current phase but needs to be reviewed in a future phase in consideration of detailed development design when sufficient design detail becomes available to fully address the condition; 'Future phase' means that the detailed development design is required to address the condition. 'Not Required' means this has been specifically stated by Village staff.

Table 1. Continued.

OCP Section	DP Language	Addressed in this report	Status
10.1.5	**DPA#1 EP Guidelines – General Requirements**		
5	As a condition of the development permit and in accordance with the bio-inventory for the project, the Village may require monitoring of the development by a qualified professional such as a professional engineer or biologist.	A Qualified Environmental Professional will be retained to ensure development is conducted in accordance with the Development Permit, the bioinventory, and applicable BMP's. The QEP will conduct surveys for active bird nests and other wildlife with low motility (i.e., amphibians and reptiles) prior to any vegetation removal or grubbing in the breeding bird season (April 15 - August 31), as per Sections 5.	Complete
6	Should damage occur to an environmentally sensitive area during development, the Village shall require, at the developer's cost:		
	a) A Professional assessment and report on the damage incurred along with recommended mitigations;	No ESAs were found to occur on the property. However, a QEP will be retained to ensure development is conducted in accordance with the Development Permit, the bioinventory, and applicable BMP's. If damage occurs to an ESA the QEP will provide an assessment of the damage and recommend mitigations, as per Section 5.	Complete
	b) Full mitigation and rehabilitation of the impacted ESA.	If damage occurs to an ESA, the QEP will oversee mitigation and rehabilitation of the impacted ESA.	Complete
7	Development design must reflect the objectives and guidelines of the Standards and Best Practices for Instream Works, Land Development Guidelines for the Protection of Aquatic Habitat, Stormwater Management: A Guidebook for British Columbia. Develop with Care Environmental Guidelines for Urban and Rural Land Development in British Columbia (Section 3 - Guidelines for Ecosystems and Species Protection and Section 4), Access Near Aquatic Areas: A Guide to Sensitive Planning, Design and Management and other best management practices guides produced by the provincial government.	Subdivision servicing should follow the BMPs and reflect the objectives and guidelines of Stormwater Management: A Guidebook for British Columbia and Develop with Care Environmental Guidelines for Urban and Rural Land Development in British Columbia (Section 3 - Guidelines for Ecosystems and Species Protection and Section 4), as per Section 5.2. No aquatic ecosystem areas or features occur within the Project area thus the remaining listed guidance does not apply.	Partial - future phase

[1]Interpretation: 'Complete' means that the condition has been addressed and no further work is required, this may be because the work is complete and no further work is required or because any risk to potential ESA's/EVR's is low. 'N/A' means that the condition does not apply because the site conditions that the condition applies to are not present on site, '-' means that the condition does not require action or a commitment at this time; have been appropriately mitigated; 'Partial - future phase' means that bio-inventory requirement has been met for the current phase but needs to be reviewed in a future phase in consideration of detailed development design when sufficient design detail becomes available to fully address the condition; 'Future phase' means that the detailed development design is required to address the condition. 'Not Required' means this has been specifically stated by Village staff.

Table 1. Continued.

OCP Section	DP Language	Addressed in this report	Status
10.1.5	**DPA#1 EP Guidelines – General Requirements**		
8	Plan, design, and implement land development and subdivision in a manner that:		
	a) Supports the maintenance and restoration of natural system functions including watercourse, and groundwater recharge; hydrology	No watercourses occur in the Project area. Roadside ditches will be designed to maximize infiltration, as per Section 5.2 .	Complete
	b) Preserves natural features including soil, watercourses, groundwater, and native shrubs, groundcover and tree cover;	The subdivision will include ground disturbance for servicing and greenway construction. Natural features or the functions of natural features will be preserved where feasible and/ or planned, as per Section 5.1.	Complete
	c) Maintains connectivity and linkages with adjacent sensitive ecosystems and other habitat areas and minimizes fragmentation;	No sensitive ecosystems or important habitat areas were detected on or immediately adjacent to the Project area, as per Section 4.4 and 4.5. No park dedication to protect connectivity through the area is provided by the development as the park dedication is being aloted to a greenway for human travel. Prior to future development in the area, connectivity corridors for wildlife between key habitats including Comox Lake and Morrison headwaters should be planned and set	Complete
	d) Protects endangered, threatened, or vulnerable species or plant communities by avoiding disturbance to sites where rare plants are growing and where rare natural plant communities occur;	No mature communities at risk or rare plants were detected in the Project area as per Section 4.4.	Complete
	e) Maintains critical habitat structures such as old trees, snags, trees with cavities, and ephemeral wetlands.	No critical habitat structures were identified in the Project area, as per Section 4.4.	Complete
9	Retain mature vegetation wherever possible and incorporate it into the design of the project.	No mature vegetation occurs in the Project area as per Section 4.4. Vegetation will be disturbed for servicing during subdivision. Young trees that were left after the property was last logged should be left standing outside of the footprint required for construction of servicing, as per Section 5.4.	Complete
10	Demonstrate that a diligent effort has been made in site design to:		
	a) Preserve both the natural vegetation and tree cover; or	Historical forest densities and hydrological function will not be restored as the Project area is zoned for and planned to be an industrial area. However, BMPs for stormwater management will be followed to minimize alteration to hydrological function, as per Section 5.2.	Complete
	b) Restore historical forest densities and hydrological function.		Complete

[1]Interpretation: 'Complete' means that the condition has been addressed and no further work is required, this may be because the work is complete and no further work is required or because any risk to potential ESA's/EVR's is low. 'N/A' means that the condition does not apply because the site conditions that the condition applies to are not present on site, '-' means that the condition does not require action or a commitment at this time; have been appropriately mitigated; 'Partial - future phase' means that bio-inventory requirement has been met for the current phase but needs to be reviewed in a future phase in consideration of detailed development design when sufficient design detail becomes available to fully address the condition; 'Future phase' means that the detailed development design is required to address the condition. 'Not Required' means this has been specifically stated by Village staff.

Table 1. Continued.

OCP Section	DP Language	Addressed in this report	Status
10.1.5	**DPA#1 EP Guidelines – General Requirements**		
11	Prevent disturbance of nesting sites and breeding areas. Animals must have access to the habitat that supports their reproduction in order to ensure future generations.	No specific nesting sites or breeding areas were identified in or immediately adjacent to the Project area as per Section 4.5. Nevertheless, all work should be completed outside of the breeding bird season (March 15 - August 31) in order to minimize potential impacts to wildlife. If work cannot be completed outside of the breeding bird season, then pre-clearing surveys for active bird nests and other wildlife with low motility (i.e., amphibians and reptiles) will be conducted and protective buffers maintained around active nesting sites and breeding areas, as directed by a QEP. Recommendations for appropriate timing of works, and associated mitigations, are provided in Sections 5.5.	Complete
12	Schedule work during times when impacts to wildlife will be minimal, including:		
	a) Outside of known wildlife migration seasons.	No high or moderate value migration habitat was detected in the Project area, as per Section 4.5.	Complete
	b) Outside of breeding, birthing, and rearing seasons (refer to Section 4 of 2012 Develop with Care Manual for breeding season least risk windows).	All work should be completed outside of the breeding bird season (March 15 - August 31) in order to minimize impacts to wildlife. If work cannot be completed outside of the breeding bird season, then pre-clearing nest and small wildlife sweeps will be conducted and protective buffers maintained around active nests, as directed by a QEP. All wildlife sightings should be provided to the QEP. Recommendations for appropriate timing of works, and associated mitigations, are provided in Sections 5.5.	Complete
13	Preserve existing and potential connections to adjacent Terrestrial, Aquatic and Connectivity Areas by maintaining native shrub, groundcover and tree cover between habitats.	There are no Terrestrial or Aquatic Ecosystem areas adjacent to the Project Area as per Section 4 and Map 4.	Complete
14	Prevent foreign material from entering into any restricted development areas, including—without limitation—greases, oils, gasoline, sediments, and other contaminants during and after the construction phase of the proposed development.	No restricted development or buffer zones identified on or adjacent to the Project area, as per Section 5.	N/A
15	Design lighting on developments to provide the minimum necessary for safety purposes and to avoid light intrusion throughout the parcel.	No lighting will be installed for the subdivision.	Complete
16	Any fencing should be designed according to the guidelines described in A Landowners Guide to Wildlife Friendly Fences: How to Build Fence with Wildlife in Mind, Montana Fish Wildlife and Parks.	No fencing will be installed for the subdivision.	Complete
17	Manage rainwater in accordance with the Water Balance Model or the most recent integrated watershed management or rainwater policy and design manual. This includes managing rainwater on site and maintaining pre-development drainage flows.	Subdivision servicing and site design will follow BMP's for rainwater management. Specifically, roads and ditches will be designed to manage most rainwater on site and maintain pre-development infiltration, as per Section 5.2.	Complete

[1]Interpretation: 'Complete' means that the condition has been addressed and no further work is required, this may be because the work is complete and no further work is required or because any risk to potential ESA's/EVR's is low. 'N/A' means that the condition does not apply because the site conditions that the condition applies to are not present on site, '-' means that the condition does not require action or a commitment at this time; have been appropriately mitigated; 'Partial - future phase' means that bio-inventory requirement has been met for the current phase but needs to be reviewed in a future phase in consideration of detailed development design when sufficient design detail becomes available to fully address the condition; 'Future phase' means that the detailed development design is required to address the condition. 'Not Required' means this has been specifically stated by Village staff.

Table 1. Continued.

OCP Section	DP Language	Addressed in this report	Status
10.1.5	**DPA#1 EP Guidelines – General Requirements**		
18	Encroachment into the DPA by all development activities will not exceed that indicated in the site plan approved in the development permit. All development activities will avoid or minimize disturbance in the DPA beyond the building footprint. This may mean adjusting conventional practices with respect to locating machinery and stockpiles relative to excavations, use of hand labour as opposed to machinery, etc.	Development will not encroach on land outside of the Project area, unless permission provided in writing by landowner. Currently encroachement is planned for a hammerhead in the Village ROW as per the Drawing.	-
19	Prior to any development activity, the boundaries of restricted development and buffer zones identified in the bio-inventory will be clearly marked with a bright orange or other highly visible temporary fence with a minimum height of 1.2 meters and supported by poles a maximum distance of 2.5 meters from one another. This fence will remain in place throughout clearing, site preparation, construction, or any other form of disturbance.	No restricted development or buffer zones are identified in the Project area, as per Section 5.	N/A
20	Ensure that the roots of trees are protected during construction. The roots of mature trees typically extend from 1–3 times the height of the tree from the tree's trunk and are found within 30.5–38.1 centimeters of the soil surface. Damage to these roots (especially in mature trees) can impede the tree's ability to obtain water and nutrition and can cause it to fall or blow over. Communicate tree protection plans to everyone involved in the project.	No mature trees exist on the property. Young trees (i.e., 30-80 years old) that will not be removed for the facility will be protected from construction activities. Trees that are within planned retention areas will be protected with orange drift fence as per Section 4.4.	Complete
21	Any trail or pathway development must: a) Minimize the impacts of recreational use on restricted development zones and adjacent natural areas and systems;	No restricted development zones exist in the Project area. Recreational use will be restricted to the greenway location chosen by the Village, as per Map 2. No maintenance of natural areas is included in the site plan.	Complete
	b) Adhere to the Village's trail and pathway design and construction practices for ESADP Areas;	The greenway will adhere to the Village's trail and pathway design and construction practices for ESADP Areas, as per Section 5.	Complete
	c) Be designed to prevent motorized vehicle use to the maximum extent possible.	The subdivision is zoned industrial and requires motorized vehicle use. There is a dedicated greenway that will facilitate access by alternate methods.	Complete
22	When establishing watercourse and riparian buffer zones, consider the needs of all species and not just fish. For example, SPEAs established using the Riparian Areas Regulation methodology focus on the needs of salmon and trout and may not adequately protect other species such as amphibians, birds, and small mammals.	No watercourse or riparian buffer zones occur in the Project area or in the near vicinity, as per Section 4.3 and Map's 2-4.	N/A

[1]Interpretation: 'Complete' means that the condition has been addressed and no further work is required, this may be because the work is complete and no further work is required or because any risk to potential ESA's/EVR's is low. 'N/A' means that the condition does not apply because the site conditions that the condition applies to are not present on site, '-' means that the condition does not require action or a commitment at this time; have been appropriately mitigated; 'Partial - future phase' means that bio-inventory requirement has been met for the current phase but needs to be reviewed in a future phase in consideration of detailed development design when sufficient design detail becomes available to fully address the condition; 'Future phase' means that the detailed development design is required to address the condition. 'Not Required' means this has been specifically stated by Village staff.

Table 2. Development Permit Area #1 Environmental Protection Guidelines – Connectivity Areas.

OCP Section	DP Language	Addressed in this report	Status
10.1.6.3	**DPA#1 EP Supplemental Guidelines – Connectivity Areas**		
1	The following requirements apply to all development permit applications in all Connectivity Areas.		
	a) Locate development within the parcel where it will cause the least impact to natural habitat and the movement of native fauna between adjacent areas	The Project area is comprised of relatively uniform ecological characteristics. The development makes use of existing disturbance. Future development in Bevan area should include dedicated areas for wildlife movement through watershed.	Complete
	b) New road development within Connectivity Areas should be avoided to the maximum extent possible	Roads have been minimized to the extent possible.	Complete
	c) If new road development cannot be avoided, the length and width of road development must be minimized and:	Roads have been minimized to the extent possible.	Complete
	i) Appropriate wildlife crossing infrastructure as determined by the mitigation measures described in the bio-inventory must be designed and installed, using best practices for mitigating the effects of roads on local species	Speed limits should be set and posted to minimize the likelihood of collisions with wildlife, as per Section 5.5.	Complete
	ii) Establish Wildlife Traffic Zones with appropriate traffic warning signage and reduced speeds to mitigate dangers to the public and wildlife mortality threats	Appropriate speed limits (20 km/ hr) will be posted to mitigate dangers to humans and wildlife, as per Section 5.5.	Complete
	d) The location of recreational trails and pathways shall be in accordance with current Best Management Practices in British Columbia, including but not limited to Develop with Care 2012–Environmental Guidelines for Urban and Rural Land Developments in British Columbia and Environmental Best Management Practices for Urban and Rural land Development (Section 3 Site Development and Management and Fact Sheet #5-Parks).	The Bevan greenway will be constructed in accordance with current best management practices and Village requirements, as per Section 5.	-
	e) To the maximum extent possible, the distribution and intensity of native vegetation and cover should be maintained throughout the property.	Subdivision, servicing and greenway construction will cause ground disturbance. The function of natural cover, such as infiltration will be restored to the extent possible	Complete
	f) Conserve trees in communities (groups of trees along with their associated understory) rather than isolating individual specimens. Groups of trees form a larger intact ecosystem and are more likely to maintain the important characteristics of the ecosystem over time than a few scattered trees. However, some ecosystems are characterized by or may contain some isolated trees and their conservation as well is important.	Subdivision, servicing and greenway construction will require land disturbance. Vegetated areas will be preserved during this phase where practicable.	Complete

[1]Interpretation: 'Complete' means that the condition has been addressed and no further work is required, this may be because the work is complete and no further work is required or because any risk to potential ESA's/EVR's is low. 'N/A' means that the condition does not apply because the site conditions that the condition applies to are not present on site, '-' means that the condition does not require action or a commitment at this time; have been appropriately mitigated; 'Partial - future phase' means that bio-inventory requirement has been met for the current phase but needs to be reviewed in a future phase in consideration of detailed development design when sufficient design detail becomes available to fully address the condition; 'Future phase' means that the detailed development design is required to address the condition. 'Not Required' means this has been specifically stated by Village staff.

Appendix B. Wildlife Habitat Plot Survey Data

LIST OF TABLES

Table 1. Site description data.

Site	Site Series	Meso Slope Position	Structural Stage	Seral Stage	Estimated Age (years)	Canopy Closure	Slope (%)	Exposure	Micro-topography	Elevation (masl)
TRI-WHP01	01	Level	Low Shrub	Establishment	4	+ (<1%)	1	full sun	smooth	164
TRI-WHP02	01	Level	Tall Shrub	Establishment	7	+ (<1%)	1	full sun	smooth	164
TRI-WHP03	01	Level	Low Shrub	Establishment	5	+ (<1%)	1	full sun	smooth	164

Table 2. Ground cover data.

Site	Ground Cover					
	Rock	Water	Organic Matter	Bedrock	Mineral Soil	Decaying Wood
TRI-WHP01	Trace	Nil	Nil	Nil	Dominant	Subdominant
TRI-WHP02	Nil	Nil	Trace	Nil	Dominant	Subdominant
TRI-WHP03	Nil	Nil	Trace	Subdominant	Dominant	Nil

Table 3. Soil characteristics data.

Site	Soil Moisture	Soil Nutrient	Soil Texture	Coarse Fragment	Soil Colour[1]	Humus Form	Comment
TRI-WHP01	submesic	medium	silt loam	65-85%	medium (soil color 7.5 3/4)	Lignomodor	The humus form is ~2 cm FH that is loose, friable and has low mycelia content. The soil was slightly moist, at time of survey but is very well drained due to abundance of coarse fragments up to 7 cm diameter.
TRI-WHP02	mesic	medium	silt loam	10-35%	medium	Lignomodor	Organic layers comprised of a 8 cm LFH, mostly comprised of FH, that was friable and wood with some charcoal. Mineral soils create a stronger cast than other sites, the site has higher sand content than other sites and more deeper fine roots than TRI-WHP01.
TRI-WHP03	submesic	medium	silt loam	35-65%	medium (soil color 7.5 3/4)	Lignomodor	Soils very similar to TRI-WHP01, with an approximately 2 cm very friable FH overlaying a B layer. Small gravels present.

[1]Soil color is the Munsell soil colour hue value and chroma.

Table 4. Vegetation composition data.

Site	Trees		Tall Shrubs		Short Shrubs		Herbs		Mosses and Lichens	
	Coverage (%)	Dominant Species	Coverage (%)	Dominant Species	Coverage (%)	Dominant Species	Coverage (%)	Dominant Species	Coverage (%)	Dominant Species
TRI-WHP01	1-5%	sparse residual white pine ~40 years old	1-5%	western redcedar understory retention; dead conifers (not included in cover estimate)	25-50%	salal, Oregon grape, blackcap raspberry, red huckleberry	5-25%	trailing blackberry, grasses and small sedges, twinflower, fireweeds	5-25%	step moss, others
TRI-WHP02	1-5%	white pine	5-25%	Douglas-fir, western hemlock, western redcedar; dead woody shrubs (not included in cover estimates)	25-50%	salal, red huckleberry, Douglas-fir, Oregon grape	5-25%	bracken fern	25-50%	step moss, others
TRI-WHP03	1-5%	western redcedar, white pine	0%	-	25-50%	salal, red huckleberry, Oregon grape, Douglas-fir, western hemlock, white pine	5-25%	-	25-50%	step moss, others

Appendix C. Site Photos

LIST OF FIGURES

1. TRI-WHP01

Figure 1. View north from plot centre, March 26, 2019.

Figure 2. View southwest from plot centre, March 26, 2019.

Figure 3. View of soils, March 26, 2019.

2. TRI-WHP02

Figure 4. View north from plot centre, March 26, 2019.

Figure 5. View south from plot centre, March 26, 2019.

Figure 6. View of B-layer soils, March 26, 2019.

Figure 7. View of organic soil layers, March 26, 2019.

3. TRI-WHP03

Figure 8. View north from plot centre, March 26, 2019.

Figure 9. View of soils, March 26, 2019.

Figure 10. Largest tree on property, with evidence of woodpecker feeding and droppings indicating it has been used for avian perching, March 26, 2019.

Appendix D. At-risk wildlife and plant species considered

LIST OF TABLES

Table 1. Avian species at risk within the CWH Biogeoclimatic Zone and Comox Valley Regional District (CDC 2019).

Common Name	Scientific Name	Pre-field Likelihood of Occurrence[1]	Likelihood of Interaction by Season[1]			Federal Designation		Provincial Designation	
			Breeding Period	Overwintering Period	Other (e.g., migrating, foraging)	COSEWIC Status	SARA Status	BC List	Identified Wildlife[2]
Band-tailed Pigeon	*Patagioenas fasciata*	Moderate	Low	-	Low	SC (Nov 2008)	1-SC (Feb 2011)	Blue	
Barn Owl	*Tyto alba*	Low	Low	-	Low	T (Nov 2010)	1-T (Jun 2018)	Red	
Barn Swallow	*Hirundo rustica*	Moderate	Low	-	Low	T (May 2011)	1-T (Nov 2017)	Blue	
Black Swift	*Cypseloides niger*	Low	Low	-	Low	E (May 2015)		Blue	
Caspian Tern	*Hydroprogne caspia*	Negligible	Negligible	Negligible	Negligible	NAR (May 1999)		Blue	
Common Nighthawk	*Chordeiles minor*	Moderate	High	-	High	SC (May 2018)	1-T (Feb 2010)	Yellow	
Double-crested Cormorant	*Phalacrocorax auritus*	Negligible	Negligible	Negligible	Negligible	NAR (May 1978)		Blue	
Evening Grosbeak	*Coccothraustes vespertinus*	High	Moderate			SC (Nov 2016)		Yellow	
Great Blue Heron, *fannini* subspecies	*Ardea herodias fannini*	Low	Negligible	Negligible	Negligible	SC (Mar 2008)	1-SC (Feb 2010)	Blue	Y (May 2004)
Green Heron	*Butorides virescens*	Low	Negligible	Negligible	Negligible			Blue	
Marbled Murrelet	*Brachyramphus marmoratus*	Low	Negligible	Negligible	Negligible	T (May 2012)	1-T (Jun 2003)	Blue	Y (May 2004)
Northern Goshawk, *laingi* subspecies	*Accipiter gentilis laingi*	Moderate	Negligible	Low	Low	T (Apr 2013)	1-T (Jun 2003)	Red	Y (May 2004)
Northern Pygmy-Owl, *swarthi* subspecies	*Glaucidium gnoma swarthi*	High	Negligible	Low	Low			Blue	Y (Jun 2006)
Olive-sided Flycatcher	*Contopus cooperi*	Moderate	Low	Low	Low	SC (May 2018)	1-T (Feb 2010)	Blue	
Peregrine Falcon, *pealei* subspecies	*Falco peregrinus pealei*	Low	Negligible	Low	Low	SC (Dec 2017)	1-SC (Jun 2003)	Blue	
Purple Martin	*Progne subis*	Low	Negligible					Blue	
Short-eared Owl	*Asio flammeus*	Low	Low	Low	Low	SC (Mar 2008)	1-SC (Jul 2012)	Blue	Y (May 2004)
Western Screech-Owl, *kennicottii* subspecies	*Megascops kennicottii kennicottii*	High	Negligible	Low	Low	SC (Mar 2012)	1-T	Blue	

[1] Confirmed - The species has been detected within the Project area. Species presence information was recorded during the field surveys and/or gleaned from the background review. High - The current range and distribution of the species overlap the Project area. Highly suitable habitat is present within the Project area; however, the species has not been detected. Moderate - The current range and distribution of the species overlap the Project area. Sufficiently suitable habitat may be present within the Project area; however, the species has not been detected. Low - The current range and distribution of the species may overlap or border the Proejct area; however, it is unlikely that sufficiently suitable habitat is present. The species has not been detected. Negligible - The species is likely to occur within the Comox

[2] Identified under the Identified Wildlife Management Strategy.

Table 2. Herpetofauna and mammal species at risk within the CWH Biogeoclimatic Zone and Comox Valley Regional District (CDC 2019).

Common Name	Scientific Name	Pre-field Likelihood of Occurrence[1]	Likelihood of Interaction by Season[1]			Federal Designation		Provincial Designation	
			Breeding Period	Overwintering Period	Other (e.g., migrating, foraging)	COSEWIC Status	SARA Status	BC List	Identified Wildlife[2]
Northern Red-legged Frog	*Rana aurora*	Moderate	Low		Moderate	SC (May 2015)	1-SC (Jan 2005)	Blue	Y (May 2004)
Wandering Salamander	*Aneides vagrans*	Low-Moderate	Low	Low	Low	SC (May 2014)	1-SC (Feb 2018)	Blue	
Western Toad	*Anaxyrus boreas*	Moderate	Low	Moderate	Moderate	SC (Nov 2012)	1-SC (Jun 2018)	Yellow	
Western Painted Turtle, Pacific coast population	*Chrysemis picta*	Low	Negligible	Negligible	Low	T (2016)	1-E (2007)	Red	
American (Common) Water Shrew, *brooksi* subspecies	*Sorex palustris brooksi*	Moderate	Low	Low	Low			Red	Y (Jun 2006)
Ermine, *anguinae* subspecies	*Mustela erminea anguinae*	Moderate	Moderate		Low			Blue	
Keen's (Long-eared) Myotis	*Myotis keenii*	Moderate	Low		Moderate	DD (Nov 2003)	3 (Mar 2005)	Blue	Y (May 2004)
Little Brown Myotis	*Myotis lucifugus*	High	Low		Moderate	E (Nov 2013)	1-E (Dec 2014)	Yellow	
Townsend's Big-eared Bat	*Corynorhinus townsendii*	Moderate	Low		Moderate			Blue	
Roosevelt Elk	*Cervus elaphus roosevelti*	Moderate	Low	Low	Moderate				
Vancouver Island Marmot	*Marmota vancouverensis*	Negligible	Negligible	Negligible	Negligible				
Wolverine, *vancouverensis* subspecies	*Gulo gulo vancouverensis*	Negligible	Negligible	Negligible	Negligible	SC (May 2014)	1-SC (Jun 2018)	Red	Y (May 2004)

[1] Confirmed - The species has been detected within the Project area. Species presence information was recorded during the field surveys and/or gleaned from the background review. High - The current range and distribution of the species overlap the Project area. Highly suitable habitat is present within the Project area; however, the species has not been detected. Moderate - The current range and distribution of the species overlap the Project area. Sufficiently suitable habitat may be present within the Project area; however, the species has not been detected. Low - The current range and distribution of the species may overlap or border the Proejct area; however, it is unlikely that sufficiently suitable habitat is present. The species has not been detected. Negligible - The species is likely to occur within the Comox

[2] Identified under the Identified Wildlife Management Strategy.

Table 3. Invertebrate species at risk within the CWH Biogeoclimatic Zone and Comox Valley Regional District (CDC 2019).

Common Name	Scientific Name	Likelihood of Occurence[1]	Federal Designation		Provincial Designation	
			COSEWIC Status	SARA Status	BC List	Identified Wildlife[2]
Threaded Vertigo	*Nearctula rowellii*	Low	SC (Apr 2010)	1-SC (Jul 2012)	Blue	
Western Thorn	*Carychium occidentale*	Low			Blue	
Evening Fieldslug	*Deroceras hesperium*	Low	DD (Nov 2003)		Red	
Prairie Fossaria	*Galba bulimoides*	Negligible			Blue	
Sunset Physa	*Physella virginea*	Negligible			Blue	
Broadwhorl Tightcoil	*Pristiloma johnsoni*	Low			Blue	
Wrinkled Marshsnail	*Stagnicola caperata*	Negligible			Blue	
Alkali Bluet	*Enallagma clausum*	Negligible			Blue	
Blue Dasher	*Pachydiplax longipennis*	Negligible			Blue	
Autumn Meadowhawk	*Sympetrum vicinum*	Negligible			Blue	
Western Pine Elfin, sheltonensis	*Callophrys eryphon sheltonensis*	Low			Blue	
Common Wood-nymph, incana subspecies	*Cercyonis pegala incana*	Moderate			Red	
Common Ringlet, insulana subspecies	*Coenonympha tullia insulana*	Low			Red	
Sand-verbena Moth	*Copablepharon fuscum*	Negligible	E (Nov 2013)	1-E (Jul 2005)	Red	
Propertius Duskywing	*Erynnis propertius*	Negligible			Red	
Edith's Checkerspot, taylori subspecies	*Euphydryas editha taylori*	Negligible	E (May 2011)	1-E (Jun 2003)	Red	
Dun Skipper	*Euphyes vestris*	Low	T (Apr 2013)	1-T (Jun 2003)	Red	
Western Branded Skipper, oregonia	*Hesperia colorado oregonia*	Low	E (Nov 2013)		Red	
Clodius Parnassian, claudianus subspecies	*Parnassius clodius claudianus*	Low			Blue	
Rocky Mountain Parnassian, olympiannus	*Parnassius smintheus olympiannus*	Low			Blue	
Greenish Blue, insulanus subspecies	*Plebejus saepiolus insulanus*	Low	E (May 2012)	1-E (Jun 2003)	Red	

[1] Confirmed - The species has been detected within the Project area. Species presence information was recorded during the field surveys and/or gleaned from the background review. High - The current range and distribution of the species overlap the Project area. Highly suitable habitat is present within the Project area; however, the species has not been detected. Moderate - The current range and distribution of the species overlap the Project area. Sufficiently suitable habitat may be present within the Project area; however, the species has not been detected. Low - The current range and distribution of the species may overlap or border the Proejct area; however, it is unlikely that sufficiently suitable habitat is present. The species has not been detected. Negligible - The species is likely to occur within the Comox Valley Regional District; however, suitable habitat is not present and the species is very unlikely to occur within the Project area.

Table 4. Plant species at risk within the CWH Biogeoclimatic Zone and Comox Valley Regional District (CDC 2019).

English Name	Scientific Name	Likelihood of Occurrence	Provincial Designation	Federal Designation	
			BC List	COSEWIC	SARA
banded cord-moss	*Entosthodon fascicularis*	Negligible	Blue	SC (May	1-SC (Aug 2006)
black knotweed	*Polygonum paronychia*	Negligible	Blue		
Henderson's checker-mallow	*Sidalcea hendersonii*	Negligible	Blue		
heterocodon	*Heterocodon rariflorus*	Low	Blue		
Macoun's meadow-foam	*Limnanthes macounii*	Low	Red	T (Nov 2004)	1-T (Aug 2006)
Nuttall's quillwort	*Isoetes nuttallii*	Low	Blue		
poverty clover	*Trifolium depauperatum var.*	Low	Blue		
purple sanicle	*Sanicula bipinnatifida*	Low	Red	T (May 2001)	1-T (Jun 2003)
slimleaf onion	*Allium amplectens*	Low	Blue		
Vancouver Island beggarticks	*Bidens amplissima*	Negligible	Blue	SC (Nov	1-SC (Jun 2003)
western cowbane	*Oxypolis occidentalis*	Low	Blue		
western wahoo	*Euonymus occidentalis var.*	Low	Red		
white-top aster	*Sericocarpus rigidus*	Moderate	Blue	SC (Apr	1-SC (Jun 2003)
yellow montane violet	*Viola praemorsa var.*	Low	Red	E (Nov 2007)	1-E (Jun 2003)
yellow sand-verbena	*Abronia latifolia*	Negligible	Blue		
curve-leaved cow-hair moss	*Ditrichum schimperi*	Moderate	Blue		
long-beaked water feathermoss	*Platyhypnidium riparioides*	Negligible	Blue		