Comox Valley School District Environmental Inventory

Environmental Inventory of Properties Within
School District 71, Comox Valley, BC

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ENVIRONMENTAL

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1 INTRODUCTION

The Comox Valley School District (School District 71) retained Current Environmental Ltd. to complete an environmental inventory of the 24 ministry owned properties within the Comox Valley, BC. Site visits were completed between summer 2020 and spring 2021 by a Field Technologist and a Registered Professional Biologist from Current Environmental Ltd. Items identified as part of this assessment include provincially or federally protected species and habitats, as well as unique environmental features on each site, outdoor education opportunities, and opportunities for habitat enhancement. This report is intended to support land use decisions and maintenance works by SD71 Operations staff and to empower administration, teaching staff, students, community groups and parents of each school to learn about and, importantly, to steward ecological value and function on the properties.

A series of maps were produced to display spatial aspects of the inventory; maps are supplemented with written descriptions for each property.

1.1 STUDY AREA

There were 24 properties included in this environmental inventory; all of these properties are held by and administered within School District 71. These properties include active school sites, as well as school sites that are currently inactive. Table 1 provides a full list of sites and Figure 1 provides an overview map of the study area.

Table 1. List of SD71 properties that were included in this environmental inventory, including their addresses.

Reference #	Name	Address
1	Miracle Beach Elementary	8763 Paulsen Road, Black Creek, BC
2	North Island Distance Education Navigate Academy	2505 Smith Road, Courtenay, BC
3	Huband Park Elementary	5120 Mottishaw Road, Courtenay, BC
4	Queneesh Elementary	2345 Mission Road, Courtenay, BC
5	Georges P. Vanier Secondary	4830 Headquarters Road, Courtenay, BC
6	Glacier View Secondary Centre	241 Beecher Place, Courtenay, BC
7	Mark R. Isfeld Senior Secondary and Valley View Elementary	1551 Lerwick Road and 2300 Valley View Drive, Courtenay, BC
8	Airport Elementary	1475 Salmonberry Drive, Lazo, BC
9	Highland Secondary	750 Pritchard Road, Comox, BC
10	Brooklyn Elementary	1290 Guthrie Road, Comox, BC
11	Ecole Robb Road	1909 Robb Avenue, Comox, BC
12	Aspen Park Elementary	2250 Bolt Avenue, Comox, BC
13	Ecole Puntledge Park Elementary and Lake Trail Middle School	401 Willemar Avenue and 805 Willemar Avenue, Courtenay, BC
14	Courtenay Elementary	1540 McPhee Avenue, Courtenay, BC
15	Arden Elementary	3040 Lake Trail Road, Courtenay, BC
16	Cumberland Community School	2674 Windermere Avenue, Cumberland, BC
17	Royston Elementary	3830 Warren Avenue, Royston, BC
18	Field across from Royston Elementary	Across street from 3830 Warren Avenue, Royston, BC
19	Denman Island Community School	1100 NW Road, Denman Island, BC
20	Hornby Island Elementary	2100 Sollans Road, Hornby Island, BC
21	Comox Elementary – Not in use	2085 Fairbairn Avenue., Comox, BC
22	Union Bay School – Not in use	5539 Hwy 19A, Union Bay, BC
23	Sandwick Technical Education Project	2947 Rennison Road, Courtenay, BC
24	Atlas Road Property	2055 Atlas Road, Courtenay, BC

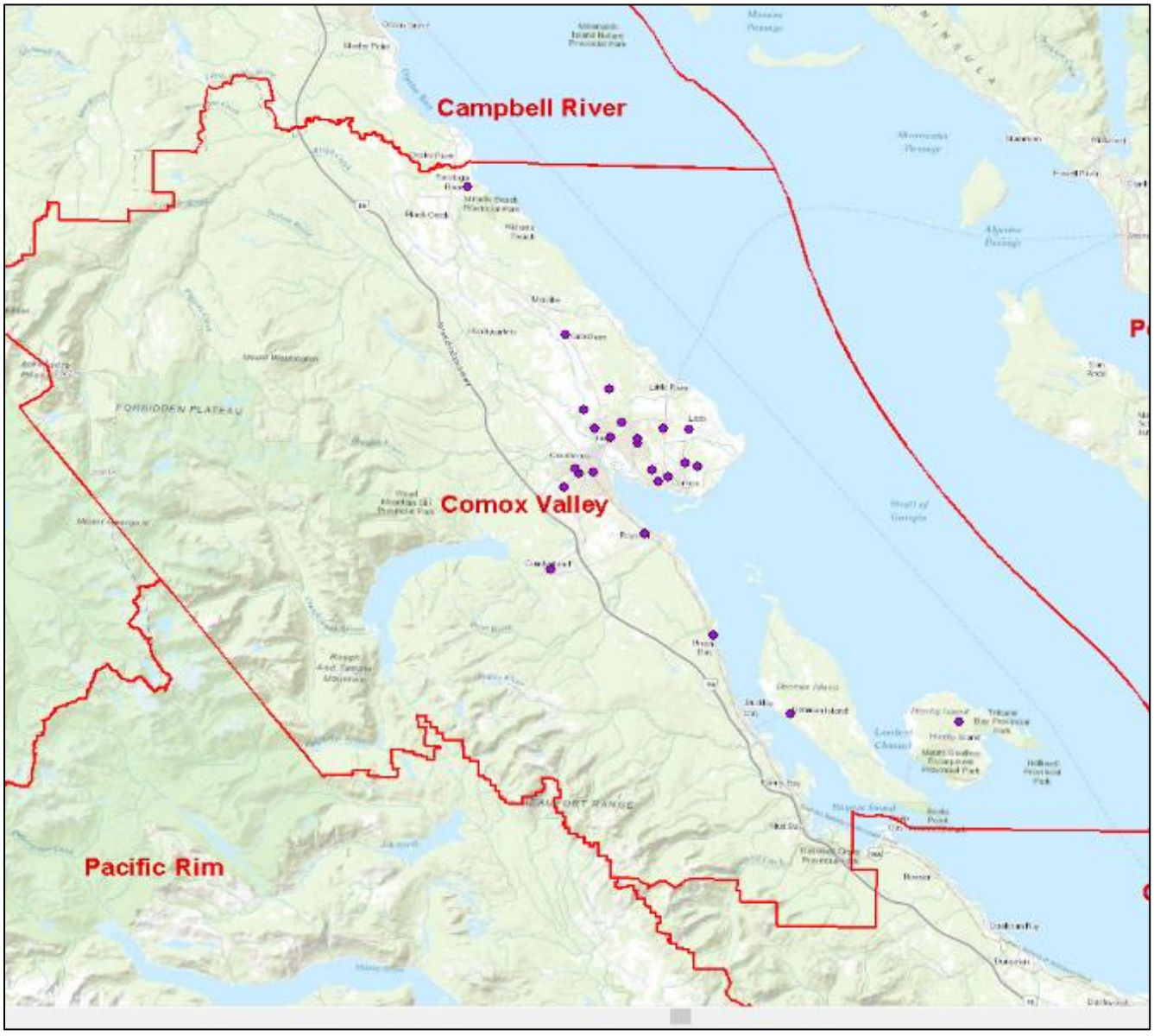


Figure 1. School District 71 showing the individual school properties in purple. A more detailed map of sites can be found in the results section.

1.2 OBJECTIVES

The objectives of this environmental inventory are as follows:

1. Complete an inventory and assessment of Environmentally Sensitive Areas (ESAs) on or near the 24 properties within School District 71 (SD71).
2. Identify invasive species and any areas of environmental degradation on any of the properties within School District 71.
3. Propose habitat enhancement opportunities where applicable.

4. Identify and provide brief summaries of ecologically valued features on properties to support outdoor education opportunities.
5. Provide Conservation Value rankings for each property to support long term planning and quickly screen for operational protocols and best management practices.

2 METHODOLOGY

A desktop review using online mapping databases was completed as well as site visits to each of the subject properties within School District 71. Site visits were completed between April 2020 and March 2021 by a Technologist and a Registered Professional Biologist from Current Environmental Ltd. Items identified as part of this assessment include municipally, provincially or federally protected species and habitats, as well as unique environmental features on each site, outdoor education opportunities, and opportunities for enhancement. A total of 24 properties were visited as part of this assessment (see Section 1.1. for the complete list of sites).

Items addressed or identified as part of this inventory included:

1. All watercourses and wetlands, both fish bearing and non-fish bearing;
2. Terrestrial ecosystems;
3. Wildlife habitat features;
4. Species at Risk;
5. Invasive species;
6. Outdoor Education Opportunities; and
7. Habitat enhancement opportunities.

The following sub-sections describe the specific methodology that was used to delineate and identify the items listed above as well as resources that were used as general guidance.

2.1 RESOURCES AND BACKGROUND DOCUMENTS

General guidance for this report as well as background information on Environmentally Sensitive Areas (ESAs) was obtained from the following resources:

1. Develop with Care: Environmental Guidelines for Urban and Rural Land Development (FLNRORD, 2014)[1];
2. Canadian Environmental Protection Act (CEPA, 1999)[2];
3. BC Riparian Areas Protection Regulation (FLNRORD, 2019)[3];
4. Canadian Fisheries Act (DFO, 2019)[4];
5. BC Weed Control Act (BC MoE, 1996)[5];

[1] BC Ministry of Forests, Lands, Natural Resource Operations & Rural Development. (2014). Develop with Care: Environmental Guidelines for Urban and Rural Land Development. Accessed from <https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/best-management-practices/develop-with-care/dwc-section-4.pdf>

[2] Government of Canada (1999). *Canadian Environmental Protection Act* (S.C. 1999, c. 33). Accessed from <https://laws-lois.justice.gc.ca/eng/acts/c-15.31/>

[3] BC Ministry of Forests, Lands, Natural Resource Operations & Rural Development. (2019). *Riparian Areas Protection Regulation* (BC Reg 178/2019). Accessed from <https://www.canlii.org/en/bc/laws/regu/bc-reg-178-2019/latest/bc-reg-178-2019.html>

[4] Government of Canada (2019). *Fisheries Act* (R.S.C. 1985, c. F-14). Accessed from <https://laws-lois.justice.gc.ca/eng/acts/f-14/>

[5] BC Ministry of Environment (1996). *Weed Control Act* (RSBC 1996 Chapter 487). Accessed from <https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/96487_01>

6. Species at Risk Act (SARA, 2002)[6];
7. BC Species and Ecosystems Explorer and the Conservation Data Center (BC MoE, 2021)[7];
8. Comox Valley Regional District iMap 3.1. (CVRD, 2021)[8];
9. iMap BC (Government of British Columbia, 2021)[9];
10. eBird online resource (The Cornell Lab of Ornithology, 2021)[10];
11. Aerial photographs; and
12. Experience of the project team.

2.2 AQUATIC HABITATS

2.2.1 Watercourses

Watercourses were initially identified using several online databases including the *Comox Valley Regional District iMap 3.1* (CVRD, 2021)[8], *iMap BC* (Data BC, 2021)[9], and the *Fisheries Information Summary System* (FISS) database[11]. Watercourses found during the desktop review were then field-verified during site visits between the months of April 2020 and March 2021 by a Technologist and a Registered Professional Biologist from Current Environmental Ltd.

Methodologies used to delineate watercourses in the field were based on the *BC Riparian Areas Protection Regulation (RAPR) Technical Manual* (FLNRORD, 2019)[12], the *BC Water Sustainability Act* (FLNRORD, 2018)[13] and the federal *Fisheries Act* (DFO, 2019)[4]. Geospatial delineation of watercourses was done using a handheld GPS unit; Avenza Mapping software was used to support field assessment work. Linework was then projected on maps using GIS software.

Consistent with the above resources, watercourses were assumed fish bearing if they were connected via surface flow to known fish bearing waters downstream during bankfull conditions. Fish presence/absence sampling was conducted in some cases to provide background to any potential enhancement opportunities and to gather more information about each site. Minnow traps, soaked for approximately 24 hours, were used for fish sampling. Fish sampling was completed in the winter months once sites were fully saturated, and fish had time to distribute into smaller tributaries.

2.2.2 Wetlands

Methodologies employed for the classification and delineation of wetlands were based primarily on standards adapted from the *BC RAPR Technical Manual* (FLNRORD, 2019)[12], *Wetlands of British Columbia – A Guide to Identification* (Moran and

[6] Government of Canada (2002). *Species at Risk Act* (S.C. 2002, c. 29). Accessed from <https://laws.justice.gc.ca/eng/acts/S-15.3/>

[7] B.C. Conservation Data Centre: Explore CDC Data (2021). Ministry of Environment, Victoria, B.C. Accessed from <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/conservation-data-centre/explore-cdc-data/species-and-ecosystems-explorer>

[8] Comox Valley Regional District (2021). CVRD iMap 3.1. Accessed from <http://imap2.comoxvalleyrd.ca/imapviewer/>

[9] Government of BC (2021). iMap BC. Accessed from <https://www2.gov.bc.ca/gov/content/data/geographic-data-services/web-based-mapping/imapbc>

[10] The Cornell Lab of Ornithology (2021). eBird. Accessed from <https://ebird.org/home>

[11] BC Ministry of the Environment (2021). Fisheries Inventory Data Queries. Accessed from <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/fish/fish-and-fish-habitat-data-information/search-fish-fish-habitat-data-information/fisheries-inventory-data-queries>

[12] BC Ministry of Forests, Lands, Natural Resource Operations & Rural Development. (2019). Riparian Areas Protection Regulation Technical Assessment Manual. Accessed from: < https://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/fish-fish-habitat/riparian-areas-regulations/rapr_assessment_methods_manual_for_web_11.pdf>

[13] BC Ministry of Forests, Lands, Natural Resource Operations & Rural Development. (2019). *Water Sustainability Act* (SBC 2014 Chapter 15). Accessed from <https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/14015>

MacKenzie, 2004)[14], The *Canadian Wetland Classification System* (Warner, 1997)[15], *Indicator Plants of Coastal British Columbia* (Klinka et al. 1989)[16], and the *Resources Inventory Committee of British Columbia Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures Version 2.0* (BC Fisheries Information Services Branch, 2001)[17].

A wetland is defined as *"land that is saturated with water long enough to promote wetland or aquatic processes as indicated by poorly drained soils, hydrophytic vegetation and various kinds of biological activity which are adapted to a wet environment"* (Warner, 1997)[15]. Wetlands with a direct surface flow connection to fish bearing watercourses are afforded protection under the *BC RAPR*[3], and isolated wetlands are protected under the *BC Water Sustainability Act* (FLNRORD, 2018)[13]. Both connected and isolated wetlands were identified as part of this assessment.

Methodologies to classify wetlands in the field and to determine the potential surface flow linkage included:

1. Completing an inventory of vegetation types and plant communities in and immediately adjacent to wetlands, with a focus on the occurrence of hydrophytic plant types as these indicate the persistent presence of surface water and are the essential characteristics used to classify wetlands;
2. Examining soil types in and around the wetland where necessary;
3. Examining local topography such as continuous depression areas and elevated or sloped sections, and existing saturated areas to determine potential drainage patterns; and
4. Measuring water depths and delineating existing drainage patterns as they pertain to the adjacent waterbody in question.

2.2.3 Setbacks/SPEAs for Aquatic Habitats

As an "institutional" body, SD71 properties are exempt from regulation under the *BC RAPR*[3]. However, development, including land alteration and tree management activities, are still subject to the Federal *Fisheries Act*[4] and BC *Water Sustainability Act*[13].

The BC RAPR assessment methods are a science-based approach to helping to ensure compliance with these regulations. To that end, waterbodies (streams, wetlands, and ditches) inventoried during this assessment have been prescribed with setbacks – also known as Streamside Protection and Enhancement Areas (SPEAs) using the RAPR assessment methodology. Setback/SPEA areas are indicated spatially on Mapsheets and discussed in the property descriptions in Section 3 the report (where applicable).

[14] Moran and MacKenzie (2004). Wetlands of British Columbia – A Guide to Identification. This book employs a site unit classification model of a Wetland and Riparian Ecosystem Classification system (WREC) and is based on the Canadian Wetland Classification System (CWCS) (Warner and Rubec 1997).

[15] National Wetlands Working Group (1997). *The Canadian Wetland Classification System, 2nd Edition.* Warner, B.G. and C.D.A. Rubec (eds.), Wetlands Research Centre, University of Waterloo, Waterloo, ON, Canada. 68 p.

[16] Klinka et al. (1989). Indicator Plants of Coastal British Columbia. Government of Canada, Province of British Columbia, Vancouver, BC.

[17] BC Fisheries Information Services Branch (2001). *Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures Version 2.0.* Prepared for the Resources Inventory Committee. Accessed from < https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/nr-laws-policy/risc/recce2c.pdf>

2.3 TERRESTRIAL ECOSYSTEMS

Terrestrial ecosystems located within each School District 71 property were delineated based on the Biogeoclimatic Ecosystem Classification system (FLNRORD) where climax ecosystems existed. The *BC Species and Ecosystems Explorer* database (BC MoE, 2021)[7] was then used to determine whether an ecosystem is provincially or federally listed. Resources used during the field identification of terrestrial ecosystems included *A Field Guide for Site Identification and Interpretation for the Vancouver Forest Region (*FLNRORD, 1994*)*[18]*, Revised Plants of Coastal British Columbia* (Pojar and MacKinnon, 2004)[19] and *Indicator Plants of Coastal British Columbia* (Klinka, *et al*, 1989)[16].

Recorded bird species near/on the subject properties were also included for sites where eBird "hotspots" were located near the properties. eBird is a citizen science database run by the Cornell Lab of Ornithology, where birders can upload bird sightings and occurrences[10]. This database provides an understanding of bird abundance, distribution, trends, and habitat utilization across the World[10].

2.4 INVASIVE PLANTS

Occurrences of invasive plants were recorded during site visits, with a focus given to invasive plants considered to be noxious by the Coastal Invasive Species Committee of BC[20]. There are many invasive plants in the Comox Valley, but the following list highlights the priority species, which is based primarily on species that are toxic to humans and/or animals, and species that can spread quickly and aggressively.

1. Japanese, Bohemian and Giant Knotweed (*Fallopia spp* or *Polygonum spp*).
2. Giant Hogweed (*Heracleum mantegazzianum*).
3. Tansy Ragwort (*Senecio jacobaea*).
4. English Holly (*Ilex aquifolium*).
5. Spurge Laurel (*Daphne laureola*).
6. Yellow Flag Iris (*Iris pseudacorus*).
7. Himalayan Blackberry (*Rubus armeniacus*).
8. Scotch broom (*Cytisus scoparius*).
9. English Ivy (*Hedera helix*).

2.5 WILDLIFE HABITAT FEATURES

Individual wildlife habitats or features at each site were recorded as part of this assessment. This includes features that are afforded protection under municipal, provincial, or federal regulations (i.e. bald eagle nest, heron nests, etc.) as well as other important wildlife features that were observed on site (i.e. wildlife corridors, wildlife trees, amphibian breeding sites, bat roosts, snake hibernacula, bear scratch trees, etc.). While the list of important wildlife features will not be exhaustive, the goal was to capture some unique features that can be used as outdoor education opportunities and improve ecological function through protection and enhancement of the features.

[18] Green, R.N. and K. Klinka (1994). *A Field Guide for Site Identification and Interpretation for the Vancouver Forest Region*. Research Branch. Land Management Handbook 28.

[19] Pojar, J. and A. MacKinnon (2004). *Revised Plants of Coastal British Columbia including Washington, Oregon, and Alaska*. Lonepine.

[20] Coastal Invasive Species Committee (2021). Accessed from <https://www.coastalisc.com/>

Resources used for this section include *Wildlife and Trees in British Columbia* (Fenger et al, 2006)[21] and *Develop with Care: Environmental Guidelines for Urban and Rural Land Development* (FLNRORD, 2014)[1].

2.6 SPECIES AT RISK

Species at Risk are presented exclusively in this report due to the potential for mandated regulation and their importance from a biodiversity perspective. An office-based assessment of Species at Risk occurrences on the subject properties was completed using the *Comox Valley Regional District iMap 3.1* (CVRD, 2021)[8], *iMap BC* (Government of British Columbia, 2021, 2021)[9], *BC Species and Ecosystems Explorer* (BC MoE, 2021)[7], and the Federal Species at Risk Public Registry (Government of Canada, 2021)[22]. Additionally, the occurrence of any known raptor or Great Blue Heron nest on or near the subject property was identified using the *Wildlife Tree Stewardship Atlas* (2020)[23] and the *Great Blue Heron Community Mapping Network database* (2020)[24]. Rare avian species identified at three "hotspot" locations[10] close to the Lake Trail/Puntledge, Huband, and Tsolum/NIDES school properties were also queried.

Provincially red-listed and blue-listed species that were identified on or near the subject properties, or that had the potential to be on or near the subject properties have been included in the results section (Section 3).

Red-listed species are defined as "Any species or ecosystem that is at risk of being lost (extirpated, endangered, or threatened)[25].

Blue-listed species are defined as "Any species or ecosystem that is of special concern"[25].

The on-site assessment of Species at Risk was completed concurrent with other inventory initiatives mentioned above and was based primarily on methods outlined in *Environmental Best Management Practices for Urban and Rural Land Development in British Columbia* (BC MWLAP, 2004)[26] and *Develop with Care: Environmental Guidelines for Urban and Rural Land Development* (FLNRORD, 2014)[1].

2.7 RARE PLANTS

An extensive rare plant survey was completed on each property. Aside from the importance of protecting biodiversity, it was hoped that known locations of rare plants could be used for educational purposes. Unfortunately, there were no rare species located on any of the subject properties. Detailed methodology for the rare plant survey is provided in Appendix C.

2.8 BAT SURVEYS

Bat surveys were conducted at a subset of the SD71 school properties by Latitude Conservation Solutions Company (Latitude) in July 2020. Selected properties for these surveys were chosen based on the suitability of habitat for bats (e.g. roosting,

[21] Fenger et al. (2006). *Wildlife and Trees in British Columbia*. Lone Pine.

[22] Government of Canada (2021). Species at Risk Public Registry. Accessed from < https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html>

[23] Community Mapping Network (2018). The Wildlife Tree Stewardship (WiTS) Program. Accessed from <https://www.cmnbc.ca/atlasgallery/wildlife-tree-stewardship/

[24] Community Mapping Network (2018). Great Blue Heron (GBHE) Management Team. Accessed from <https://www.cmnbc.ca/atlasgallery/great-blue-heron-gbhe-management-team//>

[25] Government of British Columbia (2021). Red, Blue, and Yellow Lists. Accessed from < https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/conservation-data-centre/explore-cdc-data/red-blue-yellow-lists>

[26] BC Ministry of Water, Land, and Air Protection (2004). *Environmental Best Management Practices for Urban and Rural Land Development in British Columbia*. Accessed from <https://www.env.gov.bc.ca/wld/documents/bmp/urban_ebmp/EBMP%20PDF%201.pdf>

foraging, etc.). Aerial imagery and GIS data was used to determine which sites had the highest likelihood of bat activity – three sites were selected and surveyed: (1) Ecole Puntledge Elementary/Lake Trail Middle School (surveyed three times), (2) Huband Park Elementary (surveyed twice), and (3) Atlas Road Property (surveyed once).

Ultrasonic bat echolocation calls were recorded to determine the species diversity (number of different bat species identified) and bat activity (number of calls / hour of survey) at each of the three sites. Surveys were conducted by walking transects on trails within the forested areas of Ecole Puntledge Elementary/Lake Trail Middle School and Huband Park Elementary, and walking transects along the gravel road through the Atlas Road property.

Bats were detected at each of the three sites. Results have been summarized in in the property descriptions in Section 3for each of the three schools that were surveyed. Detailed methodology and results can be found in the Latitude memo provided in Appendix D.

2.9 SD71 PROPERTY CONSERVATION RANKING

Ascribing a *relative* conservation value that each SD71 property contributes to the region enables an informed prioritization of land management initiatives for the School District. To that end, the conservation ranking assessment completed as part of this larger inventory effort provides a standardized, science-based approach to achieving this.

This conservation assessment was based on the concept of ecological integrity at the ecological community-scale. In respect to ecological communities, the term 'integrity' is sometimes used synonymously with the term 'viability', or the likelihood of persistence of an ecological community over the long-term, including all constituent members of the community. The ecological integrity of SD71 properties was assessed on a case-by-case basis according to standard methodologies and then each property was compared to the others to determine the *relative* ecological integrity of a given property.

The methods used to rank the conservation value of SD71 properties were based on the methods used by NatureServe to rank element occurrences and describe their ecological integrity. There are three principal considerations in this assessment process:

1. Size: the size of the natural area;
2. Condition: the condition of the natural area, and;
3. Landscape Context: essentially the condition of the lands surrounding the natural area.

Each principal consideration was measured for each property, assigned a numeric score and rank, then compared to its peers to develop an overall assessment of the relative conservation value of each property.

The full conservation ranking assessment memorandum, completed by Latitude is provided in Appendix G.

2.9.1 Size

The size of the natural area occurring on the SD71 property is the first consideration. For most sites, this is a small proportion of the size of the property, considering that most school district properties include buildings, playgrounds and sports fields as primary land cover types. Natural area size was measured (in hectares) using the Comox Valley Regional District iMap system and the polygon measurement tool. 2020 air photos were used as the base layer. The properties were sorted based on size of natural area from largest to smallest. The properties were then categorized based on the Jenks Natural Breaks algorithm and ranked as Very High, High, Medium and Low. A score from 1 – 4 was attributed to each rank with 1 for Low (small) and 4 for Very High (large).

Consideration was also given as to whether or not a given property was adjacent to an existing protected area, and if so, what the total area protected would become if the SD71 natural area was incorporated into a larger conservation area. However, this circumstance is rare, and including the total area of a natural feature did not affect the rankings or scores so was discarded.

2.9.2 Condition

The NatureServe methodology relies heavily on the concept of maturity or the developmental stage of the ecological community as a key element of condition. For example, a forest that had been recently disturbed (e.g., by logging) would be considered in low (or poor) condition whereas an old-growth forest would be considered to have a very high condition rating. Site-based assessments and air-photo (2020) interpretation were used to determine the seral stage of the natural area and the score attributed to it. Structural stage 3 (shrub) was given a score of 3, pole-sapling forests 4, young forests 5, and mature forests 6. A score of 0 was attributed to properties with no natural areas remaining. In some cases, the natural areas of a property occur at different structural stages and in these cases the score was averaged according to the relative proportion of each structural stage.

If a property's natural areas included one or more Sensitive Ecosystem Inventory (SEI) polygons it was given a score of 1, if no SEI polygons were present it scored 0. If the understory vegetation was intact, it was given a score of 1. If it was degraded (e.g., by trampling) over the majority of the of the natural area, it was given a 0. A value of 0.5 was attributed to natural areas where significant portions, but not all, of a natural area included degraded understory vegetation.

The seral stage score was added to the SEI and understory vegetation scores to create a condition score for each property. These were sorted and ranked using the same approach as described above for size.

2.9.3 Landscape Context

The landscape surrounding each property was visually assessed using 2020 air-photos. A score and a rank was attributed to each property according to the criteria set out in Table 2 below.

Table 2. Landscape Context rating and scoring criteria.

Buffer Rank	Score	Definition
Very High	3	Mostly surrounded by parks, managed forests or other natural areas
High	2	Mostly surrounded by rural/agricultural lands
Medium	1	Surrounded by a mix of suburban, urban and agricultural lands
Low	0	Mostly surrounded by suburban and/or urban lands

2.9.4 Conservation Value

The relative conservation value for each property was determined by calculating a weighted average of the condition ranks for size, condition, and landscape context where Very High = 4, High = 2.5, Medium = 1 and Low = 0. Properties with no natural cover remaining were then reclassified as having no conservation value (Nil).

3 RESULTS

The following sections outline the results of the environmental inventory on each of the 24 School District 71 properties (Sections 3.1 – 3.24). Maps of each property are shown below the site descriptions. These maps show the results of the environmental inventory as well as opportunities for outdoor classrooms and habitat enhancements, as described in Sections 3.1 – 3.24. School properties have also been ranked in order of Conservation Value for the purpose of prioritizing and guiding management efforts (Section 4.1).

The results of the environmental inventory are presented in the following order:

1. Miracle Beach Elementary
2. North Island Distance Education Navigate Academy
3. Huband Park Elementary
4. Queneesh Elementary
5. Georges P. Vanier Secondary
6. Glacier View Secondary Centre
7. Mark R. Isfeld Senior Secondary and Valley View Elementary
8. Airport Elementary
9. Highland Secondary
10. Brooklyn Elementary
11. Ecole Robb Road
12. Aspen Park Elementary
13. Ecole Puntledge Park Elementary and Lake Trail Middle School
14. Courtenay Elementary
15. Arden Elementary
16. Cumberland Community School
17. Royston Elementary
18. Field across from Royston Elementary
19. Denman Island Community School
20. Hornby Island Elementary
21. Comox Elementary – Not in use
22. Union Bay School – Not in use
23. Sandwick Technical Education Project
24. Atlas Road Property

3.1 MIRACLE BEACH ELEMENTARY

Civic address:	8763 Paulsen Road, Black Creek, BC		
PID:	001-031-082	**Lot size:**	3.15 hectares
Conservation Value	High		

Key Inventory Results:

- The conservation value ranking of this property is high.
- One ditch (Ditch 1) on subject property; two unnamed streams nearby (Streams 2 and 3).
  – Stream 2 is fish bearing and Ditch 1 and Stream 3 contribute flows to Stream 2.
- Wetland located northeast of subject property.
- Mixed forest on subject property. Contiguous with municipal greenway – wildlife corridor values.
- Many stumps and rotting logs on forest floor – provides habitat for amphibians.
- Minimal trampling issues in forest with exception of lower plateau behind school.
- No ecosystems or species at risk identified.
- Outdoor education opportunities:
  - Forest.
  - Large woody debris.
  - Terrestrial amphibian habitat.
  - Stream and wetland habitats.
- Enhancement opportunities:
  - Trampled forest behind school.
  - Riparian vegetation planting along Ditch 1.
  - Monitor trails in forest to maintain low impact.

General Description of Property:

The school property at Miracle Beach Elementary consists of approximately one third forest and two thirds playing fields and developed areas. The forest is located primarily on the western side of the lot; there is a strip surrounding the playing fields as well. The intact forest on the west side connects to a municipal greenway which increases the value of the intact forest. There are walking trails throughout the forest.

Photo 1 (left). Front of Miracle Beach Elementary with the forest on the left and playing fields on the right. Photo 2 (right). Playground on the north side of the playing field.

Environmentally Sensitive Areas:

Aquatic Habitat	There is one ditch on the subject property and two streams located nearby. **Ditch 1:** Ditch 1 originates further upstream on Paulsen Rd, flows through a culvert under the entrance to Miracle Beach Elementary, and then flows east along the southern edge of the playing field. **Ditch 1 merges with other runoff and drainage once it reaches the forest adjacent the property and becomes Stream 1**. Stream 1 continues to flow east and merges into Stream 2. Ditch 1 has a prescribed SPEA of 5 m since it may be fish bearing.

Stream 2: Stream 2 is a relatively wide and significant stream that flows in a south to north direction through the low-lying forest to the east of the school property. This stream originates from residential areas near Oyster River Drive and Cedar Ridge Drive and collects into a dredged channel dug by the CVRD, which eventually outlets into the forest adjacent to the school (just north of Wilfred Road). Stream 2 widens out into a wetland before the golf course, and then flows through a channel along the center of the golf course. Stream 2 eventually outlets into the marina near the Oyster River Estuary. Stream 2 is fish bearing according to CVRD iMap Sensitive Habitat Atlas, although the species present are not indicated. Stream 2 has a prescribed SPEA of 10 m.

Stream 3: Water from the roadside ditch along Schultz Road enters Stream 3 just north of the school property. Stream 3 flows east, drops down a steep drop that precludes fish passage upstream, and enters Stream 2 just before the golf course. Stream 3 has a prescribed SPEA of 10 m.

Photo 3 (left). Ditch 1 flowing east along the south side of the playing field.
Photo 4 (right). Ditch 1 becomes Stream 1 in the forest just east of the school property.

Photos 5 and 6. Stream 2 in the low-lying forest east of the school property.

	  **Photo 7 (left). Steep drop where Stream 3 drops down to Stream 2.** **Photo 8 (right). Stream 3 at the end of Schultz Road where a walking path crosses this stream on route to the school.**
Terrestrial Habitat	**Forest:** Mixed forest ~ 65-75 years old on the west side of this property consists of red alder, Douglas fir, bigleaf maple, Sitka spruce, and the understory is dominated by salal, red huckleberry, sword fern and dull Oregon grape. Low impact trails are scattered throughout forest with very little trampling of the understory (apart from one plateau immediately adjacent the school – see below). There's a good successional tree community in this forest and complex habitat on forest floor (large woody debris).   **Photos 9 and 10. Forest on west side of property with low impact trails throughout the forest.**
Wildlife Habitat Features	**Large Woody Debris and Stumps:** The forest on the western side of this property has many stumps and rotting logs on the forest floor. This large woody debris provides excellent habitat for terrestrial amphibians – potential species utilization includes wandering salamander and western red-backed salamander. May also

	provide refuge for adult life stages of aquatic breeding amphibians such as northwestern salamander, long-toed salamander, rough skinned newt, red legged frog, western toad, and Pacific tree frog.
Species at Risk	There are no known ecosystems or species at risk on the subject property according to CDC iMap. There are also no known bald eagle or great blue heron nests within 200 m of the subject property. These results were confirmed during the site visit, with no ecosystems/species at risk or raptor/heron nests observed on the subject property.

Outdoor Education Opportunities:

Learning opportunities and ecological points of interest on or near the subject property are provided in the following list. F-Series codes refer to the general description of these habitats and their ecological importance which is provided in the Ecological Points of Interest section of this report (Table 6 in Appendix A).

Forest habitat (See F1): Forest habitat occurs in the western side of the property as well as the eastern edge of the property bordering the neighboring lot to the east.

Large Woody Debris (See F3): Large woody debris (stumps and logs) can be found throughout the forest on this property. These features are critically important for providing nutrients to new plant growth, connecting mycelium ("roots" of fungi) throughout the forest floor, and provide habitat for numerous small mammals and amphibians.

Terrestrial Amphibian Habitat (See F2): The large woody debris on the forest floor throughout this property is very likely home to many amphibians – frogs and salamanders. Some species live in the forest year-round, and others live on land as adults but return to aquatic habitat to breed. The cool, well-shaded, mossy forest floor on this property provides excellent habitat for amphibians and may also serve as a migration path for amphibians traveling to and from their breeding ponds (there are potential breeding ponds in the low-lying wet forest to the east of this property).

Stream Habitat (See F5): There are several streams and ditches surrounding the subject property, however the larger stream - "Stream 2" - in the low-lying forest just east of the subject property provides a good learning opportunity. This stream has a low gradient and slowly meanders through this forest towards the golf course. There are potential cutthroat trout, chum and coho salmon spawning in this tributary, as well as winter rearing of juvenile coho salmon and cutthroat trout. There has been a lot of erosion on upstream reaches of this stream, however this low-lying forest provides an excellent place for this stream to fan out and dissipate energy.

There could be an opportunity to partner with Fisheries and Oceans Canada or a local stream keeper group to sample for presence/absence of fish in this reach to inform potential conservation and/or restoration of this stream. This would also be a great stream to sample benthic invertebrates (i.e., "bugs" or organisms that live on the bottom of a water body); the presence of certain species provides information on the health of a given stream reach.

Wetland Habitat (See F4): Stream 2 fans out into a wetland before flowing onto the golf course. Wetlands are rich ecosystems that provide habitat for a wide array of animals and plant species.

Habitat Enhancement Opportunities:

The following list provides opportunities for habitat enhancement on the subject property. E-Series codes refer to the general description of this type of impact/issue and the general prescription for enhancing these types of areas which is provided in the Habitat Enhancement Opportunities section of this report (Table 7 in Appendix B).

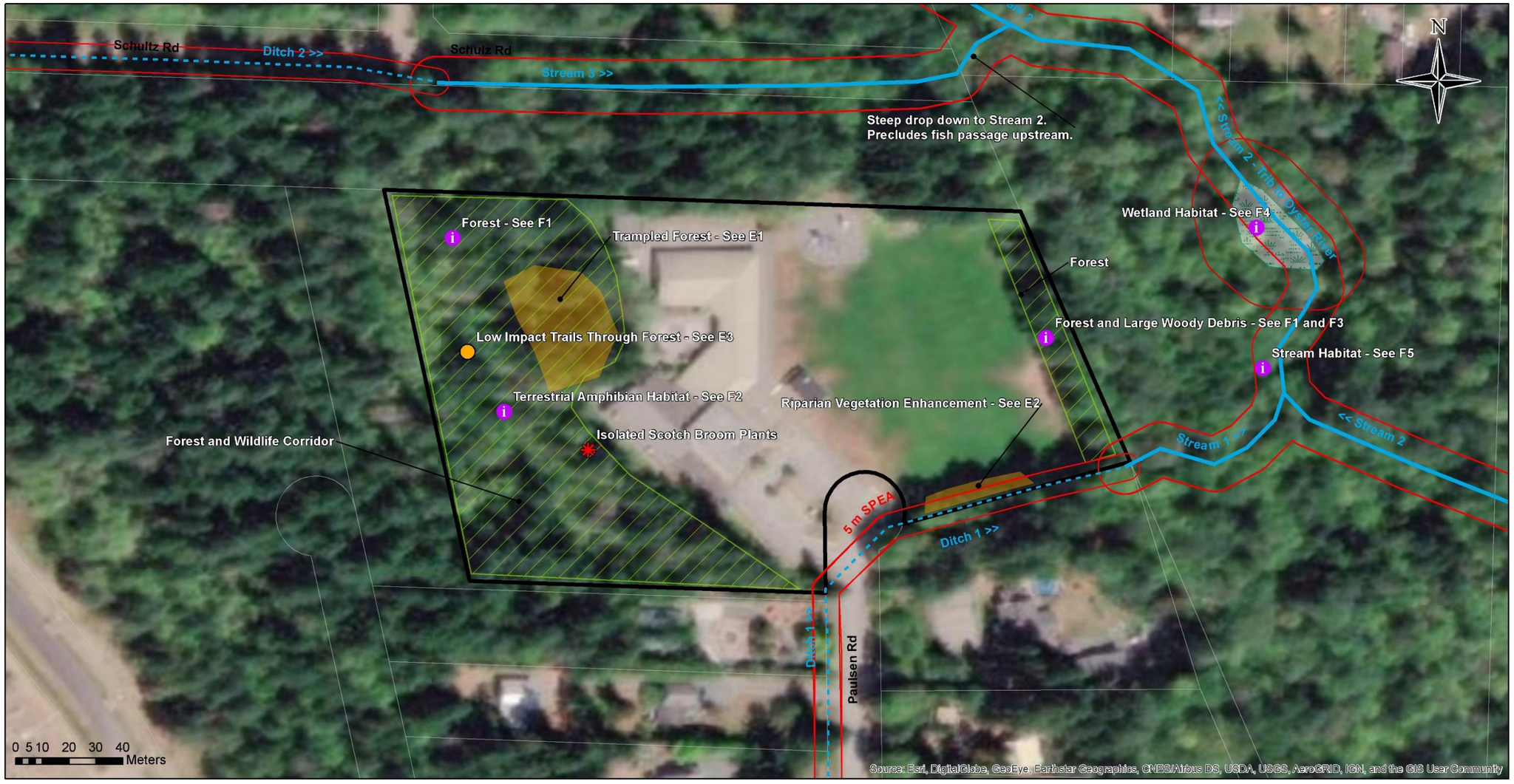
Trampled Forest (See E1): In general, this school site has minimal issues with vegetation trampling, especially in the forested areas. However, there is one lower plateau of forest immediately behind the school that has been trampled. See

general notes on vegetation trampling to help control this impact over time – the main goal at this site is to prevent this trampled area from spreading further into the forest and to save the existing stand of trees.

Riparian Vegetation Enhancement (See E2): Ditch 1 that runs along the south side of the playing field is of low habitat value, however it does flow into more sensitive fish habitat downstream. It is important to maintain good shade cover and water quality within this channel.

Low-Impact Trails Through Forest (See E3): Low impact trails are scattered throughout the forest on the west side of the property with very little trampling of the understory (apart from one plateau area immediately adjacent the school). There are no immediate recommendations for enhancement at this site. However, these trails should be monitored and if this area starts to become trampled and stripped of understory vegetation, then an effort should be made to better delineate the trails using logs and/or split rail fencing to prevent the area from being completely trampled in future.

Photo 11 (left): Section of Ditch 1 where riparian planting is recommended to better delineate and protect this ditch.
Photo 12 (right): Section of forest that is trampled immediately behind the school.



Legend

- Invasive Species
- Ecological Point of Interest
- Enhancement Opportunities Point
- Ditch
- Stream
- Wetland
- Parcels
- SD71 Boundaries
- Environmentally Sensitive Area
- Enhancement Opportunities
- Streamside Protection and Enhancement Area

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Site: Miracle Beach Elementary	Date: March 15th, 2021 Author: C.O'Neill Projection: UTM NAD83 Zn10N
	Note: All linework approximate. Not for use or reproduction without consent from the author.
	current ENVIRONMENTAL

3.2 NORTH ISLAND DISTANCE EDUCATION NAVIGATE ACADEMY

Civic address:	2505 Smith Road, Courtenay, BC		
PID:	006-167-489, 004-425-243, 006-192-751, and 006-192-815	**Lot size:**	Four parcels - total 4.0 hectares
Conservation Value	Low		

Key Inventory Results:

- The conservation value ranking of this property is low.
- Two ditches along edges of subject property that flow into Portuguese Creek (highly valued fish stream).
- Strip of vegetation around playing fields - provide foraging and cover habitat for passerine birds and smaller wildlife.
- One provincially blue-listed bird species (barn swallow) is known to use the subject property for foraging. A second provincially blue-listed species (Tundra swan) was identified at the nearby eBird hotspot ("Tsolum fields").
- Outdoor education opportunities:
  - Nearby forest.
  - Nearby Portuguese Creek (seasonal changes).
- Enhancement opportunities:
  - Boardwalk over wet areas in nearby forest.

General Description of Property:

North Island Distance Education Navigate Academy is located on 4 different parcels of land, with the PIDs above. There are two separate buildings on this property, located in an open playing field with a small row of shrubs and trees along the northeast, southeast, and southwest edges of the field.

Photo 1: View of school from Smith Road.

Environmentally Sensitive Areas:

Aquatic Habitat	There are two ditches along the edges of the subject property; both flow into Portuguese Creek which is a tributary to Tsolum River. **Ditch 1:** Ditch 1 flows along Smith Road on the northwestern edge of the property. This ditch appears to be quite seasonal in nature and of low habitat value. Ditch 1 flows in a southwestern direction along Smith Road for approximately 250 m where it joins Portuguese Creek. Ditch 1 has a prescribed SPEA of 5 m. **Ditch 2:** Ditch 2 extends along the southwest property boundary and consists of isolated depressions with standing water in the winter months. During high water levels, it is possible that this ditch connects to Ditch 1 along Smith Road, and as such, it is considered to be connected to fish habitat downstream. Overall, this ditch is shallow, has seasonal flows and like Ditch 1 is it of low habitat value. Ditch 1 and Ditch 2 are still

	important in that they provide flows and nutrients to Portuguese Creek downstream, which is a known fish-bearing stream. Ditch 2 has a prescribed SPEA of 5 m.  **Photo 2: Ditch 1 along Smith Road.**   **Photos 3 and 4: Ditch 2 - isolated pockets of water along the southwestern boundary.**
Terrestrial Habitat	**Vegetation:** Terrestrial habitat on the subject property is limited to a strip of vegetation around the school playing fields. Shrubs in these areas includes Nootka rose, baldhip rose, willow, young red alder, snowberry, flowering currant, and Himalayan blackberry. Trees include weeping willow, red alder, grand fir, Douglas fir, black hawthorn, vine maple, Pacific crabapple, ornamental cherry, and one western red cedar. These thicket habitats provide foraging and cover habitat for passerine birds and smaller wildlife. An e-bird "hotspot" was identified near the North Island Distance Education Navigate Academy (called "Tsolum fields")[27]. A total of 53 birds were identified at this hotspot. Of these, 44 are provincially yellow-

[27] The Cornell Lab of Ornithology (2021). eBird, Tsolum Fields. Accessed from <https://ebird.org/hotspot/L614591>

	listed[28], one is provincially blue-listed[29] (see Species at Risk section below), five are exotic, and three either have unknown provincial listings or are not listed. The full list of bird species identified at this hotspot is presented in Appendix E.   **Photos 5 and 6: Douglas fir and grand fir along the northeastern property line.**
Wildlife Habitat Features	There were no wildlife habitat features of note on the subject property.
Species at Risk	This property is known to be heavily used by foraging barn swallows, a provincially blue-listed species[30]. There are no other known ecosystems or species at risk on the subject property according to CDC iMap. There are also no known bald eagle or great blue heron nests within 200 m of the subject property. These results were confirmed during the site visit, with no ecosystems/species at risk or raptor/heron nests observed on the subject property. One provincially blue-listed species (Tundra swan) was identified at the nearby eBird hotspot ("Tsolum fields")[27].
Outdoor Education Opportunities:	
Learning opportunities and ecological points of interest on or near the subject property are provided in the following list. F-Series codes refer to the general description of these habitats and their ecological importance which is provided in the Ecological Points of Interest section of this report (Table 6 in Appendix A). **Nearby Forest habitat (See F1):** Every other day, students do nature walks to the forest and Portuguese Creek located immediately west of the school property. The farmer that owns the adjacent property allows the students and teachers to	

[28] According to the British Columbia Conservation Data Centre, the yellow list is defined as "any species or ecosystem that is at the least risk of being lost".

[29] According to the British Columbia Conservation Data Centre, the blue list is defined as "any species or ecosystem that is of special concern".

[30] Personal communication (2021), Tim Ennis, President, Latitude Conservation Solutions Company.

cross the field to get there. The forest provides ample learning opportunities to discuss nurse logs, bird habitat, bat habitat, terrestrial amphibian habitat, wildlife corridors, forest succession, importance of riparian vegetation (shade, nutrient inputs, moisture retention, etc.).

Portuguese Creek and Seasonal Changes in Stream Habitat (See F5): As described above, students and teachers can access the forest and stream (Portuguese Creek) to the west of the school. In drier summer months, the stream channel is dry (seasonal flows), and the students play in the stream bed. In the winter, students enjoy the wetted stream ; access to and around the stream is very muddy. Teachable outdoor learning opportunities include describing the importance of stream habitat, and discussing the seasonal changes to stream habitats and associated species (i.e. amphibians and fish time their breeding for when the water is present, certain species adapt to breed in more ephemeral streams, etc.).

Habitat Enhancement Opportunities:

The following list provides opportunities for habitat enhancement on the subject property. E-Series codes refer to the general description of this type of impact/issue and the general prescription for enhancing these types of areas which is provided in the Habitat Enhancement Opportunities section of this report (Table 7 in Appendix B).

Boardwalk Over Wet Areas in Forest (See E3): Although the forested area and stream habitat is not located on the subject property (it is across the neighbour's farm field), the muddy forest and riparian area would benefit from some low impact boardwalks over the seasonally wetted areas. While it is ok to let students play in some of the muddy areas, there should be some management of the wettest areas to limit impacts such as erosion of trails and compaction of the soils in these areas.

Legend

- Invasive Species
- Ecological Point of Interest
- Enhancement Opportunities Point
- Ditch
- Stream
- Wetland
- Parcels
- SD71 Boundaries
- Environmentally Sensitive Area
- Enhancement Opportunities
- Streamside Protection and Enhancement Area

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Site: North Island Distance Education Navigate Academy	Date: March 15th, 2021 Author: C.O'Neill Projection: UTM NAD83 Zn10N
	Note: All linework approximate. Not for use or reproduction without consent from the author. current ENVIRONMENTAL

3.3 HUBAND PARK ELEMENTARY

Civic address:	5120 Mottishaw Rd, Courtenay BC V9J 1L5		
PID:	026-872-919	**Lot size:**	11.0 hectares
Conservation Value	Very High		

Key Inventory Results:

- The conservation value ranking of this property is very high.
- Finlay Creek on subject property (fish bearing); tributary of Portuguese Creek (highly valued fish stream).
- Floodplain and wetland habitat in southern half of subject property.
- Mixed older second growth forest on subject property. Contiguous with Seal Bay forest – wildlife corridor values.
- Western red cedar snags near to or within floodplain of Finlay Creek – provide wildlife habitat.
- Highest bat activity recorded – due to intact forest surround subject property and variety of ecological features on-site.
- Invasive holly present within riparian area of Finlay Creek.
- Townsend's big-eared bat (provincially blue-listed) detected during bat survey.
- A Northern red-legged frog (provincially blue-listed; listed as Special Concern [Schedule 1] under SARA) was observed on subject property during site visit.
- Outdoor education opportunities:
  - Forest.
  - Wildlife trees.
  - Wetland and stream habitat.
  - Wildlife corridor.
- Enhancement opportunities:
  - Tree cutting and unauthorized trail building.
  - Fish passage improvement.
  - Riparian vegetation enhancement.

General Description of Property:

Huband Park Elementary is a largely forested site with substantial wetland areas bisected by a stream channel of Finlay Creek connected to known fish bearing waters.

Photo 1. Parking lot at school entrance showing the forest along Finlay Creek in the background.

Environmentally Sensitive Areas:

Aquatic Habitat	**Finlay Creek:** Approximately 450 m of Finlay Creek (tributary to Portuguese Creek) transects the Huband Park Elementary property from NW to SE. The northern half of the riparian area, adjacent to school access roads and parking lots, has been reduced to an approximate 30 m width, while the southern half of the property expands into substantial floodplain and wetland habitat with extensive riparian areas on either bank. Finlay Creek has a prescribed SPEA of 10 m. Substrates in Finlay Creek are a mix of gravel and fines. The stream in the northern half flowed within well-defined channels while the southern half flows pass relatively unconstrained through shallow floodplain areas within broader wetland habitats that are charged during periods of high flow. Although there is good seasonal habitat for rearing or over-wintering salmonids, fish sampling in the spring season did not show presence of any salmonids on the property, indicating there is possibly a barrier to fish passage downstream

	of the school property. Historical records from an upstream property, however, did show a visual observation of a salmonid. Repeated fish sampling of the channel is recommended.   **Photos 2 and 3: Culvert crossing in Finlay Creek on school property (left) and location where Finlay Creek spreads out into the wetland in the southern half of the property (right).** **Wetland:** The southern half of the subject property is a seasonally-flooded wetland in the floodplain of Finlay Creek. Hydrophytic vegetation such as slough sedge and skunk cabbage are present within the wetland. <u>The SPEA widths around this wetland are 15 m on all sides except the southern side which receives a 30 m SPEA</u>.
Terrestrial Habitat	**Forest:** Mixed older second growth SEI polygon #S1048-R7: Older Second Growth Forest encompasses the forested area of Huband Park School grounds. This SEI polygon is part of the larger Seal Bay forest that provides buffering for wetland fens and bogs within the park to the northeast. The drier northern half of the property is characterized as a mixed forest of cedar, bigleaf maple, red alder, and fir. Shrub and herb layers are dominated by red huckleberry, sword fern, salal, dull Oregon-grape, and sedges. Invasive holly was noted within the riparian area of Finlay Creek. The wetter forested area in the southern half supports populations of red alder, Western red cedar, grand fir and red osier dogwood with hydrophytic slough sedge and skunk cabbage within seasonally wetted floodplain and wetland areas. An e-bird "hotspot" was identified near Huband Park Elementary (called "Courtenay – Barbara Road Greenway")[31]. A total of 62 birds were identified at this hotspot. Of these, 58 are provincially yellow-listed[28], three are exotic, and one is not listed. The full list of bird species identified at this hotspot is presented in Appendix E.

[31] The Cornell Lab of Ornithology (2021). eBird, Courtenay – Barbara Road Greenway. Accessed from <https://ebird.org/hotspot/L5728991>.

<table>
<tr><td></td><td>  
Photos 4 and 5: Typical forest in the drier areas on the property (left) and typical forest in the wetland/Finlay Creek floodplain in the southern half of the property.

Bat Habitat: Results from the bat survey (Appendix D) show that Huband Park Elementary had a bat species diversity of 7, which is slightly lower than the species diversity recorded at Ecole Puntledge Park Elementary/Lake Trail Middle School (n=8). The highest bat activity was recorded at this site (19.8 bat calls/hour of survey effort). This school is surrounded by a relatively intact forested area (Seal Bay Nature Park and Northeast Woods), which likely had an effect on the high bat activity – there are foraging and roosting opportunities both on the subject property and surrounding it. Additionally, there are several ecosystem and wildlife features that support bats on the subject property including the wetland, stream/riparian area, and mixed coniferous/deciduous forested area with large dead and standing trees.</td></tr>
<tr><td>Wildlife Habitat Features</td><td>Western red cedar snags near to or within the floodplain of Finlay Creek have been excavated by woodpeckers or other primary cavity excavator birds that will become available to secondary cavity nesters and other wildlife such as squirrels, bats, amphibians, and smaller mammals. The well forested southern half of the property and its proximity to Seal Bay Park are part of an important migration corridor for numerous wildlife species.</td></tr>
<tr><td>Species at Risk</td><td>One Townsend’s big-eared bat was detected during the bat survey (provincially blue-listed). A northern red-legged frog was also observed at the subject property during a site visit[30]. Northern red-legged frogs are provincially blue-listed and listed as Special Concern (Schedule 1) under the SARA. There are no other known ecosystems or species at risk on the subject property according to CDC iMap. There are also no known bald eagle or great blue heron nests within 200 m of the subject property. These results were confirmed during the site visit, with no ecosystems/species at risk or raptor/heron nests observed on the subject property with the exception of the Townsend’s big-eared bat.</td></tr>
<tr><td colspan="2">Outdoor Education Opportunities:</td></tr>
<tr><td colspan="2">Learning opportunities and ecological points of interest on or near the subject property are provided in the following list. F-Series codes refer to the general description of these habitats and their ecological importance which is provided in the Ecological Points of Interest section of this report (Table 6 in Appendix A).</td></tr>
</table>

Forest habitat (See F1): The second growth forest provides ample learning opportunities to discuss nurse logs, bird habitat, bat habitat, terrestrial amphibian habitat, wildlife corridors, forest succession, importance of riparian vegetation (shade, nutrient inputs, moisture retention, etc.).

Wildlife Trees (See F8): In the forest in the southern half of the property, there are some western red cedar snags near to or within the floodplain of Finlay Creek that have been excavated by woodpeckers or other primary cavity excavator species that will become available to secondary cavity nesting birds, bats, and smaller mammals.

Wetland Habitat (See F4): Finlay Creek fans out into a wetland within the forested portion of the school property. Wetlands are ecologically rich habitats that not only provide habitat for many species but also perform critical functions in the landscape by attenuating flows and absorbing stream energy.

Stream Habitat – Finlay Creek (See F5): Finlay Creek provides an opportunity to discuss salmon habitat, especially the importance of upper tributaries like this one that are used as rearing areas for salmonids.

Wildlife Corridor (See F6): The well forested southern half of the property and its proximity to Seal Bay Park are part of an important migration corridor for numerous wildlife species.

Habitat Enhancement Opportunities:

The following list provides opportunities for habitat enhancement on the subject property. E-Series codes refer to the general description of this type of impact/issue and the general prescription for enhancing these types of areas which is provided in the Habitat Enhancement Opportunities section of this report (Table 7 in Appendix B).

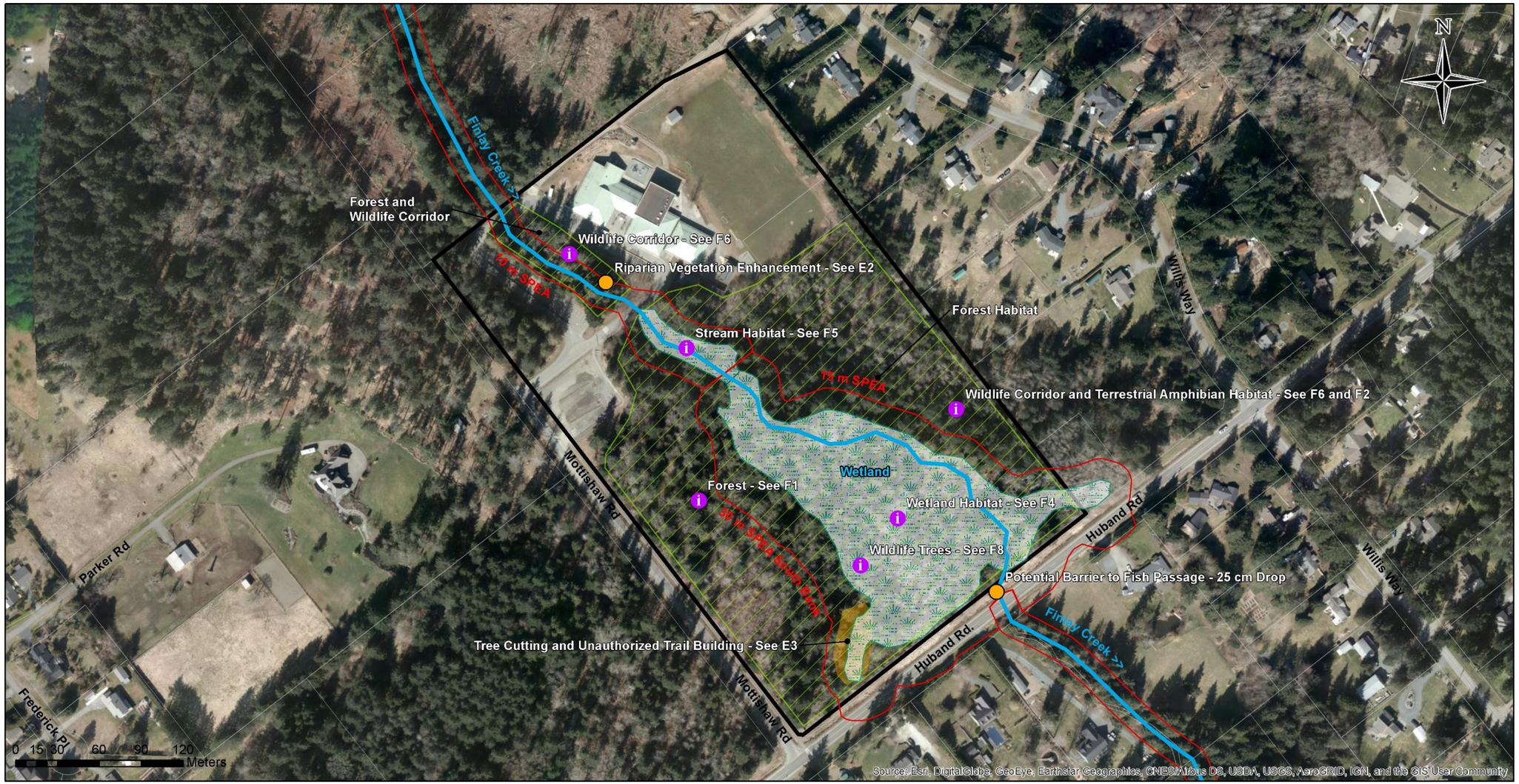
Tree Cutting and Unauthorized Trail Building (See E3): Some observations were made of tree cutting and use of wood to cross wet areas in the southern corner of the property by the wetland (Photos 6 and 7). An effort should be made to formalize the walking trails around the wetland in the southern half of the property to reduce the footprint of impacts from a sprawling trail system. This could be done using small sections of wooden boardwalk, or by delineating the edges of the pathway with woody debris (already available on the forest floor).

Removal of Barrier to Fish Passage: The 900 mm CSP culvert crossing where Finlay Creek crosses Huband Road immediately south of the subject property needs repair. Currently there is a 0.25 m drop into the rotted inlet of this culvert that is a low flow barrier to fish passage (Photo 8). SD71 could work with the BC Ministry of Transportation and Infrastructure to get this culvert replaced and to properly embed the new culvert to restore potential fish passage to upstream habitat.

Riparian Vegetation Enhancement (See E2): Protect and enhance forest understory and succession of plants in the riparian area of the northern half of the property where succession of plants has been impacted by access to the creek near the parking lot and school drop-off lane.

Photos 6 and 7: Some wood cutting and tree removal occurring in the southern corner of the property to build trails – the SD71 should give guidance and direction on responsible trail building in this area, and no trees should be removed in this sensitive habitat.

Photo 8: Culvert crossing in Finlay Creek at Huband Road where the invert is rotted out, creating a drop (and possible fish barrier) during low flow conditions.



Legend

- Invasive Species
- Ecological Point of Interest
- Enhancement Opportunities Point
- Ditch
- Stream
- Wetland
- Parcels
- SD71 Boundaries
- Environmentally Sensitive Area
- Enhancement Opportunities
- Streamside Protection and Enhancement Area

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Site: Huband Park Elementary	Date: March 15th, 2021 Author: C.O'Neill Projection: UTM NAD83 Zn10N
	Note: All linework approximate. Not for use or reproduction without consent from the author.

3.4 QUENEESH ELEMENTARY

Civic address:	2345 Mission Road, Courtenay, BC		
PID:	024-368-571	**Lot size:**	3.7 hectares
Conservation Value	Low		

Key Inventory Results:

- The conservation value ranking of this property is low.
- Strip of trees along southwestern edge of subject property. Connected to forest surrounding North Island College – wildlife corridor values.
- Invasive species in forested area (English ivy, spurge laurel, holly) and along fence line in northeastern corner of subject property (Scotch broom, Himalayan blackberry, and Cutleaf blackberry).
- Moderate trampling of understory in forest.
- No ecosystems or species at risk identified.
- Outdoor education opportunities:
  - Wildlife corridor.
  - Nurse stump.
- Enhancement opportunities:
  - Protect trees in forested areas from trampling and enhancement of protected areas.
  - Invasive species removal and native vegetation planting.

General Description of Property:

Queneesh Elementary consists of one main building with open playing fields covering most of the site. There is one strip of trees and vegetation along the southwestern property boundary.

Photos 1 and 2: Front of the school (left) and back of the school (right) showing the playing fields.

Environmentally Sensitive Areas:

Aquatic Habitat	There is no aquatic habitat on the subject property.
Terrestrial Habitat	**Vegetation:** There is one strip of trees - 45-60 years old and vegetation along the southwestern edge of the property. This forested strip is approximately 15-20 m wide and runs the length of the property – 180 m. Dominant species in this forest include Western red cedar, Douglas fir, red alder, bigleaf maple, salmonberry, snowberry, salal, Nootka rose, oceanspray, dull Oregon grape, and sword fern. There are also some isolated patches of invasive species in this forested strip including English ivy, spurge laurel, and holly. There is moderate trampling of the understory throughout this area.

	  **Photos 3 and 4: Strip of forest along the southwest edge of the property – view from field (left and from within the forest (right).**
Wildlife Habitat Features	There are no wildlife habitat features of note within the forested area.
Species at Risk	There are no known ecosystems or species at risk on the subject property according to CDC iMap. There are also no known bald eagle or great blue heron nests within 200 m of the subject property. These results were confirmed during the site visit, with no ecosystems/species at risk or raptor/heron nests observed on the subject property.

Outdoor Education Opportunities:

Learning opportunities and ecological points of interest on or near the subject property are provided in the following list. F-Series codes refer to the general description of these habitats and their ecological importance which is provided in the Ecological Points of Interest section of this report (Table 6 in Appendix A).

Wildlife Corridor – F6: The forested strip along this property is connected to intact forest surrounding the neighbouring property to the south (North Island College). These corridors of forest also connect to an intact forested lot southwest of North Island College. Although this strip of forest is small, these connected sections of forest are critically important for providing wildlife corridors and habitat connectivity throughout an urbanized landscape.

Nurse Stump – F7: There is a great example of a tree growing from a nurse stump towards the southern end of the forested strip on the subject property. The stump provides nutrients and an ideal growing climate for young saplings, but eventually the stump may rot away and leave the roots suspended.

Photo 5: Nurse stump in forest along property.

Habitat Enhancement Opportunities:

The following list provides opportunities for habitat enhancement on the subject property. E-Series codes refer to the general description of this type of impact/issue and the general prescription for enhancing these types of areas which is provided in the Habitat Enhancement Opportunities section of this report (Table 7 in Appendix B).

Moderate Trampling of Understory (See E1): There is moderate trampling of the understory vegetation in the forested strip along the southwest side of the property. Some of the roots of the trees are quite exposed and have the potential to be seriously damage the trees. While there are some remaining understory plants, there is not much regeneration of trees.

This area can continue to be used for recreation, as it is important to expose students to natural areas. However, it is recommended that some isolated groupings of trees (2-3 in a cluster) in this area be protected with split rail fencing. The protected areas should be restored by de-compacting the soils, spreading organics and mulch, and planting some shrubs and trees to help with understory re-generation and forest succession in the long term.

Planting of Shrubs in the Northeastern Corner (See E4): There is currently some Scotch broom, Himalayan blackberry, and cutleaf blackberry growing along the fence line in the northeastern corner of the property, adjacent to the parking spaces. New development on the other side of the fence has involved some landscaping and planting of trees and shrubs. Located in the center of an urbanized area, there is an opportunity to provide more habitat for birds and small mammals along this strip of grass on the school property. Scotch broom should be removed from this area by cutting the plants at their base in the spring when they are blooming. Invasive Himalayan blackberry should be removed at the same time (see E5 in Table 7). Native shrubs and trees should be planted in this area to outcompete any future Scotch broom and invasive blackberry species. Thicket-type species such as Nootka rose, thimbleberry, and snowberry would be well-suited to this area.

Photo 6. Strip of grass in the northeast corner of the school property (right side of fence) where there is an opportunity to plant native shrubs and trees. The left side of the fence was recently landscaped as part of the new development on the neighbouring lot.

Legend

- Invasive Species
- Ecological Point of Interest
- Enhancement Opportunities Point
- Ditch
- Stream
- Wetland
- Parcels
- SD71 Boundaries
- Environmentally Sensitive Area
- Enhancement Opportunities
- Streamside Protection and Enhancement Area

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Site: Queneesh Elementary	Date: March 15th, 2021 Author: C.O'Neill Projection: UTM NAD83 Zn10N	Note: All linework approximate. Not for use or reproduction without consent from the author. current ENVIRONMENTAL

3.5 GEORGES P. VANIER SECONDARY

Civic address:	4830 Headquarters Road, Courtenay, BC		
PID:	029-409-225	**Lot size:**	35.0 hectares which also includes the parcel of land designated as a park northeast of the school
Conservation Value	High		

Key Inventory Results:

- The conservation value ranking of this property is high.
- 10.35 ha Vanier forest (5.4 ha is a City of Courtenay municipal park, remaining 4.93 ha under jurisdiction of SD):
  - Important wildlife habitat for amphibians, small mammals, ungulates, bears, and bird species. Wildlife trees present throughout forest.
  - Constitutes the headwaters of Towhee Creek.
  - Supports a unique wetland-type Garry oak ecosystem.
- Construction of the Comox Valley Sports Center, SD71 Operations Yard, and various playing fields in the 70's to 90's resulted in conversion of valuable aquatic habitats (natural channels and wetlands) to a ditch-dominated system with seriously impaired hydrological function.
- Several other forested areas on subject property including riparian forest along Towhee Creek mainstem.
- Two projects currently being undertaken in forest: (1) Vanier Forest Land Use Conservation & Development Plan and (2) Vanier Forest Garry Oaks Restoration & Stewardship Pilot Project.
- Garry oaks on the property are of a unique genetic strain.
- Work to address impacts to habitats resulting from various land uses and drainage infrastructure design currently underway – priority list of candidate projects being created.
- Towhee Creek mainstem and four small tributaries on subject property. Towhee Creek supports populations of coho, cutthroat and rainbow trout, and stickleback and flows into Tsolum River (a highly valued river).
- 9 excavated ponds in Towhee Creek system – 3 larger ones on Vanier property support juvenile coho salmon rearing. These fish are subject to stranding and lethal (i.e., low) dissolved oxygen levels.
- 6 wetlands/wetland complexes in Vanier forest – 2 smaller ones on SD-held property.
- 2 additional areas with wet soils and shallow groundwater that have a higher sensitivity of disturbance and are transitioning to wetlands.
- Wetted areas provide critical hydration and rearing/foraging habitat for native amphibian species.
- Invasive species present throughout subject property including English holly, daphne-laurel, herb-Robert, Himalayan blackberry, a non-native violet, and English ivy. SD portion of Vanier Forest heavily infested with English holly and English ivy (decreasing biodiversity).
- Band-tailed Pigeon (Blue listed/S3S4B) observed feeding or roosting in the Garry oak community on May 20, 2012.
- Other potential species at risk include Northern red-legged frog (Blue listed/S3S4; may be present in seasonal wetlands) and Western Screech-Owl, *kennicottii* subspecies (Blue listed/S3; previously recorded in forests in Tsolum River Valley).
- Red-listed ecological plant community in isolated wetland in western corner of subject property (trembling aspen/Pacific crab apple/slough sedge ecological community).
- Outdoor education opportunities:
  - Vanier Forest including Garry oak habitat.
  - Wetland and stream habitats.
  - Amphibian habitat.
  - Wildlife Trees.
  - Human impacts on hydrological processes.
- Enhancement opportunities:
  - Invasive species control and removal.
  - Drainage infrastructure improvements
  - Soil management to reduce sediment release to Towhee Creek.
  - Improving poorly functioning culvert crossings.

General Description of Property:

There are three main buildings on the Georges P. Vanier Secondary property: the main school building, the Comox Valley Sports Centre and the SD71 Maintenance/Operations Building. Numerous, smaller secondary buildings are also located throughout the property. The rest of the property consists of a running track, all-weather turf field, and a large sports field in the southern portion of the property. A forest in the northeastern portion of the property behind the school – a 10.35 ha area also referred to as the "Vanier Forest" is an ecologically critical element of the site. There is also a strip of multi-aged riparian vegetation that runs through the center of the property surrounding Towhee Creek - an important coho stream in the Tsolum River watershed. Of significance, the Vanier property forms the headwaters of this productive salmon stream. Vanier School was constructed in 1968. Significant alteration of aquatic habitats has occurred - the Comox Valley Sports Center, SD71 Operations Yard, and various playing fields were constructed between the 70's to 90's resulted in conversion of valuable aquatic habitats (natural channels and wetlands) to a ditch-dominated system with seriously impaired hydrological function.

The site is very interesting from a historical perspective. As taken from the *Vanier Forest Garry Oaks Restoration & Stewardship Pilot Project* by CVN[33], the Coast Salish peoples of Vancouver Island would periodically ignite grass fires in Garry oak meadows to reduce unwanted shrubs and conifer trees to promote the regeneration of grasslands and provide improved grazing conditions for the native deer population. This provided excellent hunting conditions for the First Nation Peoples of the Comox Valley. In post-colonial times, the site has been used for agricultural purposes and also as a military facility until the 1950's.

Photo 1. Front view of G. P. Vanier Secondary

Vanier Forest

The Vanier Forest is a ~ 60 years old forested, 10.35 Ha portion of the property located on a southwest-facing hillside to the west of the high school and SD71 Maintenance buildings and yard. This area, in addition to the Towhee Creek channel and riparian corridor, constitutes the key to ecological function and biodiversity of the property as it forms the headwaters of Towhee Creek and supports a unique population of wetland-adapted Garry oak trees.

A detailed Environmental Inventory of the Vanier Forest was previously conducted by Current Environmental Ltd. on behalf of SD71 in 2013. The 2013 inventory work resulted in the dedication of a 5.4 Ha portion of the Vanier Forest as a municipal park held by the City of Courtenay (Lot 1). The remaining 4.93 Ha of forested area behind Vanier School (Lot 2) remains under the jurisdiction of SD71.

Since the 2014 subdivision of the property, the Comox Valley Land Trust (CVLT), Comox Valley Nature (CVN), and Tsolum River Restoration Society (TRRS) have undertaken extensive volunteer-driven projects to protect and restore the Vanier Forest – the area of focus including both the municipal park and SD71-held portions of the property. These projects are aimed at restoring the health and function of the unique Garry oak stands which are being out-competed by conifer forest species, restoring or enhancing hydrologic function of the headwaters system, management of invasive vegetation, and redressing several boundary issues along the municipal park and SD71-held property.

Considering these issues, there are two main projects currently being undertaken by the CVLT, CVN, and TRRS: the *Vanier Forest Land Use Conservation & Development Plan*[32], and the *Vanier Forest Garry Oaks Restoration & Stewardship Pilot Project*[33]. These groups have provided significant time and effort to protect and enhance and protect the Vanier Forest and lower reaches of Towhee Creek.

Vanier Forest Land Use Conservation & Development Plan

This CVN and CVLT-led plan is focused on addressing drainage issues and providing input on general land use for the forest, and boundary adjustments. This initiative has been ongoing since 2014.

Vanier Forest Garry Oaks Restoration & Stewardship Pilot Project

This three-year plan is the culmination of a significant effort on behalf of CVN to prescribe restoration works for a rare example of a wetland-type Garry oak ecosystem within the municipally held park portion of the Vanier Forest (Lot 1). The stand also represents one of only eight viable Garry oak stands remaining in the Comox Valley. As this project is not on SD71-held properties but is founded on implementing stewardship-based outdoor educational opportunities for SD71 students, it is mentioned here.

The Garry oak trees within this area are considered to be a unique genotype of these trees found only in the Comox Valley and are of additional interest as they are adapted to survival in wet meadow conditions supported by the continued prescribed First Nations burning practices. Natural forest successional processes are seriously threatening the long-term viability of the Garry oak groves in the park because of maturation of conifer species that are reducing solar exposure and overall habitat suitability for these locally rare trees.

Recent Assessment Work (2020-Present).

During late 2020 and into 2021, SD71 staff, CVLT, CVN, TRRS members, and Current Environmental staff have been working to address several issues resulting from SD71 operations and the drainage infrastructure design. These include the following:

1. Altered hydrological function resulting from two constructed ditches that intercept shallow groundwater flow and reduce the functional quality of wetlands along the base of the Vanier Forest slope.
2. Chronic sediment release to Towhee Creek related to vehicle traffic and an assortment of drainage network issues and excess materials storage practices.
3. Invasive species removal and riparian vegetation enhancement.
4. Poorly functioning culvert crossings and altered channel morphologies.

The project team is currently in the process of compiling a prioritized list of candidate projects to be implemented over time. Correcting the two ditched areas and addressing several erosional issues is of higher priority for implementation in 2021.

Environmentally Sensitive Areas:	
Aquatic Habitat	Sensitive aquatic habitat on the G. P. Vanier Secondary property includes the Towhee Creek mainstem and 4 small tributaries, as well as several wetlands that are seasonally connected to the Towhee Creek system. **Headwaters Function:** From a functional perspective, the Vanier property is critical to the health of Towhee Creek as it forms the vast majority of the headwaters for this Tsolum River tributary. Headwater areas are critical zones within temperate watersheds. Properly functioning headwaters feature small tributary channels that – by nature of their smaller size - collect and convey water, small debris (leaves, twigs) and food and nutrients (insects, detritus, nitrogen, phosphorus, etc.) from overhanging riparian vegetation to

[32] Henderson et al. (2020). *Vanier Forest Land Use Conservation & Development Plan*. Comox Valley Land Trust.

[33] Comox Valley Nature. (2021). *Vanier Forest Garry Oaks Restoration & Stewardship Pilot Project*. Comox Valley Nature.

downstream habitats. As well, delicate hydrological processes such as the presence of springs and small areas of infiltration and shallow groundwater flow interact to mitigate downstream flooding and sustain flows though periods of drought.

Wetlands: There are several wetlands and/or wetland complexes located in the Vanier Forest. Wetlands 1 and 2 and the Wetland 3 complex are all located within the municipal park area, off of the subject property. The wetland 4 complex, which is made up of two smaller wetlands, is located on the SD71-held portion of the property. These wetlands are all seasonally wetted depressions that are fed primarily from groundwater seepage sources with additional surface flow connections to headwater tributaries and downstream watercourses under winter flow conditions. They are typically wetted between the onset of fall rains (mid to late October) through to early May. Further to this, there are two areas of moist soils with shallow groundwater that have increased in size and moisture content since the original inventory completed in 2013. A brief assessment of soils and moisture conditions completed in early 2021 precipitated by the consideration of the disc golf course resulted in designation of two areas as of higher sensitivity to disturbance. These areas are transitioning to wetlands as a result of natural biophysical changes, upslope changes to hydrologic processes related to human development and land use, and climate-related changes such as increased volumes of precipitation over shorter periods of time (Figure 5-2).

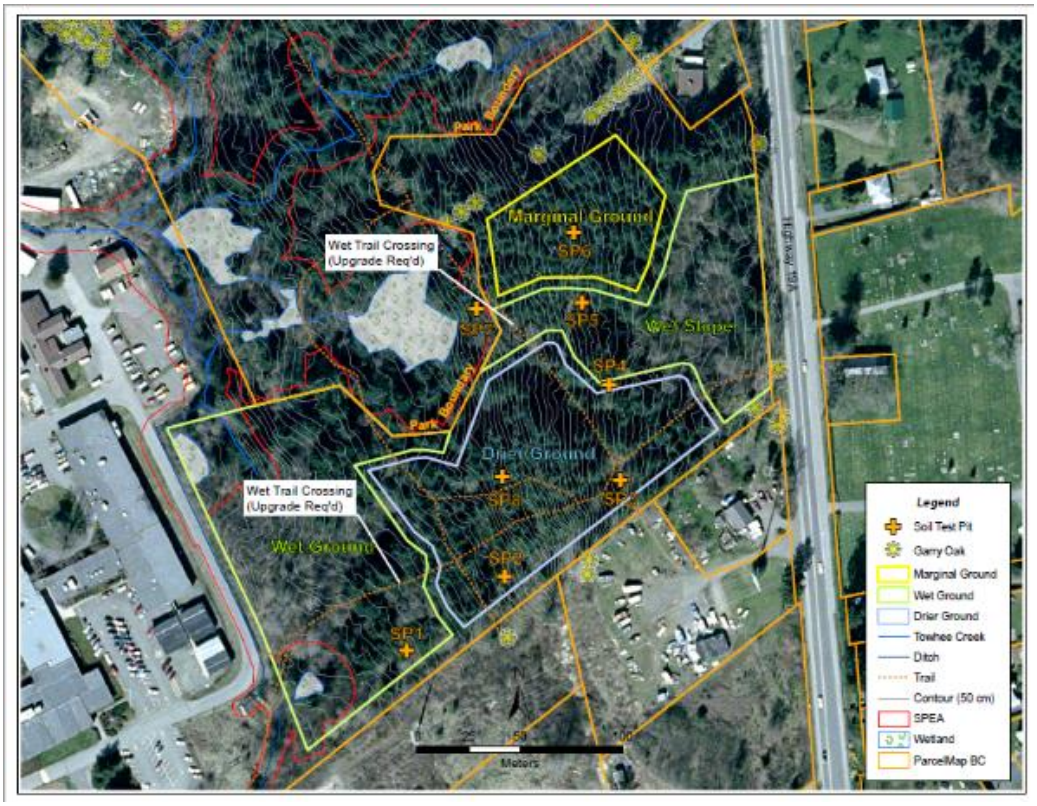


Figure 5-2. Recent soil vegetation community inventory work completed in the Lot 2 (SD71-held) portion of the Vanier Forest.

The generalized composition of wetland vegetation within Vanier Forest is characterized by the presence of slough sedge (Carex obnupta), a facultative hydrophyte that indicates the presence of wet to very wet, nitrogen rich soils (Klinka et al. 1989). Additionally, other common understory species within these wetlands include salmonberry, red-osier dogwood, snowberry, sword fern, and skunk cabbage; with canopy species comprised of Pacific crabapple, red alder, black cottonwood, Sitka spruce, grand fir, and Garry oak. Invasive species such as English holly and Himalayan blackberry were noted throughout the wetland areas as well. Average water depths within all wetlands on the property were shallow, usually less than 0.1 m deep.

The shallow depths and shortened hydroperiod of all these wetlands preclude the potential for aquatic breeding of amphibian species such as red legged frogs, Pacific chorus frogs, rough skinned newts and northwestern salamanders. However, these wetlands play an important role in the landscape by providing hydration opportunities for various wildlife, releasing food and nutrients to downstream habitats, maintaining hydrologic response processes, and filtering overland runoff. Not surprisingly, the frequency of wildlife trees ("snags") and coarse woody debris was highest within wetlands and in their riparian zones on the site.

Construction of the 2nd arena at the CVRD Sports Center in 1998 resulted in a significant loss of wetland habitat in this area[34]. As well, the storm drainage channels created during the expansion of the SD71 fleet compound in 2016 has impaired wetland function in the lower elevation areas of Vanier Forest by reducing the water table elevation. These channels are scheduled to be fixed in the summer of 2021.

<u>The mandated setback or SPEA widths around all wetlands within the Vanier Forest (Wetlands 1 and 2 and Wetland Complexes 3 and 4) is 15 m on all sides except the southern side which receives a 30 m SPEA.</u>

There is also an isolated wetland in the western corner of the subject property, at the intersection of Vanier Drive and Headquarters Road. This isolated wetland is a somewhat unique Pacific crab apple - trembling aspen – black hawthorn forest. This wetland area has no vegetation in the herb layer and very few shrubs (snowberry and a couple of Himalayan blackberry plants near the edges). A small (3X4 m) patch of slough sedge was also observed near Vanier Drive. The somewhat simplified plant community and dominant presence of trembling aspen indicates historical clearing – likely for agricultural land use. This area is seasonally saturated during winter months and is surrounded on three sides by deep roadside ditches. The black hawthorn and Pacific crab apple on this site provide good cover and food habitat for bird species. The ditches – particularly the one located on the northeast side of the wetland - provide wetted habitat for amphibians, though they are not likely wetted long enough to support breeding by these species. This wetland most resembles the trembling aspen/Pacific crab apple/slough sedge ecological community; it is red-listed by the BC Conservation Data Centre[35]. This community is characterized as occurring on sites with seasonally fluctuating water tables with organic materials or organic veneers over mineral soils and is highly sensitive to changes in hydrology patterns and invasive plant infestations. This isolated wetland receives a 10 m SPEA. In addition to these wetlands, there is also a stormwater management pond located in the southern half of the property, just southwest of the artificial turf field.


Photos 1 and 2: Wetland 1 (left) and Wetland 2 (right) in the municipal park portion of Vanier Forest.

[34] Personal communication (2020). Wayne White, President, Caroline Heim and Derek Tripp, biologists, Tsolum River Restoration Society.

[35] BC MoE (2021). BC Conservation Data Centre: Conservation Status Report. Trembling aspen/Pacific crab apple/slough sedge. Accessed from <https://a100.gov.bc.ca/pub/eswp/esr.do?id=20109>


Photos 3 and 4. Wetland 3 complex (left) and Wetland 4 complex (right) in the municipal park portion of Vanier Forest.


Photos 5 and 6: Stormwater pond in the southern half of the property (left) and isolated wetland in the western corner (at Vanier Drive and Headquarters Road).

Photo 7: Ditch surrounding isolated wetland.

Towhee Creek and Tributaries: All watercourses on the subject property are relatively small (<2 m bankfull width) and seasonally wetted: channels on the property have been observed to dry in mid to late June. Substrates varied between deep mucky fines in lower gradient channels, with higher gradient reaches containing small gravels and cobbles. Average depth within all watercourses was generally shallow, with

	poor riffle-pool development related to historical disturbance and the small size of the streams. The mandated SPEA width for Towhee Creek, the habitat ponds and all tributaries on the Vanier site is 10 m. Riparian habitat of all streams was highly variable: the intact forested areas in the Vanier Oaks forest (comprised of red alder, black cottonwood, Sitka spruce, grand fir, and Garry oak) are of moderate to good function. There are sections of piping and reduced or pinched riparian buffer areas - particularly in the reach between the SD71 Operations and Maintenance Facility to below the all-weather turf field - resulting from the proximity of buildings, extensive parking lots, and SD71 Maintenance Facility infrastructure. The width of functional riparian habitat in this area ranges between 5 to 20 m in this area. There is a strip of relatively intact riparian forest than continues throughout the southwestern half (developed portion) of the property, which consists mainly of black cottonwood, young conifers, and red alder. Invasive species, Himalayan blackberry in particular, often dominates the riparian community in this reach as well. Overall, Towhee Creek is a second order, seasonally wetted stream that is known to support coho salmon, and three-spined stickleback with very few cutthroat trout. Towhee Creek crosses Headquarters Road and eventually flows into Tsolum River approximately 800 m downstream of the subject property. There are a series of 9 in-line ponds in the lower section of Towhee Creek that were excavated in 2005 to support juvenile coho salmon rearing[36]. Fish presence within the system is generally confined to Ponds 4,5, and 6 in the lower or southwestern one-quarter of the property near Headquarters Road and in the tributary that runs along the southeast boundary of the Vanier property (Figure 5-3). Poor habitat and extensive culvert crossings upstream of Pond 6 limit direct utilization of these reaches in most years. Mark recapture work completed by the TRRS indicates that Towhee Creek may provide winter rearing habitat for ~8,000 to 10,000 juvenile coho salmonids[36]. Furthermore, the rigorous health and large size of the fish captured in the system indicate that Towhee Creek provides very high-quality conditions (food sources and habitat conditions) for coho rearing and development. Unfortunately, flow volumes within Towhee Creek are insufficient to sustain wetted habitat connectivity down to the perennially wetted habitats of the Tsolum River mainstem during the typical outmigration period of coho smolts (April through mid-June). As such the large, healthy fish produced within the Towhee Creek system become stranded and unlikely to survive summer months without manual relocation of these fish. This issue underscores the importance of maintaining proper ecological function (wetland and forest preservation, lower drainage density, infiltration capacity, protection of springs, etc.) in headwater systems. TRRS continues to seek solutions to this issue; the work to remediate impacts related to numerous poorly designed drainage channels in the headwaters area is expected to help with this issue but will not likely be effective enough to rectify the problem.

[36] Tripp et al. (2020). *Juvenile Coho Salmon Population Size and Rescue in Pond 1 on Towhee Creek, a Small Tributary of the Tsolum River, BC*. Tsolum River Restoration Society.

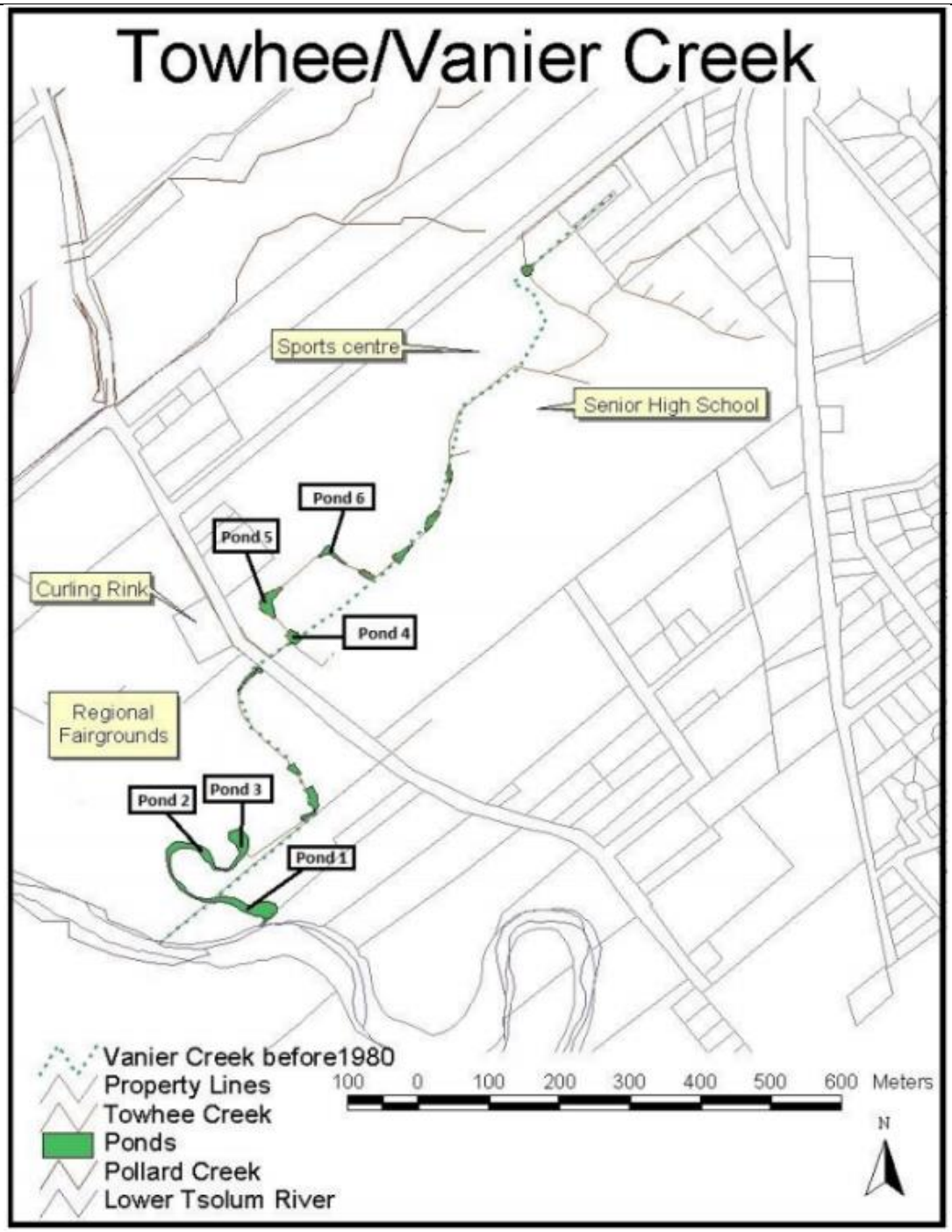


Figure 5-3. Pond locations within Towhee Creek. Source: Juvenile Coho Salmon Population Size and Rescue in Pond 1 on Towhee Creek, a Small Tributary of the Tsolum River, BC By Derek Tripp, Allan Chamberlain and Caroline Heim For the Tsolum River Restoration Society June, 2020. http://www.tsolumriver.org/uploads/4/0/5/7/4057952/2020_pond_1_final_report.pdf

	  **Photos 8 and 9: Towhee Creek in the lower half of the property (left) and one of the tributaries in the Vanier Oaks forest (right).**
Terrestrial Habitat	**Forest:** The Vanier Forest site provides valuable nesting, foraging, rearing, and hydration habitat for amphibians, small mammals, ungulates, bears, and bird species. Incidental observations of non-avian wildlife use of the property were relatively few and included black bear (sign), Pacific chorus frogs, and black-tailed deer. This may be a reflection of the poor landscape connectivity of the Vanier Forest to larger forested habitats resulting from habitat fragmentation and the presence of several very busy roads. Seven vegetation communities were identified in the Vanier Forest area excluding developed (non-vegetated) areas. All the communities were described from detailed vegetation plots undertaken in May–July 2012. Plant communities are: 1. Garry oak – Grand fir / Snowberry Mixed Forest 2. Douglas-fir / Sword Fern Evergreen Forest 3. Pacific Crab Apple – Cascara Deciduous Forest 4. Red Alder / Trailing Blackberry Deciduous Forest 5. Red Alder / Slough Sedge Forested Wetland 6. Himalayan Blackberry Shrub Thicket 7. Bentgrass – Velvetgrass Meadow. None of these communities are listed as rare by the BC CDC. The Vanier forest is approximately 60 years old and has been growing since the termination of both agricultural and military land uses in the later 1950's. The Vanier Forest, particularly the Lot 2, SD71-held portion of the property is heavily infested with invasive species that are preventing the establishment of functional plant community and limiting habitat for wildlife; the overall result is an astonishing decrease in biodiversity in the area. Notably, thickets of English holly – a species identified as particularly prevalent in the 2013 Current Environmental report - have literally exploded throughout the forested area and are occluding native shrub and herb species. English ivy is also noted throughout the area; this species threatens the long-term health several large Douglas fir trees in the forest. Further to the southwest, there is a scrubby, mixed forest and shrub-dominated area adjacent to Towhee Creek near Headquarters Road. Finally, two somewhat significant patches of forest are located on the property. The first area is immediately north of Arena #2 of the Sports Center; this mixed forest is comprised of Garry oak, black cottonwood, red alder, big leaf maple, and Douglas fir approximately 60 years old. The second area is a deciduous forest located at the corner of Vanier Drive and Headquarters Road; This forest is dominated by black cottonwood, red alder, big leaf maple, and cascara with shrub species comprised of salmonberry, thimbleberry, Himalayan blackberry. **Garry Oak Habitat:** As mentioned above, the 10.4 Ha Vanier Forest site contains a remnant of the most northern woodland Garry oak ecosystem in Canada. Three reports are available that provide detailed information on the Garry oaks on the Vanier property. These are:

	1. *SD 71 - Vanier Oak Property Ecological Assessment and Protection Plan*. 2013. Current Environmental and Raincoast Applied Ecology, for School District 71. 2. *Vanier Forest Land Use Conservation & Development Plan.* August 2020. Comox Valley Land Trust. 3. *Vanier Forest Garry Oaks Restoration & Stewardship Pilot Project*. March 2021. Comox Valley Nature. Garry oaks are concentrated in the north-central portion of the Vanier Forest; there are several smaller clusters and individual Garry oak trees located throughout the Vanier property (Figure 5-4) in an area of mixed forest. Even more interesting is the fact that these Garry oak trees are adapted to growing within wetland habitat conditions and are a unique strain from a genetic perspective. Garry oak woodlands and more open grasslands were a unique and prominent ecosystem type in the Comox Valley prior to settlement. Extensive open grasslands reported in the Tsolum River Valley attracted early settlers to the area. First Nations burning practices for the management of food source plants (camas) and hunting opportunities (ungulate grazing) led to the development of oak and grassland vegetation in an area that would otherwise be dominated by dense conifer forests. The rapid establishment and growth of Douglas fir to the east of the Garry oaks at the Vanier site suggest that First Nations land management rather than soil conditions or other environmental factors favoured the establishment of oaks historically in this area. "*The Vanier Park Garry oak population is one of five genetically distinct genotypes unique to the Comox Valley region. In addition, the Vanier group represents a now rare example of what is now considered by many researchers to be the "normal" optimal ecological condition of Garry oaks in pre-contact North-America. The optimal or best situation for Garry oaks is in "wet meadows". That was the situation in the Willamette, Puget Sound, Saanich, Victoria, Yellow Point, and the Tsolum River, prior to colonization (circa 1835).* *Wet meadows are also prime agricultural land and Garry oaks, over time, were extirpated from their prime habitat. The 2% that remain on Vancouver Island are in marginal or relict habitat - in rocky water-receiving areas.* *The Vanier site is exceptional in this respect. It is a water receiving area on an unstable hillside, and therefore not prime agricultural or suitable for development. That unusual "handicap" has enabled the Vanier site to retain an original population of Garry oaks in wet conditions, a site condition which was once prevalent but which is now rare."*[37]

[37] Maingon, Loys, MA, PhD, MSc (RPBio), Vanier Garry Oaks Notation, Feb 1, 2021.

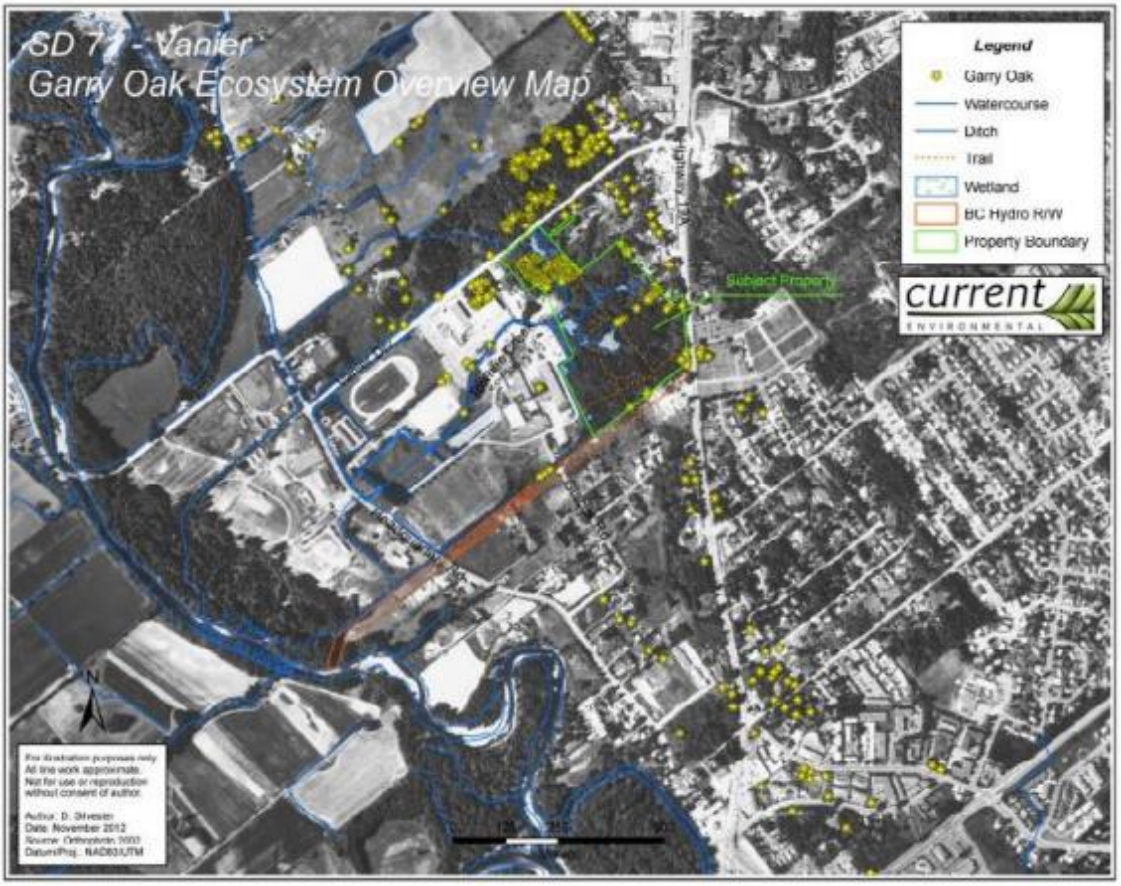


Figure 5-4. Overview of Garry Oak trees on or near the Vanier school site (Source: CEL 2013).

Wildlife Habitat Features	**Amphibian Habitat:** None of the waterbodies observed on the property are deep enough or remain wetted long enough to provide meaningful breeding habitat for amphibians. However, these wetted areas provide critical hydration and rearing/foraging habitat for native amphibian species that likely include Red-legged Frogs, Pacific Chorus Frogs, Northwestern and Long-toed Salamanders and Rough-skinned Newts. Pacific Chorus frogs were observed to utilize the abovementioned ditch for breeding purposes. **Wildlife Trees and Riparian Areas:** The aquatic habitats and their respective riparian habitats on the site function to increase the frequency of dead/decaying wildlife trees and coarse woody debris that provide critical nest and food sources for a wide variety of wildlife – particularly birds and bats. Coarse woody debris also provides valuable moist, cool microhabitats important for a broad array of wildlife – particularly amphibians – during periods of drought and high temperatures. The more structurally complex edge habitats of these areas also provide excellent habitat for wildlife such as birds, ungulates, and small mammals. Finally, these areas provide important hydration opportunities for wildlife during late fall, winter, and spring months.

Photo 10. Wildlife tree next to wetland 1

Species at Risk

There are several occurrences of species and/or ecosystems at risk on the subject property, which are outlined in the list below:

1) A single Band-tailed Pigeon (Blue listed/S3S4B) was observed feeding or roosting in the Garry oak community on May 20, 2012.
2) Western Screech-Owl, kennicottii subspecies (Blue listed/S3) has been recorded from forests in the Tsolum River Valley (1989 record in BC CDC database) but has declined because of habitat loss and predation from Barred Owls in the past two decades.
3) Cutthroat trout has been observed in Towhee Creek and it is provincially blue-listed (not listed federally).
4) Northern Red-legged Frog (Blue listed/S3S4) may occur on the site based on the presence of seasonal wetlands but would require more specialized surveys to detect presence or absence.

In general, the disturbance history of the site (as described most of the forest has developed since 1950 on previously cleared land) reduces the potential for rare plant species which often require habitat features or conditions associated with less disturbed communities. The Garry oak – Grand Fir / Snowberry Mixed Forest community has the highest potential for rare species because it contains elements of remnant natural vegetation. However, the closed canopy and dense understory reduces the potential for a suite of rare plants associated with Garry oak ecosystems (e.g., white-topped aster, yellow montane violet) to occur in the study area. It seems likely that, despite the presence of the unique Garry oak grove in the northwestern portion of the study area, all areas of the site were grazed during the historical early agricultural and military land uses – this greatly reduces the possibility of rare plants occurring on the site.

Rare Ecological Communities: The plant community in the isolated wetland in the western corner of the subject property most resembles an "at-risk" plant community according to the BC Conservation Data Centre: the red-listed trembling aspen/Pacific crab apple/slough sedge ecological community (S1)[35]. None of the other plant communities identified in the study area are recognized as "at risk" by the BC Conservation Data Centre. The listing of ecological communities is based on several factors that include the range or extent of communities with good ecological integrity, potential recruitment for adjacent areas, trends in population sizes, and resilience. The BC CDC designation of forested communities as "rare" is generally based on late seral stage, or climax community conditions, with very low disturbance history.

The Garry oak – Grand Fir / Snowberry Mixed Forest community is not currently recognized by the BC CDC because of lack of sufficient information to designate, rather than lack of ecological value, rarity, or sensitivity. Indeed, many ecologists familiar with the site consider the Garry oak community in the study

	area to be very unique within BC and the local region. A similar plant community is found in south Puget Sound (Garry oak with snowberry on moist or riparian sites) and is recognized by the US as a regionally rare, native plant community. If sufficient assessment were undertaken, we are confident this community would be considered "at risk". Forested wetland communities with red alder and slough sedge are analogous to a red-listed community (Red alder / Slough Sedge Forested Wetland) that occurs in the CDF subzone (CDFmm1) but not in the CWHxm1 subzone found in the Courtenay area. Because of the minor climatic differences between these subzones, this distinction should be reviewed by the BC Conservation Data Centre to clarify patterns of regional rarity for this forested wetland community. The Douglas-fir / Sword Fern Evergreen Forest community is similar to a forested ecological community that is blue-listed in the CWHxm1 (associated with the 04 site series). However, because of the disturbed nature of the Douglas-fir community which lacks large trees, snags, downed logs, and many plant species associated with older forests, it is not considered representative of the CDC listed community at this time. As well, the Douglas-fir forest in the study area lacks a well-developed bryophyte and understory community including characteristic species such as step moss, vanilla-leaf, baldhip rose, and dull Oregon-grape. Most features associated with older forests begin to develop between 90 to 120 years after establishment of tree cover. There are no known bald eagle or great blue heron nests within 200 m of the subject property. These results were confirmed during the site visit, with no raptor/heron nests observed on the subject property.

Outdoor Education Opportunities:

Learning opportunities and ecological points of interest on or near the subject property are provided in the following list. F-Series codes refer to the general description of these habitats and their ecological importance which is provided in the Ecological Points of Interest section of this report (Table 6 in Appendix A).

The Vanier Forest is a tremendous resource for outdoor learning opportunities for SD71 students. The Vanier Forest Garry Oaks Restoration & Stewardship Pilot Project currently being developed by CVN is an exciting project with numerous learning opportunities that include biodiversity, ecological enhancement, forest succession, rare species and communities, First Nations history, and invasive species management. It is hoped that ongoing dialogue between SD71, CVN, and City of Courtenay parks staff will result in a positive outcome and effective implementation of this program.

Garry Oak Habitat (See F9): The forest behind Vanier Secondary School provides an excellent learning opportunity for students to understand the history of Garry Oak habitat, their development with the use of the land by local First Nations, and the changing biodiversity of the site now that there is no longer the same type of human interaction and management of these grasslands/meadows.

Wetland Habitat (See F4): The expansive network of wetlands in the forest behind the school provides ample opportunities for students to learn and interact with these ecologically rich ecosystems. Topics of discussion at this site can include biodiversity, forest and watershed ecology, hydrology, the importance of water storage in the landscape in the face of climate change (increased flooding in winter and longer droughts in summer), site and regional planning if the Vanier Oaks forest were to be developed, and species at risk.

Stream Habitat (See F5): Towhee Creek provides an opportunity to learn about stream habitat, salmon habitat (especially rearing in the winter months), riparian areas and their use by a wide variety of animals, the connection to the Tsolum River downstream, fish passage through culverts, etc. The TRRS has an excellent suite of educational resources; their staff and volunteers are actively involved in engaging students and the local community (including Vanier students) in their numerous projects. http://www.tsolumriver.org/teacher-resources.html

Amphibian Habitat (See F2): The Vanier Oaks forest provides a cool moist forested habitat for amphibians. While some of the wetlands dry up too quickly to be used for aquatic breeding, adults and terrestrial amphibians may find refuge along the pond edges and woody debris on the forest floor.

Wildlife trees (See F8): There are numerous wildlife trees located throughout the Vanier Forest area. These decaying trees present cavity nesting holes in some of the larger Bigleaf maple and Douglas fir trees. Students can go on a search throughout the area to look for any new signs of cavity nesting. If any woodpeckers are heard in the areas, they can be observed making the primary cavities in trees that later become habitat for secondary cavity nesters.

Habitat Enhancement Opportunities:

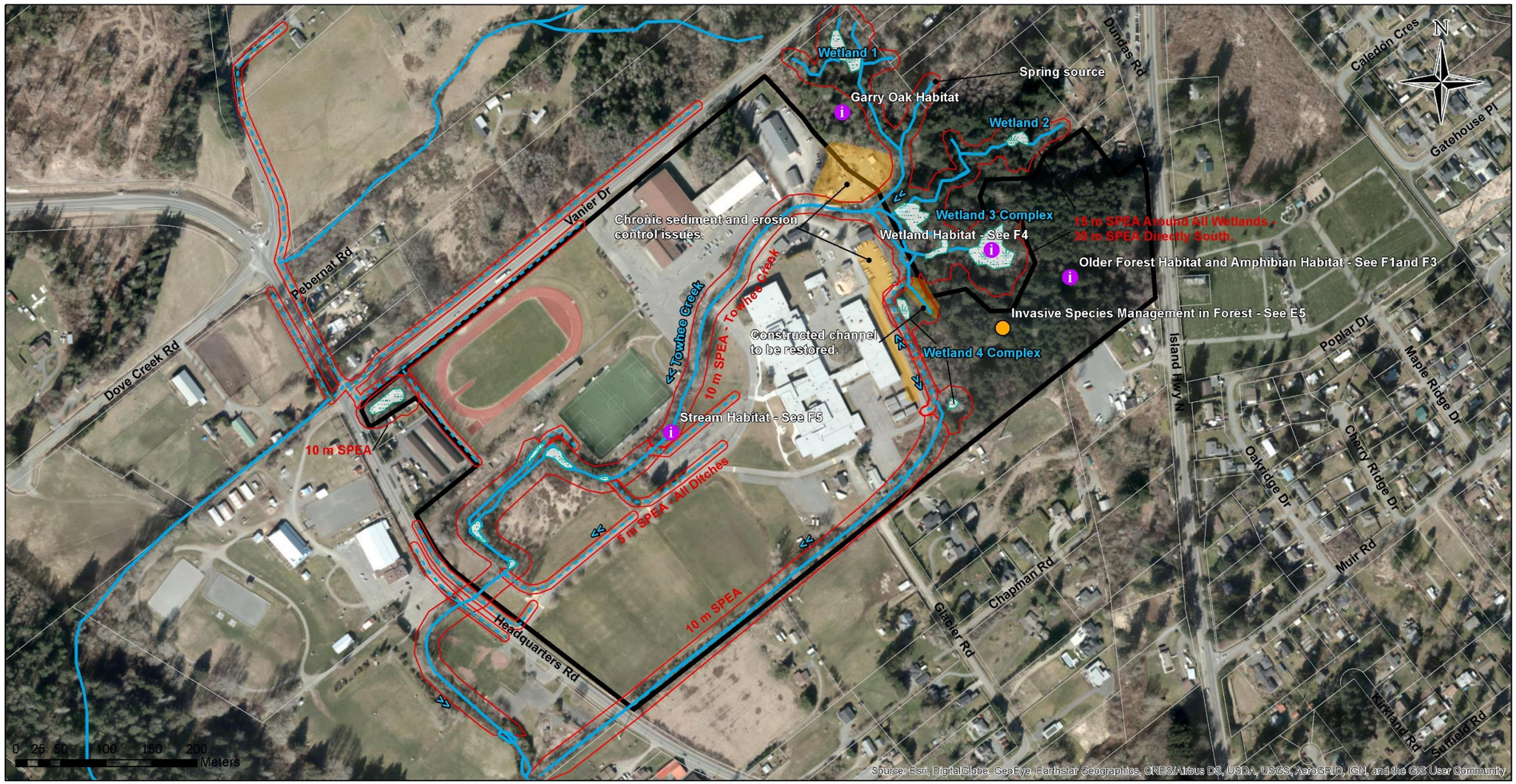
There are a number of opportunities to enhance or restore habitat and ecosystem function on the Vanier property. E-Series codes refer to the general description of this type of impact/issue and the general prescription for enhancing these types of areas which is provided in the Habitat Enhancement Opportunities section of this report (Table 7 in Appendix B).

As discussed, during late 2020 and into 2021, SD71 staff, CVLT, CVN, and TRRS members, and Current Environmental staff have been working to address several negative ecological impacts resulting from SD71 operations and the drainage infrastructure design. These include the following:

1. Altered hydrological function resulting from two constructed ditches that intercept shallow groundwater flow and reduce the functional quality of wetlands along the base of the Vanier Forest slope.
2. Chronic sediment release to Towhee Creek related to vehicle traffic and an assortment of drainage network issues and excess materials storage practices.
    a. An area within 10 m of Towhee Creek being used to store extra soils generated by SD71 operations has been identified as a source of erosion and sediment release to the creek. SD71 staff are planning on removing this material in the near future.
3. Invasive species removal.
4. Poorly functioning culvert crossings.

The project team is currently in the process of compiling a prioritized list of candidate projects to be implemented over time. Correcting the two ditched areas and addressing several erosional issues is of higher priority for implementation in 2021.

Invasive Plant Removal (See E5): Invasive plant species (English holly, daphne-laurel, herb-Robert, blackberry, English ivy, etc.) occur frequently in the study area. Within the Vanier Forest, dense monoculture thickets of English holly and areas of English ivy are becoming a very serious impediment to the establishment of a functional vegetation community by occluding native shrub and herb species. Herb-Robert was present in 29 of 34 vegetation plots but often only a few plants per plot in the 2013 assessment. A non-native violet was also observed in the southeastern edge of the study area. Himalayan blackberry forms dense thickets along the many sections of Towhee Creek and the edge of Vanier Forest but does not thrive within the denser forest community. Invasive plant control should be initiated as soon as possible to address this very serious situation and to minimize future eradication efforts.



Legend

- Invasive Species
- Ecological Point of Interest
- Enhancement Opportunities Point
- Ditch
- Stream
- Wetland
- Parcels
- SD71 Boundaries
- Environmentally Sensitive Area
- Enhancement Opportunities
- Streamside Protection and Enhancement Area

Project: School District 71: Comox Valley Schools Environmental Inventory	Page 5 of 24
Site: Georges P. Vanier Secondary	Date: March 15th, 2021 Author: C.O'Neill Projection: UTM NAD83 Zn10N
	Note: All linework approximate. Not for use or reproduction without consent from the author.

current ENVIRONMENTAL

3.6 GLACIER VIEW SECONDARY CENTRE

Civic address:	241 Beecher Place, Courtenay, BC		
PID:	024-636-070	**Lot size:**	2.48 Ha
Conservation Value	Low		

Key Inventory Results:

- The conservation value ranking of this property is low.
- Bone Creek flows around subject property (off-site). Non-fish bearing; however, it provides flow to Glen Urquhart Creek which is fish bearing.
- No forested areas – single row of trees along playing fields and small patch of trees along northeastern edge of property.
- Invasive Himalayan blackberry thicket in patch of trees.
- Seasonal pond of standing water in Himalayan blackberry thicket – negligible habitat function.
- No ecosystems or species at risk identified.
- No outdoor education opportunities:
- Enhancement opportunities:
  - Removal of Himalayan blackberry and native vegetation planting (low priority).

General Description of Property:

Glacier View Secondary Centre has one main building and an open playing field behind it. There is a strip of trees along the perimeter of the property but no forested areas.

Photo 1. Front view of the school.

Environmentally Sensitive Areas:

Aquatic Habitat	**Bone Creek:** There is one stream that originates in the forest just north, but off of the subject property, then flows southwest around the school property towards Back Road. At Back Road, this stream enters a long culvert than runs underground down Back Road, across Ryan Road, and outlets into Glen Urquhart Creek (over 300 m of piped section). This culvert precludes fish passage upstream into Bone Creek. Bone Creek dries during the summer months therefore there are no resident fish in this stream. Although this stream is non fish bearing, it still provides flows and nutrients to downstream fish habitat in Glen Urquhart Creek. Bone Creek has a prescribed SPEA of 10 m.
Terrestrial Habitat	**Vegetation:** The terrestrial habitat on site is limited to a single row of trees along the edge of the playing fields, and a small patch of trees along the northeastern edge of the property. This patch of trees is primarily

	dominated by a dense Himalayan blackberry thicket. There is a seasonal pond of standing water in a depression within the thicket – however it is not connected to any flowing streams and provides negligible habitat function to the landscape.   **Photos 2 and 3: Front of the property along the road showing a few ornamental trees (left) and back field behind the school with trees along the fence line (right).**
Wildlife Habitat Features	There are no wildlife features of note on this property.
Species at Risk	There are no known ecosystems or species at risk on the subject property according to CDC iMap. There are also no known bald eagle or great blue heron nests within 200 m of the subject property. These results were confirmed during the site visit, with no ecosystems/ species at risk or raptor/heron nests observed on the subject property.

Outdoor Education Opportunities:

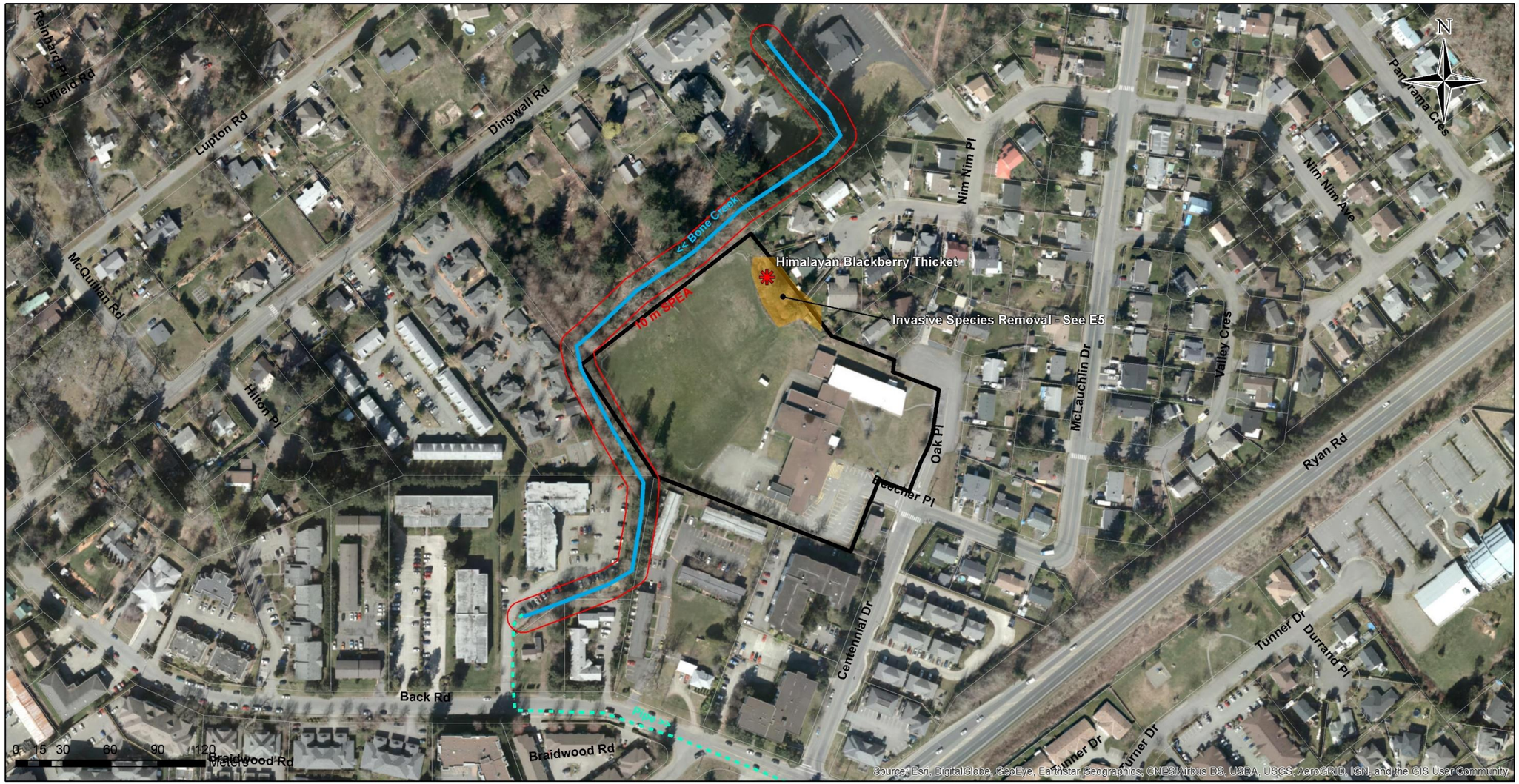
There are no outdoor education opportunities at this site.

Habitat Enhancement Opportunities:

The following list provides opportunities for habitat enhancement on the subject property. E-Series codes refer to the general description of this type of impact/issue and the general prescription for enhancing these types of areas which is provided in the Habitat Enhancement Opportunities section of this report (Table 7 in Appendix B).

Invasive Species Removal (See E5): Himalayan blackberry are well established in the patch of trees along the northeast edge of the site (Photo 4). The blackberry has formed a dense thicket that is not possible to remove by hand at this stage. The recommendation for this patch of vegetation is to use a small machine to mechanically remove blackberry in this thicket and restore native vegetation in this area. Providing access into this small, treed area would create more opportunities for outdoor learning and more ecologically valuable habitat. Overall, this is a low priority undertaking.

Photo 4. Blackberry thicket along the northeastern edge of the site.



Legend

- Invasive Species
- Ecological Point of Interest
- Enhancement Opportunities Point
- Ditch
- Stream
- Wetland
- Parcels
- SD71 Boundaries
- Environmentally Sensitive Area
- Enhancement Opportunities
- Streamside Protection and Enhancement Area

Project: School District 71: Comox Valley Schools Environmental Inventory	Page 6 of 24
Site: Glacier View Secondary Centre	Date: March 15th, 2021 Author: C.O'Neill Projection: UTM NAD83 Zn10N
	Note: All linework approximate. Not for use or reproduction without consent from the author.

3.7 MARK R. ISFELD SENIOR SECONDARY AND VALLEY VIEW ELEMENTARY

Civic address:	1551 Lerwick Rd, Courtenay, BC		
PID:	017-619-360 and 017-619-408	**Lot size:**	16.73 hectares
Conservation Value	Low		

Key Inventory Results:

- The conservation value ranking of this property is low.
- Between Brooklyn Creek and Glen Urquhart watersheds but no connected ditches or streams on the subject property.
- One isolated seasonal wetland in forest behind Valley View elementary – may provide habitat for adult life stages of aquatic breeding amphibians and terrestrial amphibians.
- Several forested areas on subject property (provide foraging and nesting habitat for birds, habitat for terrestrial amphibians, and potential habitat for bats):
    1. Small patch of forest near main entrance to Mark R. Isfeld Senior Secondary.
    2. Strip of forest along east and south side of Valley View Elementary playing fields.
    3. Trembling aspen grove along northern edge of Valley View playing fields. Relatively rare along coast of BC and protected species under City of Courtenay Tree Bylaw.
    4. Larger more connected piece of forest behind Valley View Elementary and along southwest edge of playing fields at Mark R. Isfeld Senior Secondary. Close to Malahat Storm Park and riparian greenway along Glen Urquhart Creek – wildlife corridor values.
- Minor wildlife features (habitat stumps, woody debris, cavity nesting holes in trees) in forested areas.
- Invasive Himalayan blackberry in several of the forested areas.
- No ecosystems or species at risk identified.
- Outdoor education opportunities:
    - Forest.
    - Wetland and terrestrial amphibian habitat.
    - Woody debris, nurse stumps, and wildlife trees.
- Enhancement opportunities:
    - Removal of invasive Himalayan blackberry.
    - Management of trampled forest.

General Description of Property:

Mark R. Isfeld Senior Secondary and Valley View Elementary share a large parcel of land in east Courtenay. There are two school buildings, landscaped areas around the school entrances and parking lots, and 2.0 Ha stand of forest along the southern property boundary.

Photos 1 and 2. Front view of Mark R. Senior Secondary (left) and front view of Valley View Elementary (right)

Environmentally Sensitive Areas:	
Aquatic Habitat	This school property is located on a height of land between the Brooklyn Creek Watershed that starts across Lerwick Road to the east, and the Glen Urquhart Watershed which starts just west of the subject property in Malahat Storm Park. There are no connected ditches or streams on the subject property. **Wetland:** There is one isolated wetland in the triangle of forest behind Valley View Elementary. This wetland is relatively small (10 m by 20 m), and seasonally dries up. Vegetation in this wetland consists of salmonberry, red alder, and sword fern which lined the edges. This wetland is protected under the Water Sustainability Act and a minimum SPEA of 10 m is recommended to protect this feature. With an absence of emergent vegetation and sunlight, and with such shallow intermittent water levels, this wetland is not likely to be used by amphibians for breeding. However, the cool moist ground and woody debris on the ground would provide good summer forage and refuge habitat for adult life stages of aquatic breeding amphibians and terrestrial amphibians. The salmonberry thicket also provides favourable nesting habitat for many migratory birds in the spring breeding window.  **Photos 3 and 4. Isolated wetland in the triangle of forest behind Valley View Elementary.**
Terrestrial Habitat	The developed areas on the property are well landscaped which provides opportunities for water retention and infiltration. Natural areas on the property consist of a small patch of forest to the left of the main entrance to Mark R. Isfeld Senior Secondary, a strip of forest along the east and south side of the Valley View Elementary playing fields, a stand of trembling aspen and a larger more connected piece of forest behind Valley View Elementary and along the southwest edge of the playing fields at Mark R. Isfeld Senior Secondary. These natural forested areas likely provide nesting habitat for birds. **Douglas fir/bigleaf maple forest:** Total forested area at this school site is approximately 2.76 hectares. The forested areas on the property generally have an open understory with good native vegetation cover and minimal invasive species in the understory. Dominant species in the forest are Douglas fir, western hemlock, bigleaf maple and western red cedar with sword fern, salal, Oregon grape, red huckleberry, and salmonberry in the understory. There is also a good density of woody debris on the forest floor. Deer tracks were observed along one of the pathways in the forest. With a relatively close proximity of this forest to Malahat Storm Park and the riparian greenway along Glen Urquhart Creek, this forest may be considered as a wildlife corridor. This forest also provides foraging and nesting habitat for birds, habitat for terrestrial amphibians, and potential habitat for bats. Being located at the top of two watersheds (Brooklyn and Glen Urquhart Creeks), this forest also provides a natural “sponge” that absorbs runoff water into the landscape and helps attenuate storm flows.


Photos 5 and 6. Typical forest on the subject property – low impact trails provide access.

Trembling aspen grove: There is a small stand of trembling aspen trees on the northern edge of the Valley View playing fields (Photos 7 and 8). Trembling aspen are considered a high value wildlife tree and are a protected species under the City of Courtenay Tree Bylaw (2018). These trees are known for their ability to sprout from root suckers and form clones of many individual stems. One tree can be very long lived by continually sprouting new stems. When older stems start to rot and die off, they become excellent habitat for cavity nesting birds and other wildlife. While common in other parts of BC and Canada, this species is relatively rare along the coast of BC.

The understory of this grove is overgrown with Himalayan blackberry. Blackberry is competing with the trembling aspen for light (for new shoots) and nutrients, and it would be beneficial to remove this invasive species from the area.


Photos 7 and 8. Small trembling aspen grove between the Isfeld parking lot and the north side of the Valley View playing fields.

Wildlife Habitat Features	There are several minor wildlife features scattered throughout the forest which include habitat stumps, woody debris on the forest floor, and cavity nesting holes in some of the larger Bigleaf maple and Douglas fir trees as well as the trembling aspen trees.

Photo 9. Nurse stump in the forested playing area behind Valley View Elementary.

Species at Risk	There are no known ecosystems or species at risk on the subject property according to CDC iMap. There are also no known bald eagle or great blue heron nests within 200 m of the subject property. These results were confirmed during the site visit, with no ecosystems/species at risk or raptor/heron nests observed on the subject property.

Outdoor Education Opportunities:

Learning opportunities and ecological points of interest on or near the subject property are provided in the following list. F-Series codes refer to the general description of these habitats and their ecological importance which is provided in the Ecological Points of Interest section of this report (Table 6 in Appendix A).

Forest Habitat (See F1): The patch of forest behind Valley View Elementary provides excellent opportunities to learn about the habitat values in a forest – i.e., temperature moderation on the landscape, water retention, habitat for terrestrial amphibians, birds, small mammals, bats, deer, etc.

Wetland and terrestrial amphibian habitat (See F2 and F3): The small wetland in the triangle of forest behind Valley View Elementary provides an opportunity for students to learn about wetland habitat. The moist, cool habitat in this area also provides good foraging and refuge habitat for adult life stages of amphibians.

Woody debris on forest floor and nurse stumps (See F3 and F7): There are several habitat features scattered throughout the forest which includes habitat stumps, woody debris on the forest floor, and nurse stumps. One good example of a nurse stump can be found in the treed playing area behind Valley View Elementary.

Wildlife trees (See F8): There are a few examples throughout the forest of cavity nesting holes in some of the larger Bigleaf maple and Douglas fir trees as well as the trembling aspen trees. Students can go on a search throughout the area to look for any new signs of cavity nesting. If any woodpeckers are heard in the areas, they can be observed making the primary cavities in trees that later become habitat for secondary cavity nesters.

Habitat Enhancement Opportunities:

The following list provides opportunities for habitat enhancement on the subject property. E-Series codes refer to the general description of this type of impact/issue and the general prescription for enhancing these types of areas which is provided in the Habitat Enhancement Opportunities section of this report (Table 7 in Appendix B).

Removal of invasive species (See E5): Overall, occurrences of invasive species on this property are considered low to moderate. However, some more dense patches of Himalayan blackberry include a thicket along the southern edge of the Valley View Park playing field (Photo 10) and within the isolated patches of vegetation around the Isfeld parking lot (including the trembling aspen grove; Photo 11). Blackberry is outcompeting new growth from trees and native shrubs in these patches, and it would be beneficial to mechanically remove these thickets to restore native vegetation in these areas. Removal will require a staged, repeated approach over several years to be successful.

Trampled forest (See E1): There is one patch of trampled forest behind Valley View Elementary (Photo 12). Tree roots are exposed and there is a lack of any understory vegetation or succession of trees in this area of the forest. It is important, and valuable, to continue to allow students to play and learn in this forested area. However, some management of this area may be needed to ensure that the trees survive into the future.

Photos 10 and 11. Himalayan blackberry thicket along the southern edge of the Valley View field (left) and isolated patches of blackberry within the vegetated areas around the Isfeld parking lot (right).

Photo 12. Trampled forest behind Valley View Elementary.

Legend

- Invasive Species
- Ecological Point of Interest
- Enhancement Opportunities Point
- Ditch
- Stream
- Wetland
- Parcels
- SD71 Boundaries
- Environmentally Sensitive Area
- Enhancement Opportunities
- Streamside Protection and Enhancement Area

Project: School District 71: Comox Valley Schools Environmental Inventory		Page 7 of 24
Site: Mark R. Isfeld Senior Secondary and Valley View Elementary	Date: March 15th, 2021 Author: C.O'Neill Projection: UTM NAD83 Zn10N	Note: All linework approximate. Not for use or reproduction without consent from the author. current ENVIRONMENTAL

3.8 AIRPORT ELEMENTARY

Civic address:	1475 Salmonberry Drive, Lazo, BC		
PID:	027-190-544	**Lot size:**	8.97 ac (3.63 ha)
Conservation Value	Medium		

Key Inventory Results:

- The conservation value ranking of this property is medium.
- No streams, ditches, or wetlands on subject property.
- Low-lying wetted area 15-70 m west of subject property.
- Second growth (55-70 years old) mixed coniferous and deciduous forest in western portion of property. Trembling aspen observed in forest (rare along BC coast).
- Forest is connected to larger forested area to the northwest – minor wildlife corridor values.
- Trails through forest have resulted in severe trampling and exposed roots. Potential loss of trees.
- Lack of woody debris on forest floor; several wildlife trees and cavity nests observed.
- Invasive Scotch broom, English ivy, and Cutleaf blackberry throughout forest and along field edges.
- No ecosystems or species at risk identified.
- Outdoor education opportunities:
  - Wildlife trees.
  - Wildlife corridor.
- Enhancement opportunities:
  - Removal of invasive species.
  - Management of trampled forest including native species planting.

General Description of Property:

The majority of this school property is composed of lawn/fields with minimal other vegetation types. There is a second growth mixed deciduous/coniferous forest on the western edge of the school property, with the eastern edge of the forest extending approximately 30 m into the subject property boundary. The eastern edge of the subject property is bordered by a row of young Douglas fir trees, along Salmonberry Drive. A second row of Douglas firs has been planted to the immediate south of the school, possibly to mitigate exposure to intense sun. There are several patches of invasive species in the western part of the property including Scotch broom, English ivy, and cut leaf blackberry.

Photos 1 and 2: Planted row of Douglas fir trees visible to the south of the school (left) and main playing field (right).

Environmentally Sensitive Areas:

Aquatic Habitat	

	There are no streams, ditches, or wetlands on the subject property. There is a low-lying wetted area in the forest between 15-70 m from the western property boundary. Species in this wet area include slough sedge, salmonberry, creeping buttercup, red-osier dogwood, red alder, false lily-of-the-valley, and herb Robert.
Terrestrial Habitat	**Forest:** The western portion of the property is composed of a second growth mixed coniferous and deciduous forest approximately 55-70 years old. The dominant tree species in the forest include Douglas fir, Western red cedar, Grand fir, Sitka spruce, and black cottonwood. The forest floor is very open with minimal understory vegetation in the portion of the forest on school property (Photos 3-5). Tree roots have been exposed (Photos 3 and 5), which has likely been caused by pedestrian trampling. Several trails have been created within this forest. Understory species that are present within and along the eastern edge of the forest include oceanspray, Pacific crabapple, dull Oregon grape, bracken fern, snowberry, Nootka rose, baldhip rose, thimbleberry, red huckleberry, and trailing blackberry. Several trembling aspens were noted along the eastern edge of the forest. Trembling aspen are considered a high value wildlife tree. These trees are known for their ability to sprout from root suckers and form clones of many individual stems. One tree can be very long lived by continually sprouting new stems. When older stems start to rot and die off, they become excellent habitat for cavity nesting birds and other wildlife. While common in other parts of BC and Canada, this species is relatively rare along the coast of BC. There is a lack of coarse woody debris on the forest floor, however several cut logs were observed on the ground just outside of the school property. These could potentially be spread out on the forest floor to provide wildlife habitat (see habitat enhancement opportunities below). There is a cluster of large boulders in the northwest corner of the subject property.  **Photos 3 and 4: Typical forest on the subject property (left) and one of the paths in the forest (right).**  **Photo 5. Cluster of boulders in northwest corner of subject property (in forest).**
Wildlife Habitat Features	**Wildlife trees**: There are several Sitka spruce trees within the forested area that may provide nesting habitat for species such as creepers, bats, and small mammals (Photo 6 and 7). A cavity nest in a tree in the

	northwestern corner of the subject property was also observed. As mentioned, the trembling aspen trees on the property can become important wildlife trees over time. **Wildlife corridor:** The forested area on the subject property may serve as a minor wildlife corridor since it is connected to a larger forested area to the northwest.   **Photo 6 (left). Sitka spruce tree – bark may provide nesting habitat for birds.** **Photo 7 (right). Cavity nest in tree (in approximate center of photo).**
Species at Risk	There are no known ecosystems or species at risk on the subject property according to CDC iMap. There are also no known bald eagle or great blue heron nests within 200 m of the subject property. These results were confirmed during the site visit, with no ecosystems/species at risk or raptor/heron nests observed on the subject property.

Outdoor Education Opportunities:

Learning opportunities and ecological points of interest on or near the subject property are provided in the following list. F-Series codes refer to the general description of these habitats and their ecological importance which is provided in the Ecological Points of Interest section of this report (Table 6 in Appendix A).

Wildlife trees (See F8): As described above, some of the trees in the forested area may provide habitat for nesting birds, roosting bats, and refuge for small mammals.

Wildlife corridor (See F6): The forest on the subject property is connected to a larger forest network to the northwest and as such, it may function as a minor wildlife corridor.

Habitat Enhancement Opportunities:

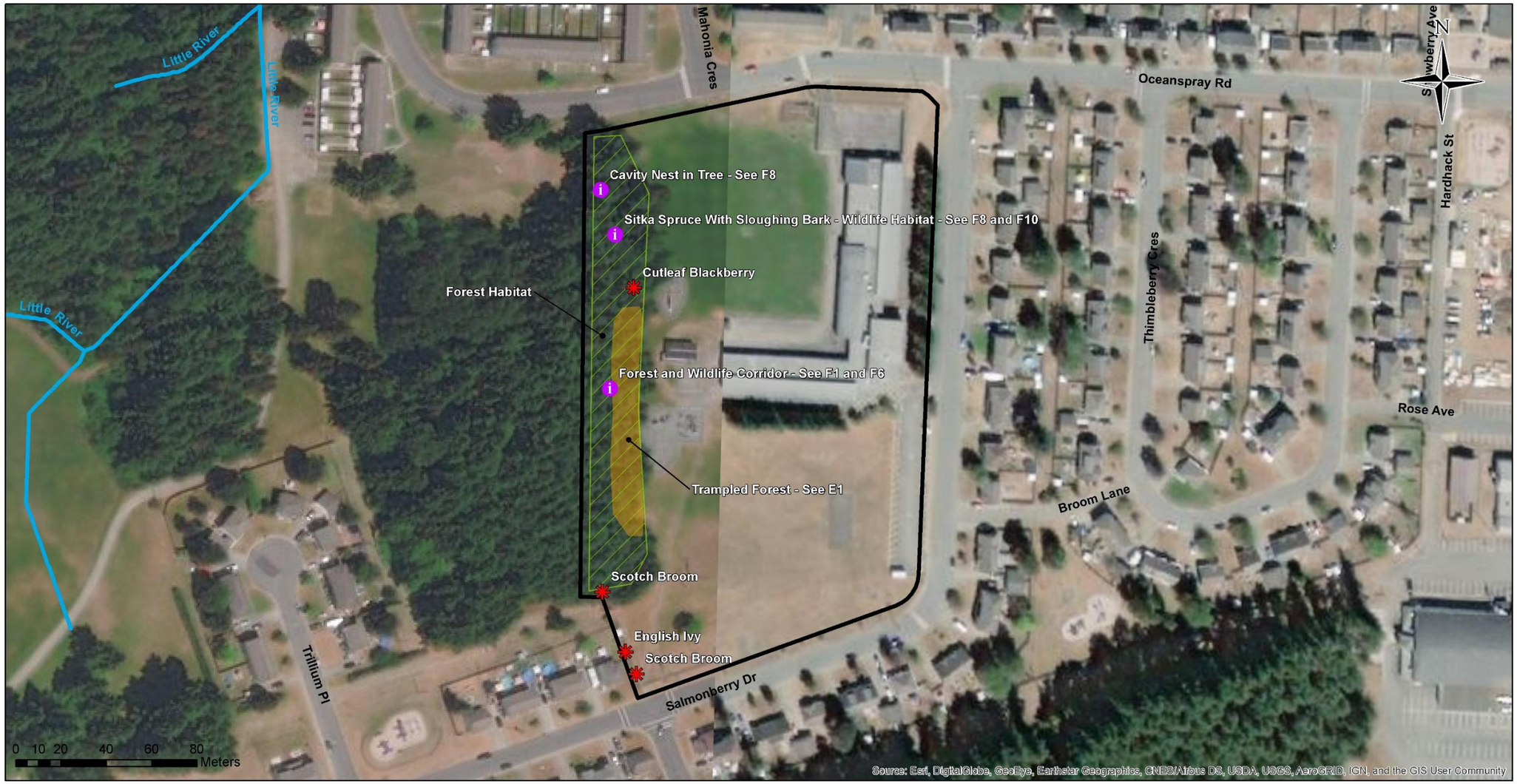
The following list provides opportunities for habitat enhancement on the subject property. E-Series codes refer to the general description of this type of impact/issue and the general prescription for enhancing these types of areas which is provided in the Habitat Enhancement Opportunities section of this report (Table 7 in Appendix B).

Invasive species removal (See E5): There were several patches of invasive species observed on the subject property, including Scotch broom, English ivy, and cut leaf blackberry (Photos 8-10). We recommend that these species be removed. These species are primarily present along the western side of the subject property, along the fence line and the forest edge.

Severe trampling of forest (See E1): There is also an opportunity to plant native species in the forested area to promote successional processes. Native species that could be planted include oceanspray, snowberry, Nootka rose, baldhip rose, and dull Oregon grape. These species are already present within the forest and are adapted to the local conditions. Additional enhancement opportunities in the forest include the addition of coarse woody debris to the forest floor and fencing off the planted areas with split-rail fencing to preserve tree roots and allow for understory growth.

Photo 8 (left). Scotch broom patch on forest edge, in southwestern portion of property.
Photo 9 (right). Cutleaf blackberry on eastern edge of forest.

Photo 10. Exposed tree roots in forest due to trampling.



Legend

- Invasive Species
- Ecological Point of Interest
- Enhancement Opportunities Point
- Ditch
- Stream
- Wetland
- Parcels
- SD71 Boundaries
- Environmentally Sensitive Area
- Enhancement Opportunities
- Streamside Protection and Enhancement Area

Project: School District 71: Comox Valley Schools Environmental Inventory		Page 8 of 24
Site: Airport Elementary	Date: March 15th, 2021 Author: C.O'Neill Projection: UTM NAD83 Zn10N	Note: All linework approximate. Not for use or reproduction without consent from the author. current ENVIRONMENTAL

3.9 HIGHLAND SECONDARY

Civic address:	750 Pritchard Rd, Comox, BC		
PID:	004-599-934	**Lot size:**	6.16 hectares
Conservation Value	High		

Key Inventory Results:

- The conservation value ranking of this property is high.
- One ditch (Ditch 2) on subject property that originates in man-made depression behind school. Likely flows into ditch along Guthrie Road (Ditch 1) during heavy rainfall events. Ditch 1 contributes flow to Brooklyn Creek (fish bearing).
- Ditch 2 allows for water infiltration and retention and minimizes stormwater runoff to Brooklyn Creek.
- Several patches of Douglas fir forest (20% of subject property)
  - Provides valuable wildlife habitat and may serve as wildlife corridor between nearby Northeast Woods.
- Trembling aspen grove in northern portion of property connected to Ditch 2 (rare along coast of BC).
- Invasive Himalayan blackberry and Scotch broom on subject property.
- Wildlife features in forested areas including habitat stumps, woody debris on forest floor, trembling aspen trees, and cavity nesting holes in Douglas fir trees.
- No ecosystems or species at risk identified.
- Outdoor education opportunities:
  - Forest.
  - Woody debris and nurse stumps.
  - Wildlife trees.
  - Wildlife corridor.
- Enhancement opportunities:
  - Removal of invasive species.

General Description of Property:

Highland Secondary consists of one main school building closer to Pritchard Road with several patches of intact forest surrounding the school and playing fields. Forested areas cover approximately 20% of the landscape at Highland Secondary.

Photo 1. Front of school building with forest visible in the distance.

Environmentally Sensitive Areas:

Aquatic Habitat	Highland Secondary is in the Brooklyn Creek watershed – the mainstem of Brooklyn Creek crosses Guthrie Road approximately 380 m West of Highland Secondary at Salish Park. Brooklyn Creek is fish bearing and supports known populations of coho salmon, chum salmon, and cutthroat trout. There is a roadside ditch that runs along the north side of Guthrie Road up to a point adjacent to the school (Ditch 1). There is also an ephemeral drainage (Ditch 2) that crosses the school property and connects into Ditch 1 during high flow events.

Ditch 1: As described above, Ditch 1 runs along the north side of Guthrie Road adjacent to the school property. The gradient of this ditch is fairly steep at approximately 8%, and this ditch appears to have little to no flow for most of the year judging by the size of culverts in driveway crossings (400 mm or less) and the grass-dominated bottom of the ditch (Photo 3). However, this ditch is still important as it delivers flows and nutrients to Brooklyn Creek downstream. Ditch 1 has a prescribed SPEA of 2 m.

Ditch 2: Ditch 2 originates in a man-made depression/trench at the edge of the field behind the school (Photos 4 and 5). Vegetation in this wet depression consists of trembling aspen, Nootka rose, hardhack, and what appears to be lodgepole pine (likely planted). There are a few Douglas fir and western red cedar trees as well. Water appears to hold in this depression, isolated from watercourses, however, there is a shallow depression in the grass between fields that gently slopes towards Ditch 1 which would act as an overflow channel during heavy rainfall events. While this ditch is not fish bearing (ephemeral nature and seasonality preclude viable habitat), this feature may sometimes supply flow and nutrients to Ditch 1 and Brooklyn Creek downstream. Ditch 2 has a prescribed SPEA of 2 m.

More importantly, this feature is helping to retain water on the land and facilitate infiltration back to the ground, especially during the rainy winter months. This helps to moderate the effects of increased stormwater runoff in an urban landscape. Brooklyn Creek is known to be particularly impacted by increased rates of runoff over developed areas which has led to erosion, habitat degradation, and property flooding in the watershed.

Photos 2 and 3. Ditch 1 culvert under school driveway (left) and view looking down the hill towards Brooklyn Creek showing the ephemeral nature of Ditch 1.

	  **Photos 4 and 5. Ditch 2 overflow channel (left) with the deeper wet depression in the background, and vegetation in the wet depression (right).**
Terrestrial Habitat	**Douglas fir forest:** There are several patches of forest around the main building at Highland Secondary as well as a forested corridor along the south side of the playing field. Overall, the forested areas cover approximately 20% of the landscape at Highland Secondary. The dominant tree species in the forest (and nearly the only tree species) is Douglas fir, all of a similar age class (~ 65-70 years old). There are also some isolated patches of Western red cedar and lodgepole pine. Understory vegetation consists of salal, red huckleberry, and dull Oregon grape in moderate densities. There are some well-defined paths throughout the forested areas, with little to no sign of trampled forest outside of the pathways. There is also a good density of woody debris on the forest floor that appears to have been placed there purposefully when trees or limbs have been cut. Deer droppings were observed along some of the pathways in the forest. The forested areas on the subject property are in proximity but not directly contiguous with the large intact forest of the Northeast Woods nature park, therefore some animals like deer may move freely between these areas. The forest on the subject property also provides foraging and nesting habitat for birds, habitat for terrestrial amphibians, and potential habitat for bats. Being located within the Brooklyn Creek watershed, these forested areas also act as natural "sponges" that absorb runoff water into the landscape and help attenuate storm flows. **Trembling aspen grove:** There is a small stand of trembling aspen trees along the edge of the basketball court in the northern portion of the property which also connects to the wet depression in Ditch 2. Trembling aspen are considered a high value wildlife tree. These trees are known for their ability to sprout from root suckers and form clones of many individual stems. One tree can be very long lived by continually sprouting new stems. When older stems start to rot and die off, they become excellent habitat for cavity nesting birds and other wildlife. While common in other parts of BC and Canada, this species is relatively rare along the coast of BC. Some of the understory of this grove is overgrown with Himalayan blackberry. Blackberry is competing with the trembling aspen for light (for new shoots) and nutrients, and it would be beneficial to remove the blackberry thicket in this area.


Photos 6 and 7. Douglas fir forest on the subject property.


Photos 8 and 9. Trembling aspen grove on the subject property by the basketball court.

Wildlife Habitat Features	There are several wildlife features scattered throughout the forest which include habitat stumps, woody debris on the forest floor, and cavity nesting holes in some of the larger Douglas fir trees as well as the valued trembling aspen trees.
Species at Risk	There are no known ecosystems or species at risk on the subject property according to CDC iMap. There are also no known bald eagle or great blue heron nests within 200 m of the subject property. These results were confirmed during the site visit, with no ecosystems/species at risk or raptor/heron nests observed on the subject property.

Outdoor Education Opportunities:

Learning opportunities and ecological points of interest on or near the subject property are provided in the following list. F-Series codes refer to the general description of these habitats and their ecological importance which is provided in the Ecological Points of Interest section of this report (Table 6 in Appendix A).

Forest Habitat (See F1): The patches of forest surrounding Highland Secondary provides opportunities to learn about the habitat values in a forest – i.e., temperature moderation on the landscape, water retention, habitat for terrestrial amphibians, birds, small mammals, bats, deer, etc.

Woody debris on forest floor and nurse stumps (See F3 and F7): There are several habitat features scattered throughout the forest which includes habitat stumps, woody debris on the forest floor, and nurse stumps.

Wildlife trees (See F8): There are a few examples throughout the forest of cavity nesting holes in some of the larger Douglas fir trees as well as the trembling aspen trees. Students can go on a search throughout the area to look for any new signs of cavity nesting. If any woodpeckers are heard in the areas, they can be observed making the primary cavities in trees that later become habitat for secondary cavity nesters.

Habitat Enhancement Opportunities:

The following list provides opportunities for habitat enhancement on the subject property. E-Series codes refer to the general description of this type of impact/issue and the general prescription for enhancing these types of areas which is provided in the Habitat Enhancement Opportunities section of this report (Table 7 in Appendix B).

Removal of invasive species (See E5): Overall occurrences of invasive species on this property are considered low to moderate. However, there are denser patches of Himalayan blackberry, including a thicket along the northern edge of the parking lot (Photo 10); there is Scotch broom at this location as well. There is another patch of blackberry within the trembling aspen grove as well. Blackberry is outcompeting new growth from trees and native shrubs in these patches, and it would be beneficial to mechanically remove these thickets to restore native vegetation in these areas. Removal will require a staged approach over several years to be successful. It appears as though some recent blackberry removal has occurred along the parking lot (Photo 11).


Photos 10 and 11. Himalayan blackberry growing in the trembling aspen grove (left) and along the northern edge of the basketball court and parking lot (right).

Legend

- Invasive Species
- Ecological Point of Interest
- Enhancement Opportunities Point
- Ditch
- Stream
- Wetland
- Parcels
- SD71 Boundaries
- Environmentally Sensitive Area
- Enhancement Opportunities
- Streamside Protection and Enhancement Area

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	Note: All linework approximate. Not for use or reproduction without consent from the author.
	current ENVIRONMENTAL

3.10 BROOKLYN ELEMENTARY

Civic address:	1290 Guthrie Rd, Comox, BC		
PID:	027-071-448	**Lot size:**	2.71
Conservation Value	Nil		

Key Inventory Results:

- The conservation value ranking of this property is nil.
- Located within Queen's Ditch watershed but no connected ditches or streams on the subject property.
- Little to no forest on subject property – adjacent to forest to east and small forested patch to west (both on municipally-owned land).
- Small portion of forested area to west used for recess and play area – showing negative effects of trampling.
- Dense thicket of invasive Himalayan blackberry and Scotch broom along edge of forest adjacent to school playing fields (within property boundaries).
- Cut and managed danger trees along edge of forest adjacent to school playing fields (within property boundaries) – valuable wildlife trees.
- Wildlife features in forested areas (off subject property) including habitat stumps, woody debris on forest floor, and nurse stumps.
- No ecosystems or species at risk identified.
- Outdoor education opportunities:
  - Forest (forested areas to east and west of subject property).
  - Wildlife trees.
- Enhancement opportunities:
  - Removal of invasive species.
  - Management of trampled forest.

General Description of Property:

Brooklyn Elementary is a relatively new school site located on the edge of a large second growth forest. The school property consists of a main building located beside the road and a playing field in the back with a strip of vegetation around the perimeter of the field. There is a small, treed area that is used for recess and playing on the west side of the property that is off of the Brooklyn Elementary property.

Photo 1 (left). Front view of the school looking west.
Photo 2 (right). Front view of the school looking east at the border of the forest.

Environmentally Sensitive Areas:

Aquatic Habitat	Brooklyn Elementary is located on a height of land within the Queen's Ditch watershed. Across Guthrie Road from the school, there is a roadside ditch that connects into Queen's Ditch. However, there are no ditches or aquatic habitat on the subject property.

Terrestrial Habitat	**Forest surrounding the school property:** There is little to no forest on the subject property itself, however, this school is immediately adjacent to a second growth forest to the east (Photos 3 and 4). There is also a patch of forest to the west of the property on the Town of Comox Public Works yard. Both parcels are owned by the municipality; it is recommended that options be considered to formally integrate access to these forested areas to secure forest habitat for valuable outdoor learning opportunities for years to come. A small portion of the forested area to the west is already being used as a recess and play area adjacent to the parking lot. **Dense blackberry and Scotch broom thicket:** Dominant species in the forest east and west of the school property includes Douglas fir, western red cedar, and western hemlock as well as sword fern, salal, dull Oregon grape and red huckleberry in the understory. Along the edge of the forest immediately adjacent to the school playing fields (within the property boundaries), there is a dense thicket of Himalayan blackberry and Scotch broom (Photos 5 and 6). If left unmanaged, this patch will outcompete any other native shrubs or trees that try to grow in that areas and will continue to occlude native vegetation and limit the ecological and esthetic value of the area.   **Photos 3 and 4. Forest to the east of the school property.**   **Photos 5 and 6. Dense Himalayan blackberry and Scotch broom thicket along the edge of the forest and school playing field.**
Wildlife Habitat Features	**Wildlife trees:** There are several wildlife trees along the edge of the forest that have obvious signs of cavity nesters. Of note, these trees appear to have been cut and managed as danger trees; left standing as snags to provide excellent wildlife habitat value over the long-term.

	Other wildlife features in the forest: There are many other wildlife features scattered throughout the forest including habitat stumps, large woody debris on the forest floor, nurse stumps, and healthy forest successional processes.  **Photo 7. Wildlife trees at the edge of the forest.**
Species at Risk	There are no known ecosystems or species at risk on the subject property according to CDC iMap. There are also no known bald eagle or great blue heron nests within 200 m of the subject property. These results were confirmed during the site visit, with no ecosystems/species at risk or raptor/heron nests observed on the subject property.

Outdoor Education Opportunities:

Learning opportunities and ecological points of interest on or near the subject property are provided in the following list. F-Series codes refer to the general description of these habitats and their ecological importance which is provided in the Ecological Points of Interest section of this report (Table 6 in Appendix A).

Forest habitat (See F1): As described above, the forests adjacent to the eastern and western school properties are second growth forests with ample opportunities for outdoor learning. Topics can include forest succession, temperature and climate moderation, nurse logs and stumps, bird nesting in the different layers of canopy, wildlife/snag trees, bat roosting, terrestrial amphibian habitat, etc.

Wildlife trees (See F8): As described above, there are several wildlife trees along the eastern forest edge where there are signs of primary and secondary cavity nesters. Students can monitor these trees to identify species that are using them (primary or secondary cavity nesters?).

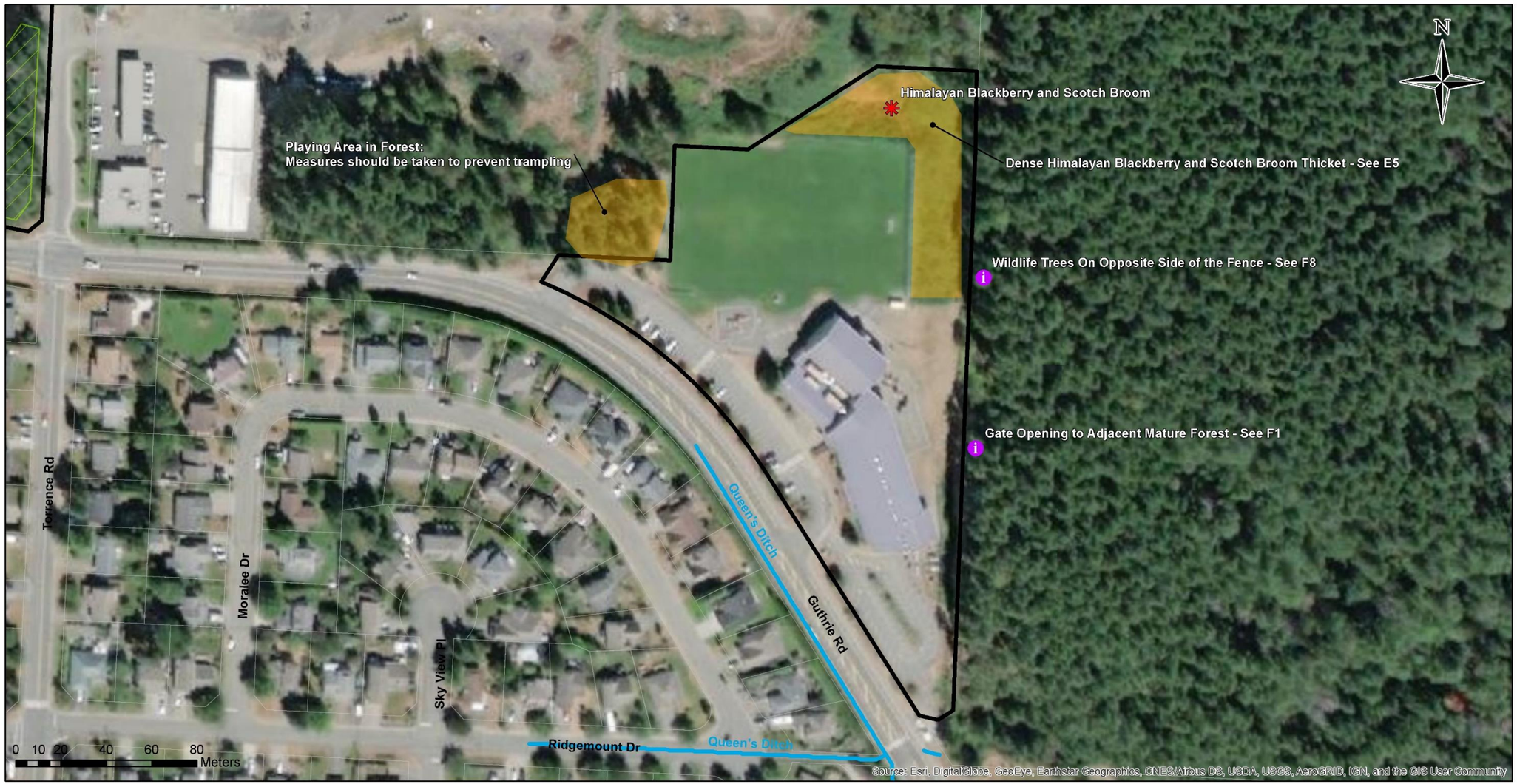
Habitat Enhancement Opportunities:

The following list provides opportunities for habitat enhancement on the subject property. E-Series codes refer to the general description of this type of impact/issue and the general prescription for enhancing these types of areas which is provided in the Habitat Enhancement Opportunities section of this report (Table 7 in Appendix B).

Invasive species removal (See E5): The biggest recommendation for this site is the management of Himalayan blackberry and Scotch broom in the areas around the playing field. These patches will outcompete other native shrubs or trees that try to grow in this area and will continue to be a "monocrop" which limits biodiversity and impairs ecological function. This dense thicket requires mechanical removal and a multi staged approach to keep these plants under control. A vegetation plan for this area should be established and implemented upon removal of the invasive plants.

Trampled forest (See E1): It should be noted that the portion of forest to the west that is being used as a play area is showing negative effects of trampling. There are patches of shrubs and young trees in clusters around the trees, however, logs should be placed pre-emptively around these remaining vegetation clusters to signal "no access areas" and prevent further encroachment and damage around the base of the trees.

Photo 8. Forested playing area where preventative measures should be done to protect the existing clusters of shrubs and young trees.



Legend

- Invasive Species
- Ecological Point of Interest
- Enhancement Opportunities Point
- Ditch
- Stream
- Wetland
- Parcels
- SD71 Boundaries
- Environmentally Sensitive Area
- Enhancement Opportunities
- Streamside Protection and Enhancement Area

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Site: Brooklyn Elementary	Date: March 15th, 2021 Author: C.O'Neill Projection: UTM NAD83 Zn10N	Note: All linework approximate. Not for use or reproduction without consent from the author. current ENVIRONMENTAL

3.11 ECOLE ROBB ROAD

Civic address:	1909 Robb Ave, Comox, BC		
PID:	006-134-041 and 006-134-050	**Lot size:**	2 parcels of land that total 3.32 hectares
Conservation Value	Low		

Key Inventory Results:

- The conservation value ranking of this property is low.
- Ditch 1 along southern perimeter of playing field on subject property. Non-fish bearing and unlikely to provide habitat for breeding amphibians but contributes flow to fish habitat in Golf Course Creek downstream.
- Vegetated areas on subject property include landscaped trees near main building, native trees along perimeter of field, and a patch of black cottonwood and Douglas fir trees surrounding bald eagle nest tree in southeast corner of lot.
- "Restoration area" around nest tree with planted trees and shrubs.
- Eagle nest (BAEA-106-370) in black cottonwood tree in southeast corner of lot.
- No ecosystems or species at risk identified.
- Outdoor education opportunities:
  - Eagle nest monitoring.
- Enhancement opportunities:
  - Enhance vegetation buffer around eagle nest tree – install split rail fencing around this area to protect it.

General Description of Property:

Ecole Robb Road consists of a main building close to the road, with a large playing field behind the school. There is a strip of vegetation around the perimeter of the field, and a patch of shrubs along a ditch at the southern boundary. Of note on this property is the bald eagle nest located in the southeast corner of the lot.

Photos 1 and 2: Front of school (left) showing a row of ornamental trees and a view of the back field (right).

Environmentally Sensitive Areas:

Aquatic Habitat	**Ditch 1:** There is one ditch that runs along the southern perimeter of the playing field on the subject lot (Photos 3 and 4). This ditch is stagnant and generally pools water as opposed to conveying it offsite. During high water levels, this ditch does flow west to east and connects into a small culvert/storm drainage along the pathway to Douglas Street (Photos 5 and 6). There are no visible ditches along Douglas Street, however there are a few catch basins visible at the end of the street. The nearest daylighted stream or ditch to the subject property is Golf Course Creek, which originates in a pond on the golf course approximately 350 m from the school property.

With such a long distance piped underground, Ditch 1 on the subject property is considered non-fish bearing. This ditch is also unlikely to support amphibian breeding as it is currently enclosed in a blackberry and salmonberry thicket with little sunlight exposure. However, despite the low habitat sensitivity of this ditch, it is still important to maintain a vegetated buffer to help attenuate flows in the landscape and prevent flooding downstream. Ditch 1 also delivers flows and nutrients to fish habitat downstream in Golf Course Creek. Ditch 1 has a prescribed SPEA of 2 m.

Vegetation surrounding the ditch consists of black cottonwood, red alder, and a dense thicket of Himalayan blackberry. There are also some salmonberry plants and Nootka rose in the thicket. Substrates are muddy fines.

Photos 3 and 4: Ditch 1 along the southern edge of the school property with dense blackberry along most of its length (images were taken at the only 2 accessible spots along the ditch).

Photos 5 and 6: Ditch 1 just off the subject property to the west (left) and Ditch 1 further down the walking path towards Douglas Street where the ditch enters an underground storm drain network (right).

Terrestrial Habitat	**Vegetation:** Terrestrial habitat on the subject property is limited to landscaped trees near the main building, black cottonwood, red alder, and Douglas fir trees along the perimeter of the field, and a patch of black cottonwood and Douglas fir trees surrounding the aforementioned bald eagle nest tree in the southeast corner of the lot. There are some young Douglas fir trees and Nootka rose shrubs that have been planted in the new "restoration area" surrounding the tree. The cottonwood and Douglas fir trees on the property provide valuable perching and nesting trees for birds, as well as potential bat roosting. With grass surrounding most of the trees, there is limited terrestrial habitat on the ground. There are some pieces of logs and old tree trunks that have been left on the ground (purposefully) which do provide some potential habitat and nutrients to the soil.   **Photos 7 and 8: Row of trees along the western property boundary (left) and cluster of trees and bald eagle nest in the southeastern corner of the property (right).**   **Photos 9 and 10: Douglas fir trees along the eastern property boundary (left) and woody debris left on the ground along the eastern property boundary that provide some habitat and nutrients to the soil.**
Wildlife Habitat Features	**Eagle nest tree:** There is an eagle nest tree (a large black cottonwood tree) located in the southeast corner of the subject property (Photos 11 to 14). This nest reference is BAEA-106-370 in the Wildlife Tree Stewardship Atlas (WiTS)[23]. The site visit for this property was conducted in March 2021 and at that time there were no signs of the nest being active for the 2021 season; no bald eagles were observed on or near the nest during the site visit, there were no wash or feathers at the base of the tree. However, it is not late enough in the breeding season to completely rule out breeding for this year.

	According to WiTS, this nest was last recorded as active in 2018 when a pair of eagles successfully bred using this nest. The nest is located 2 meters from the top of a large black cottonwood tree that is partially dead; there is one large branch that appears healthy but the portion of the trunk where the nest is located is partially dead. The nest is clearly visible from all angles of the school playing field. There is a cluster of other black cottonwood trees and some Douglas fir trees surrounding the nest tree. These trees provide important perch trees for adults and provide important habitat for juvenile eaglets to learn flying and landing behaviours. Young Douglas fir trees have been planted in the restoration area adjacent to the tree.  **Photos 11 and 12: Bald eagle nest in black cottonwood tree in the southeast corner of the school property showing the patch of vegetation around the tree (left) and a close up view of the nest (right).**
Species at Risk	There are no known ecosystems or species at risk on the subject property according to CDC iMap. There is one bald eagle nest on the subject property. Bald eagle nests are protected under the Wildlife Act and local bylaws, however bald eagles are not a species at risk in BC. There are no great blue heron nests within 200 m of the subject property. These results were confirmed during the site visit, with no ecosystems/species at risk or heron nests observed on the subject property.

Outdoor Education Opportunities:

Learning opportunities and ecological points of interest on or near the subject property are provided in the following list. F-Series codes refer to the general description of these habitats and their ecological importance which is provided in the Ecological Points of Interest section of this report (Table 6 in Appendix A).

Eagle nest monitoring: Bald eagles often have 2-3 nests that they alternate between for breeding. As such the eagle nest on the subject property may have years where it is not in use. However, it still provides an excellent learning opportunity for students.

Bald eagles are Canada's largest bird of prey, and their nests are the largest of any bird in North America. Bald eagles add to their nest every year resulting in average nest sizes of 1.5 to 2 m wide and 1 m tall. One nest was recorded to be as large

as 3 m wide and 6 m tall and estimated to be as heavy as a car! In the center of the nest, there is a small depression lined with soft feathers and vegetation where the female bald eagle lays 1-3 large eggs. Eggs incubate for approximately 1 month before hatching into chicks. From egg laying until chicks fledge (i.e., fly out of) the nest, this process usually takes about 3.5 to 4 months. As mentioned, adjacent perch trees provide important landing and viewing habitat for adult eagles and are critical for juveniles eaglets to learn landing and flying behaviour.

In the Comox Valley, the bald eagle breeding window (from courtship to chicks fledging the nest) is approximately January 1st to August 31st, with the eggs most often being laid in April or May. Students can set up a viewing scope, and watch/record the eagle activity each year in this nest to determine whether the nest is active. If active, students can watch chicks hatching, growing up in the nest, and taking their first few flights!


Photos 13 and 14: Close up of Bald Eagle nest on the subject property (left) and photo of the active nest in 2018 from the Wildlife Tree Stewardship Atlas (right).

Habitat Enhancement Opportunities:

The following list provides opportunities for habitat enhancement on the subject property. E-Series codes refer to the general description of this type of impact/issue and the general prescription for enhancing these types of areas which is provided in the Habitat Enhancement Opportunities section of this report (Table 7 in Appendix B).

Enhance vegetation buffer around eagle nest tree (See E1 and E2 for planting techniques): There is currently a native plant restoration buffer that extends approximately 20-25 m from the base of the eagle nest tree. A sign has been mounted that says: "Native Plant Recovery Area" and there are quite a few young shrubs starting to establish in this area (mostly Nootka rose). This area is on its way to recovering, however there were still obvious walking paths through the area and large gaps between the shrubs that may compromise the long-term viability of the nest tree. This area would benefit from an established barrier such as split rail fencing, or large logs placed around the perimeter of the area to help establish a visual barrier.

More planting should be done among the Nootka rose to better establish this area as a vegetated buffer. Specifically, we recommend planting 10 Douglas fir trees (spaced 4 m apart), 4 bigleaf maple (spaced 5 m apart), 20 sword fern (planted in clusters), 10 salmonberry, 10 thimbleberry and 10 snowberry (all planted in clusters of 2-3 plants of like species). All of these plants should be purchased in 1 gallon or 2 gallon sized pots from a native plant nursery. The soils will need to be de-compacted and loosened up prior to planting, and mulch/topsoil/or compost should be spread over the area to provide nutrients and help retain moisture.

Finally, if possible, the eagle nest buffer should also be expanded to as large an area as is practical to maintain schoolyard function. As an example, the Town of Comox Development Permit Area #10 – Eagle and Great Blue Heron Nesting

Sites/Perching Trees (DPA 10) stipulates a vegetated buffer of 60 m for parcels less than 1 hectare, and 100 m for parcels between 1 and 5 hectares.

Photo 15: Restoration Area sign and location where the planted area should be enhanced.

Legend

- Invasive Species
- Ecological Point of Interest
- Enhancement Opportunities Point
- Ditch
- Stream
- Wetland
- Parcels
- SD71 Boundaries
- Environmentally Sensitive Area
- Enhancement Opportunities
- Streamside Protection and Enhancement Area

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Site: Ecole Robb Road	Date: March 15th, 2021 Author: C.O'Neill Projection: UTM NAD83 Zn10N
	Note: All linework approximate. Not for use or reproduction without consent from the author.
	current ENVIRONMENTAL

3.12 ASPEN PARK ELEMENTARY

Civic address:	2250 Bolt Avenue, Comox, BC		
PID:	024-100-099	**Lot size:**	2.81
Conservation Value	Low		

Key Inventory Results:

- The conservation value ranking of this property is low.
- Isolated ditch/depression along northeast edge of playing field - not considered ecologically important habitat.
- Narrow forested strip around perimeter of school playing field. Provides nesting habitat for birds and minor forage and cover for deer and smaller animals.
- Forested strip overgrown with invasive Himalayan blackberry.
- No ecosystems or species at risk identified.
- Outdoor education opportunities:
  - Forest walk – can access forest in small area without blackberry in southeast corner of Aspen Park.
- Enhancement opportunities:
  - Removal of invasive species.

General Description of Property:

Aspen Park Elementary is located immediately adjacent to Aspen Park, a municipal park with two baseball diamonds and a large field. The school property has one main building towards the south end of the lot, a large playing field behind the school, and a strip of vegetation around the perimeter of the field. The strip of vegetation widens in the northern portion of the property which is mainly overgrown with Himalayan blackberry.

Photo 1. Front of Aspen Park Elementary.

Environmentally Sensitive Areas:

Aquatic Habitat	**Isolated ditch/depression:** There is one small (30 m long) isolated ditch/depression located along the northeast edge of the playing field (Photos 2 and 3). This depression does not flow or connect to any other ditches, and there is no outlet to this feature; water pools in this depression after heavy rain events and when the water table is high in the winter months. This isolated ditch is not connected to fish habitat nor does it provide breeding habitat for amphibians and as such is not considered ecologically important habitat.

<table>
<tr><td></td><td>  
Photos 2 and 3: Small isolated depression/ditch along the playing field (left) and a wet/muddy area at the end of this feature where a walking path begins (right)</td></tr>
<tr><td>Terrestrial Habitat</td><td>Vegetation: Terrestrial habitat on the property is limited to a strip of vegetation around the perimeter of the school playing field. Tree species within these forested strips consists of Douglas fir, red alder, black cottonwood, bigleaf maple and western hemlock. Apart from a small forest opening along the northeastern property boundary (Photo 4), all the vegetated strips are overgrown with Himalayan blackberry (Photos 5 to 9). Quite a large thicket of blackberry has established in the northern portion of the property, which is choking out some young conifers and making the forest impenetrable. The shrub layer within the forested strip along the western field boundary is also dominated by blackberry. Overall terrestrial habitat is limited to nesting habitat for birds and minor forage and cover for deer and smaller animals.
  
Photos 4 and 5: Open treed area along the northeast boundary (left) and blackberry thicket in the northern portion of the field (right)</td></tr>
</table>


Photos 6 and 7: Blackberry thicket at the northern end of the field.


Photos 8 and 9: Blackberry along pathway in the northeast corner of the lot (left) and vegetation along the western edge of the proper ty (right)

Wildlife Habitat Features	There were no wildlife features of note on this school property. There used to be a bald eagle nest tree located on this property in the northwest corner (BAEA-106-201). However, this nest tree fell sometime in the late 1990s and there are no new nests near this property. There were no significant snags or wildlife trees on the property.
Species at Risk	There are no known ecosystems or species at risk on the subject property according to CDC iMap. There are also no known bald eagle or great blue heron nests within 200 m of the subject property. These results were confirmed during the site visit, with no ecosystems/species at risk or raptor/heron nests observed on the subject property.

Outdoor Education Opportunities:

Learning opportunities and ecological points of interest on or near the subject property are provided in the following list. F-Series codes refer to the general description of these habitats and their ecological importance which is provided in the Ecological Points of Interest section of this report (Table 6 in Appendix A).

Forest habitat (See F1): The blackberry thickets around the perimeter of the property severely limit forest access on the subject property. However, there is a triangle of forest in the southeast corner of Aspen Park, at the corner of Bolt Ave. and Aspen Road, that provides opportunities for nature walks in the forest.

Photo 10. Forest in Aspen Park adjacent to Aspen Park Elementary.

Habitat Enhancement Opportunities:

The following list provides opportunities for habitat enhancement on the subject property. E-Series codes refer to the general description of this type of impact/issue and the general prescription for enhancing these types of areas which is provided in the Habitat Enhancement Opportunities section of this report (Table 7 in Appendix B).

Invasive species removal (See E5): The primary issue at this site is the dense thickets of Himalayan blackberry which are choking out young conifers and hindering forest succession. These thickets will require mechanical removal as they are very well established. A large-scale blackberry removal effort at this school would greatly benefit overall habitat quality as well as the potential interaction of students with treed areas (currently there is no access through the blackberry thicket).

Legend

- Invasive Species
- Ecological Point of Interest
- Enhancement Opportunities Point
- Ditch
- Stream
- Wetland
- Parcels
- SD71 Boundaries
- Environmentally Sensitive Area
- Enhancement Opportunities
- Streamside Protection and Enhancement Area

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Site: Aspen Park Elementary	Date: March 15th, 2021 Author: C.O'Neill Projection: UTM NAD83 Zn10N
	Note: All linework approximate. Not for use or reproduction without consent from the author.

3.13 ECOLE PUNTLEDGE PARK ELEMENTARY AND LAKE TRAIL MIDDLE SCHOOL

Civic address:	401 Willemar Avenue, Courtenay, BC (Ecole Puntledge Park Elementary), 805 Willemar Avenue, Courtenay, BC (Lake Trail Middle School)		
PID:	005-501-946	**Lot size:**	24.87 hectares
Conservation Value	Very High		

Key Inventory Results:

- The conservation value ranking of this property is very high.
- Morrison and Arden Creeks on subject property (highly valued fish streams).
- Several wetlands on subject property – some provide amphibian habitat.
- Large second-growth (~ 45-85 years old with some larger trees interspersed throughout) mixed coniferous and deciduous forest on subject property.
- Extensive trampling of understory riparian vegetation.
- Second highest bat activity recorded – large forested area and a variety of ecological features on-site.
- Invasive English holly noted in forested areas and English ivy threatening trees at 5th Ave. and Willemar Ave. corner.
- Very high biodiversity values:
  - Morrison Creek Lamprey (red listed species).
  - Coastal cutthroat trout (blue listed species).
  - Terrestrial and aquatic amphibian habitat throughout subject property.
  - CDC iMap polygon for western screech owl, *Kennicottii* subspecies (blue-listed).
  - Several bat species at risk: Townsend's big-eared bat (provincially blue-listed) detected during bat survey, high likelihood that fringed myotis (provincially blue-listed) present at this site (unconfirmed), and little brown myotis recorded at site (listed on Schedule 1 [Endangered] in the SARA; provincially yellow-listed).
  - Five provincially blue-listed bird species (Band-tailed pigeon, black swift, California gull, great blue heron, and Western screech-owl) identified at the nearby eBird hotspot.
  - Diverse forest communities.
- Contiguous with Roy Morrison Municipal Greenway (32 Acres) - wildlife corridor values.
- outdoor education opportunities:
  - Morrison and Arden Creeks.
  - Bat habitat.
  - Wildlife trees.
  - Forest and wildlife corridors.
  - Amphibian habitat.
  - Rare species.
  - History of Puntledge mill.
  - Indigenous use of plants in forest.
- Enhancement opportunities:
  - Stream restoration.
  - Riparian vegetation planting and management of trampled forest.
  - Invasive species removal.
  - Tree management in older second-growth forest.

General Description of Property:

Ecole Puntledge Park Elementary School and Lake Trail Middle School share a 24.87-hectare property that is largely forested, with school fields adjacent to the school buildings. This property is undoubtedly the highest value ecologically valued property owned by the SD71 and not surprisingly has tremendous value for outdoor educational and recreational opportunities. Importantly it is contiguous with Roy Morrison Nature Park, a ~ 12 Ha municipally-held park within the City of Courtenay. Together these two properties comprise a highly valued sanctuary for biodiversity within the City of Courtenay and Comox Valley as a whole.

Both Arden Creek and Morrison Creek flow through the subject property with the confluence between the two located in the northeast corner of the property. There are many walking trails throughout the forested area of the property; these are used extensively by both students and local residents. There are two mapped-SHIM polygons on the subject property: a coniferous old growth forest (OF:co) in the southwest corner of the property and a swamp (WN:sp) to the northwest of

Lake Trail Middle School. Two additional wetlands and one ditch have previously been identified by Current Environmental Ltd. on the subject property. Morrison and Arden Creeks are regionally highly significant watercourses known to support healthy populations of salmonids and a rare species of lamprey that is considered endemic[38] (i.e., found in no other place in the world!) to this watershed.

Photo 1 (left): Ecole Puntledge Park Elementary.
Photo 2 (right): Lake Trail Middle School.

Environmentally Sensitive Areas:

Aquatic Habitat	Morrison Creek flows across the northern portion of the subject property, ultimately flowing into the Puntledge River 600 m downstream. Arden Creek, a tributary to Morrison Creek, also flows across the school property along the edge of the school playing fields and joins Morrison Creek in the northeast corner of the school property. There are also several wetlands throughout the property: 1 SHIM-mapped wetland (WN:sp) and two wetlands mapped by Current Environmental Ltd. (CEL) in 2014. Finally, a ditch has previously been mapped by CEL along the northeast property boundary. Comox Valley Project Watershed completed the initial SHIM-based mapping of the Morrison Creek Watershed in 1999[39]. **Morrison Creek:** Morrison Creek is one of the most productive salmon streams in the Comox Valley; as an urban stream, it is regarded as one of the most unique and productive streams of its size on Vancouver Island[40], with known populations of chum salmon, pink salmon, coho salmon, chinook salmon, cutthroat trout, rainbow trout, and three-spined stickleback[41]. The Morrison Creek Streamkeepers also report Dolly Varden trout as being present in the headwaters of Morrison Creek[41]. Morrison Creek is also home to the red-listed Morrison Creek lamprey, which is a population of Western brook lamprey that only live in the Morrison Creek watershed[42] (see details in the Species at Risk section below). Pacific and western brook lamprey are also known to inhabit this system. Of critical importance, Morrison Creek has very strong, year-round flows owing to a plethora of several natural spring sources located at the base of an escarpment in the forested headwaters of this system. These flows are sustained by groundwater flows that travel slowly from Comox and Maple Creek Lakes through gravel deposits and emerge at the base of this steep drop in elevation just northeast of Bevan Road (known locally as "the Dump Road"). Low summer base flows are a common critical limiting factor of fish productivity in East Coast Vancouver Island Streams[43]. The prescribed

[38] This means it is only found in the Morrison Creek Watershed – nowhere else in the entire world!

[39] Bainbridge, G. and J. Woodland (1999). *Morrison/Arden Creek Mapping and Inventory Project, SHIM Mapping.* Project Watershed.

[40] For example: Kasabuchi, T. and J. Cragg, J (2007). *Vancouver Island Anadromous Cutthroat Trout Revitalization Program - Project Summary Report 2007*. BC Ministry of Environment. 84pp.

[41] Morrison Creek Streamkeepers (2021). Fish. Accessed from <https://morrisoncreek.org/species/fish/>

[42] Morrison Creek Streamkeepers (2021). *The Morrison Creek Lamprey*. Accessed from <https://morrisoncreek.org/lamprey/>

[43] Reid, G. et al. (2006). *Status of Fish Habitat in East Coast Vancouver Island Watersheds*. Fisheries Section, British Columbia Ministry of Environment, Lands and Parks. 14 pp.

	SPEA for Morrison Creek is 30 m – this width is wider than the RAPR-based prescribed setback. According to the Morrison Creek Lamprey Recovery Strategy, Morrison Creek and its tributaries receive a 30 m setback due to the high value of the stream and designation of the creek and tributaries as "critical habitat" for the endangered Morrison Creek lamprey[44]. Riparian cover along Morrison Creek on the subject property is dominated by red alder, Douglas fir, bigleaf maple, grand fir, black cottonwood, Pacific ninebark, and bitter cherry. Understory species along the creek include sword fern and skunk cabbage. Overall riparian cover and ecological function along Morrison Creek within this SD71 property is considered to be very good (Photo 3). Several enhancement projects have been conducted within Morrison Creek over the past decade. The Morrison Creek mainstem flows along the northern boundary to the confluence with Arden Creek near the northern-most corner of the property. There have been flooding issues reported in Embleton Creek properties during high flow events; these residential properties were constructed too close to the creek and floodplain system. Flooding issues have been recently controlled by continued management of debris jams by the stewardship group and local residents. It will continue to be an issue that needs to be managed. **Arden Creek:** Arden Creek is a smaller tributary of Morrison Creek that supports populations of coho salmon and cutthroat trout, with some populations of chum and pink salmon known to spawn in the lowermost reaches. Arden Creek also supports populations of the Morrison Creek lamprey. Arden Creek originates in forested areas adjacent to Arden Elementary School and uphill to the BC Hydro powerlines.. Flows within this stream are supplemented by a short 8" intake pipe installed in the mainstem of Morrison Creek near the corner of Embleton Crescent and Arden Road. This pipe and conveyance channel to Arden Creek are remnants of an older system constructed near the 1870s power the Comox Valley's first sawmill on the Courtenay River near the 5th St Bridge. Importantly, this pipe sustains flows in Arden Creek through the summer months as it would otherwise dry due to a lack of spring flows. The pipe intake was upgraded by the DFO Resource Restoration Unit in 2006. On the SD71 property, this creek is of very low gradient and is over-widened as a result of the relocation works completed in the 1950's and 60's to drain wetland areas for school development. excavation works. It is therefore very straight and dominated with fine substrates, deep accumulations of organic materials, and limited spawning gravels (Photo 3). This reach of the creek provides significant rearing habitat for salmonids – particularly coho and the Morrison Creek Lamprey. Multiple debris jams were noted throughout the creek (Photo 4). The prescribed SPEA for Arden Creek is 30 m (see above section on Morrison Creek). Riparian species along Arden Creek are similar to those observed along Morrison Creek. Additional riparian species observed along Arden Creek include Sitka spruce, snowberry, Nootka rose, red-osier dogwood, false lily of the valley, and twisted stalk. Several invasive species were observed in the riparian area of the creek near Ecole Puntledge Park Elementary School, including spurge laurel, English ivy, English holly, and Himalayan blackberry. Riparian habitat function along Arden Creek is generally low as a result of pronounced vegetation trampling and exposure of tree roots related to trails that are immediately adjacent to most of the channel (Photos 1,2, and 5). In addition to school children playing in the forest, a recently constructed disc golf course has contributed to these impacts. The course has been recently reconfigured to minimize impacts to riparian vegetation. Extensive riparian planting is being proposed for this area (Photo 5)[45]. Of note, the reach along the western edge of the school fields is overwhelmingly dominated by red alder resulting from historical excavation and straightening of the channel in the 1990s (Photo 3). During this work, excavated materials from the channel were sidecast immediately adjacent to the channel; these exposed

[44] National Recovery Team for Morrison Creek Lamprey (2007). *Recovery Strategy for the Morrison Creek Lamprey (Lampetra richardsoni var. marifuga) in Canada*. Species at Risk Act Recovery Strategy Series, Fisheries and Oceans Canada, Ottawa. v + 24 pp.

[45] Personal communication (2021). Jan Gemmel – President of the Morrison Creek Streamkeepers.

soils were rapidly colonized by alder – a pioneer tree species that specializes in populating exposed soils. This predominance of alder is creating large accumulations of debris in the channel as a result of their shorter life span and weak structure. The alder are also suppressing the establishment of riparian conifer species. Though alder trees are an important riparian species, conifer species provide superior riparian function due to their stronger root systems that stabilize banks, higher longevity, and more diverse habitat structure. There are walking trails immediately adjacent to the right bank of Arden Creek along the majority of the school property reach. This has resulted in vegetation loss and chronic erosion and sediment release to the channel.

There is active restoration work occurring along Arden Creek where the disc golf course is located. One of the walking trails adjacent to Arden Creek in this area has been closed and planted by Lake Trail students with assistance from the Morrison Creek Streamkeepers to stabilize the bank and minimize erosion (Photo 5). As well, additional planting and realignment of trails away (from the channel) along the reaches closer to Ecole Puntledge Park are also currently being planned. This area is critical habitat for the Morrison Creek lamprey.

Photos 1 and 2: Riparian area of Arden Creek between Ecole Puntledge Park Elementary and Arden Creek with exposed tree roots and limited understory vegetation.

Photo 3 (left). Straightened channel of Arden Creek with side casted fill material along right bank and dominance of alder trees in the riparian area.
Photo 4 (right). Debris jam in Arden Creek.

Photo 5. Portion of Arden Creek that has on-going restoration by Lake Trail students.

There are several wetlands on the school property. These have been labelled as Wetlands 1 to 4 and are described below.

Wetland 1: Wetland 1 has been previously mapped out by Current Environmental and is located in the northwestern portion of the subject property, between Morrison and Arden Creeks. Wetland 1 is a skunk cabbage and slough sedge swamp with multiple pockets that support amphibian breeding. This wetland connects with Morrison Creeks during high flow events and may provide habitat for overwintering coho salmon. Wetland 1 is wetted year-round, providing habitat for breeding amphibians.

Wetland 2: Wetland 2 is a mapped SEI wetland (swamp) and is located adjacent to the southwest corner of Lake Trail Middle school, at the toe of the slope down from the bench. A constructed drainage ditch flows to the northwest, connecting the wetland with Arden Creek during high flow events. Vegetation species present within and around the wetland include miner's lettuce, bleeding heart, herb Robert, and stinging nettle, horsetail, and English holly (Photo 6). Wetland 2 has moderate habitat sensitivity and may support amphibian breeding. The primary importance of this wetland is that it provides nutrients to Arden Creek and moderates flows, by collecting and absorbing water from the landscape during precipitation events.

Wetland 3: Wetland 3 has also been previously mapped out by Current Environmental. It is located in the forested area between the Lake Trail Middle School and Ecole Puntledge Park Elementary School fields. This wetland is likely where Arden Creek historically would have flowed prior to being straightened and re-directed. Vegetation species present in and around this wetland include red-osier dogwood, skunk cabbage, thimbleberry, Nootka rose, bigleaf maple, red alder, Pacific willow, hardhack and black cottonwood (Photo 7). Many of these species are hydrophytic but not obligative wetland species, indicating a relatively short hydroperiod. This wetland extends to the southern end of Willemar Road where it discharges into City stormwater infrastructure via a shallow straightened channel with densely colonized red-osier dogwood (Photo 8). Wetland 3 is connected to Arden Creek during high flow events, with Arden Creek flowing northeast into the wetland.

Wetland 4: Wetland 4 is connected to Arden Creek, providing nutrients and flows to the mainstem. This wetland may provide habitat for overwintering coho since it does connect to Arden Creek in the winter months. It may also provide habitat for breeding amphibians.

The mandated SPEA widths around all wetlands on this subject property are 30 m on all sides (see above comments).


Photo 6 (left). Mapped SEI wetland with horsetail (Wetland 2).
Photo 7 (right). Low-lying seasonally wetted area between the school fields (Wetland 3). Riparian area predominantly composed of red alder, skunk cabbage, and red-osier dogwood.

Photo 8. Culvert where ditch at south end of Willemar Road is connected to Wetland 3.

Terrestrial Habitat

Forest: The majority of the forested area on the subject property is composed of a second-growth (~ 45-85 years old with some larger trees interspersed throughout) mixed coniferous and deciduous forest. Tree species within the forested area include Douglas fir, balsam fir, red alder, Sitka spruce, and bigleaf maple. Understory species observed include swordfern, bleeding heart, Herb Robert, trillium, false bugbane, red elderberry, and devil's club (Photo 9). Comox Valley Nature has provided a comprehensive listing of vegetation and wildlife species noted within the Roy Morrison Park and SD71 properties: (https://comoxvalleynaturalist.bc.ca/nature-viewing-guide/6-comox-lakepuntledge-river-area/morrison-greenway-and-roy-morrison-nature-park/). There is ongoing bat monitoring along Arden Creek by CVLT as part of the BC Community Bat Program.

Site topography changes at the western property boundary; a bench/escarpment slopes upward near the western property boundary. Not surprisingly, the forest community changes in this location from a wetter mixed forest found in lower elevation areas (cedar, Sitka spruce, red alder, with salmonberry and skunk cabbage) to a community indicative of drier conditions at the crest of the slope (Douglas fir, Oregon grape, and swordfern). This bench land is cut deeply near the southern property boundary by a gully through which Arden Creek flows (Photo 10). A second growth coniferous SEI polygon populated by Douglas fir begins on the south side of the gully in the southwest corner of the subject property (Photo 11). The aforementioned disc golf course is located throughout this forest, resulting in impacted understory vegetation from trampling. Again, recent measures have been implemented to mitigate these impacts; evaluation of these measures is ongoing (Photo 11). As mentioned, a historical channel that used to divert flow from Arden Creek to a sawmill on the Courtenay River is present within this SEI polygon (Photo 12). There are multiple felled mature trees within this older second growth forest (Photo 13).

An e-bird "hotspot" was identified near the Ecole Puntledge Park Elementary School and Lake Trail Middle School property (called "Courtenay – Roy Stewart Morrison Nature Park")[46]. A total of 83 birds were identified at this hotspot. Of these, 74 are provincially yellow-listed[28], five are provincially blue-listed[29] (see Species at Risk section below), two are exotic, and two either have unknown provincial listings or are not listed. The full list of bird species identified at this hotspot is presented in Appendix E.

Bat Habitat: Results from the bat survey (Appendix D) show that Ecole Puntledge Park Elementary/Lake Trail Middle School had the highest bat species diversity (n=8), compared to a diversity of seven at Huband Park Elementary and three at the Atlas Road Property. The second highest bat activity (15.6 bat calls/hour of survey effort) was recorded at this site, after Huband Park Elementary (19.8 bat calls/hour of survey effort). There is a large mixed coniferous and deciduous forest on this subject property and adjacent to the subject property with many ecological features that provide valuable bat habitat. These include large dead and alive trees, stream and riparian habitats, and wetlands. Additionally, the subject property is near the Puntledge River and its riparian habitat, and there is a known maternal colony of Little Brown Bats within 250 m of the subject property. A California myotis and big brown bats were observed feeding at the subject property during the bat survey. The poor riparian functionality along Arden Creek where trampling had occurred provided better foraging access to the creek by the California myotis.


Photo 9 (left). Second-growth mixed deciduous and coniferous forest in western portion of property.
Photo 10 (right). Gully through which Arden Creek flows, looking south across channel toward forest.


Photo 11 (left). Second growth SEI polygon in southwest corner of subject property. Old growth stumps and second growth Douglas fir trees visible. Minimal understory due to disc golf course.
Photo 12 (right). Historical drainage channel from Arden Creek to the old sawmill located on the Courtenay River.

[46] The Cornell Lab of Ornithology (2021). eBird, Courtenay – Roy Stewart Morrison Nature Park. Accessed from <https://ebird.org/hotspot/L4447216>

<table>
<tr><td></td><td> 
Photo 13. Felled wood in second growth forest SEI polygon.</td></tr>
<tr><td>Wildlife Habitat Features</td><td>Wildlife trees: Multiple standing dead wildlife trees were observed throughout the forested area. A stand of dead red alder was observed beside the walking trail (Photo 14). One of these wildlife trees had sloughing bark which could serve as habitat for birds such as brown creepers and bat species as well. A potential owl cavity nest was observed in another wildlife tree in this stand. A second cluster of wildlife trees was observed beside the walking path. A wildlife tree with potential for owl nesting was observed on the top of the bench near the gully (Photo 15).

Wildlife corridor: There are wildlife corridors for deer and bears throughout the forested area in the western portion of the subject property. Specifically, wildlife can use the relatively intact riparian area along Morrison Creek to travel west and east to the Puntledge River. This habitat connectivity is somewhat fragmented in sections by road crossings and residential development.

  
Photo 14 (left). Stand of dead or dying red alders that may serve as wildlife trees.
Photo 15 (right). Potential owl cavity nest in dead standing tree.</td></tr>
<tr><td>Species at Risk</td><td>There are several occurrences of species and/or ecosystems at risk on or near the subject property, which are outlined in the list below:</td></tr>
</table>

1) The Morrison Creek lamprey is provincially red-listed and is listed as Endangered (Schedule 1) under the *Species at Risk Act* (SARA). The Morrison Creek lamprey is found in both Morrison and Arden Creeks.
2) The subject property is within a CDC iMap polygon for western screech owl, *Kennicottii* subspecies which is provincially blue-listed (of special concern) and is listed as Threatened (Schedule 1) under the SARA. Western screech-owl has been identified in the nearby eBird hotspot ("Courtenay – Roy Stewart Morrison Nature Park"); see point number 7 below.
3) Cutthroat trout has been observed in both Morrison and Arden Creeks and it is provincially blue-listed (not listed federally).
4) Red-legged frogs may be present on the subject property due to the wetland habitats. Red-legged frog is provincially blue listed and is listed as Special Concern (Schedule 1) under the SARA.
5) There is also a green heron polygon approximately 100 m east of the subject property according to CDC iMap. Green heron is provincially blue-listed (not listed federally).
6) Two Townsend's big-eared bats were detected during the bat survey (provincially blue-listed). Based on acoustic analysis, there is a high likelihood that fringed myotis (provincially blue-listed) were present at this site, although the results are unconfirmed[30]. Finally, little brown myotis were recorded at the subject property. Little brown myotis are provincially yellow-listed, however they are listed on Schedule 1 (Endangered) of the federal *Species at Risk Act*. Little brown myotis populations have declined quickly throughout North American due to white nose syndrome (WNS), which kills 80-100% of affected colonies[47]. It is expected that WNS will soon affect little brown myotis in BC, since WNS was detected in bats near Seattle, Washington in 2016, which was the first known case of WNS in Western North America[48]. The conservation status of little brown myotis in BC will likely be impacted if WNS begins to affect bats in BC.
7) Five provincially blue-listed bird species (Band-tailed pigeon, black swift, California gull, great blue heron, and Western screech-owl) were identified at the nearby eBird hotspot ("Courtenay – Roy Stewart Morrison Nature Park").

There are no known bald eagle or great blue heron nests within 200 m of the subject property (however a great blue heron has been observed at the nearby eBird hotspot). These results were confirmed during the site visit, with no raptor/heron nests observed on the subject property.

Outdoor Education Opportunities:

Learning opportunities and ecological points of interest on or near the subject property are provided in the following list. F-Series codes refer to the general description of these habitats and their ecological importance which is provided in the Ecological Points of Interest section of this report (Table 6 in Appendix A).

Morrison and Arden Creek (See F5 and F4): The proximity of these productive salmon streams to Ecole Puntledge Park Elementary and Lake Trail Middle School provide excellent outdoor education opportunities for learning about stream, wetland and riparian habitat, salmon habitat, Morrison Creek lamprey (pictured here), etc. A walking trail leads to an open forested area along the right bank of Morrison Creek (Photo 16). This could be a good location for students to view salmon migrating, with an opportunity to teach them about the salmon life cycle and spawning.

[47] Government of British Columbia (2021). *White Nose Syndrome*. Accessed from <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/wildlife/wildlife-health/wildlife-diseases/white-nose-syndrome>

[48] British Columbia Bat Action Team (2019). *2016-2020 Action Plan in Response to the Threat of White-nose Syndrome*. Accessed from < https://bcbats.ca/attachments/BCBat-Action-Plan.pdfChttps://bcbats.ca/attachments/BCBat-Action-Plan.pdf>

Bat habitat (See F10): Interestingly, night surveys conducted by the Cumberland Bat Collective have found that the open understory in the forest between Ecole Puntledge Park Elementary and Arden Creek provide excellent habitat for foraging bats. There is the potential to see bat activity at night when standing on the bridge over Morrison Creek.

Wildlife trees (See F8): The stand of dead and standing red alders could be a teachable moment for students to discuss different bird nest types (potential for brown creeper nesting due to sloughing bark, cavity nest for owls, etc.). Other wildlife trees noted throughout the property and adjacent Roy Morrison Municipal Park.

Forest habitat and wildlife corridors (See F1 and F6): The large section of forest on the subject property and the adjoining forest and nature trails provide excellent opportunities to learn about forest habitat.

Amphibian habitat (See F2): The cool, moist forest on the subject property is likely home to many terrestrial salamanders and adult life stages of aquatic breeding amphibians. Students can gently lift mossy logs or woody debris to look for these animals and learn about the different species present in that forest.

Rare Species: The Morrison Creek Lamprey, western screech owl, coastal cutthroat trout, and Townsend's big-eared bat.

History of the Puntledge Mill: Students can learn about the history of the mill and where water was diverted from Arden Creek.

Indigenous use of plants in forest: The intact forest and wetlands provide an opportunity to learn about indigenous uses of plant species found in these areas.

The Morrison Creek Streamkeepers are an excellent resource for information on the Morrison Creek Lamprey and all other issues related to this amazing watershed (www.morrisoncreek.org).

Photo 16. Potential location where students can watch salmon migration in Morrison Creek.

Habitat Enhancement Opportunities:

The following list provides opportunities for habitat enhancement on the subject property. E-Series codes refer to the general description of this type of impact/issue and the general prescription for enhancing these types of areas which is provided in the Habitat Enhancement Opportunities section of this report (Table 7 in Appendix B).

Stream Restoration: As mentioned, there are potential for stream and riparian habitat restoration projects currently being planned in Arden Creek. These include instream spawning gravel placements and habitat structures (riffles and woody

debris to create localized scour and mobilize accumulated fine sediments), riparian revegetation, and trail relocation projects throughout Arden Creek. Students will be invited to participate in and learn about these projects as they occur.

Trampled forest and riparian vegetation enhancement (See E1 and E2): The area beside Ecole Puntledge Park Elementary and the right bank of Arden Creek is severely trampled by students and pedestrians. It is important, and valuable, to continue to allow students to play and learn in these forested areas. However, some management of these areas is needed to ensure that they last into the future. At this particular site, there have been a number of mature trees that have turned into danger trees once their roots were completely exposed from trampling; there was no choice but to remove these trees for safety reasons, but it is unfortunate as they were right on the edge of the creek.

Past efforts have been made to re-vegetate this area, but some of the planting was unsuccessful as the ground was not de-compacted. Section E1 in the Enhancement Opportunities table (Table 7) of the report provides guidance on loosening up compacted soils and restoring trampled areas.

Invasive species removal (See E5): English holly is noted throughout forested areas – particularly so in the forest between Embleton Crescent and the Puntledge playing field. Pulling of smaller plants or cutting of larger specimens is recommended. The longer this is delayed, the more pronounced this impact will become. As well, there is a somewhat smaller population of English ivy near the corner of 5th St and Willemar Avenue that is threatening large Douglas fir trees.

Tree management in older second growth forest: Distribute coarse woody debris throughout older second growth forest in southwest corner of property. Felled trees could be cut up and spread throughout and smaller pieces chipped and used for mulch. Any trees in this area that must be topped for safety reasons should be topped at the highest safe height possible to provide wildlife tree habitat for birds and other species.

Photo 17. Trampled right bank along Arden Creek that could be planted and fenced off (critical Morrison Creek lamprey habitat).

Legend

- Invasive Species
- Ecological Point of Interest
- Enhancement Opportunities Point
- Ditch
- Stream
- Wetland
- Parcels
- SD71 Boundaries
- Environmentally Sensitive Area
- Enhancement Opportunities
- Streamside Protection and Enhancement Area

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Site: Ecole Puntledge Park Elementary and Lake Trail Middle School	Date: March 15th, 2021 Author: C.O'Neill Projection: UTM NAD83 Zn10N	Note: All linework approximate. Not for use or reproduction without consent from the author. current ENVIRONMENTAL

3.14 COURTENAY ELEMENTARY

Civic address:	1540 McPhee Ave, Courtenay, BC		
PID:	005-563-160	**Lot size:**	3.54 hectares
Conservation Value	Nil		

Key Inventory Results:

- The conservation value ranking of this property is nil.
- No streams, ditches, or wetlands on subject property.
- Minimal trees with exception of several non-native oak trees surrounding school building and planted restoration area to north of school.
- No ecosystems or species at risk identified.
- Outdoor education opportunity:
  - Urban gardening
- Enhancement opportunities:
  - Native planting for increased biodiversity.

General Description of Property:

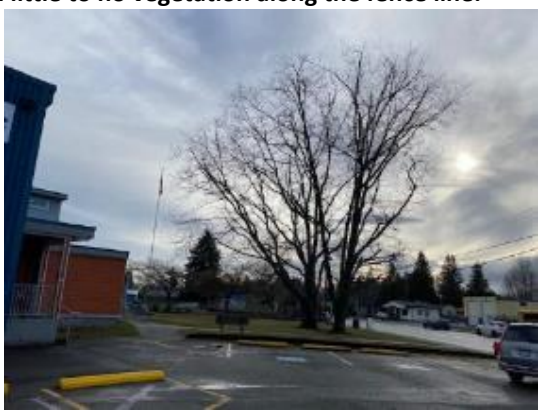
Courtenay Elementary is located on a sunny lot with very few trees. There are several oak trees (non-native varieties) around the school building and some newly planted trees on the north side of the property that appear to be of the native variety (*Quercus garryana*).

Photo 1. Front view of Courtenay Elementary from McPhee Ave. showing the large oak trees surrounding the school.

Environmentally Sensitive Areas:

Aquatic habitat	There are no ditches or aquatic habitat on the subject property.
Terrestrial habitat	**Vegetation:** There are several oak trees (a non-native variety) surrounding the school building. There is also a plant restoration area to the north of the school where a tree grove has been planted. Otherwise, there are very few trees on the subject property – the area behind the school is mostly playing fields.


Photos 2 and 3. Fields behind the school with little to no vegetation along the fence line.

Photos 4 and 5. Restoration area to the north of the school (left) and oak trees in front of the school (right).

Photo 6. Oak leaves under the large oak trees with pointed tips – part of the red oak family (native to eastern Canada).

Wildlife habitat features	There are no wildlife features of note on the subject property.

Species at Risk	There are no known ecosystems or species at risk on the subject property according to CDC iMap. There are also no known bald eagle or great blue heron nests within 200 m of the subject property. These results were confirmed during the site visit, with no ecosystems/species at risk or raptor/heron nests observed on the subject property.

Outdoor Education Opportunities:

Learning opportunities and ecological points of interest on or near the subject property are provided in the following list. F-Series codes refer to the general description of these habitats and their ecological importance which is provided in the Ecological Points of Interest section of this report (Table 6 in Appendix A).

Urban gardening: There is limited potential for outdoor learning on the subject property with no forested areas, streams, wetlands, or habitat features of not on the subject property. However, the full sun exposure of this site, combined with an urban setting and close proximity to the Comox Valley Foodbank lends this school property well to having a successful urban garden. All (or most) of the school properties in the Comox Valley have small gardens for learning, and this school already has a well-established garden as well. However, there is potential to expand this garden into a larger orchard if desired.

Photo 7. Existing garden at Courtenay Elementary.

Habitat Enhancement Opportunities:

The following list provides opportunities for habitat enhancement on the subject property. E-Series codes refer to the general description of this type of impact/issue and the general prescription for enhancing these types of areas which is provided in the Habitat Enhancement Opportunities section of this report (Table 7 in Appendix B).

New planted areas for increased biodiversity (See E1, E2, and E4): There are very few trees overall on this school site. There is the potential to plant trees and shrubs along the eastern and southern property boundaries. More trees and vegetation on this site would create bird nesting habitat and would provide this urban landscape with temperature moderating effects and more resiliency against climate change. Expanding the native plant restoration area at the to the north of the school is also a good option to consider.

Legend

- Invasive Species
- Ecological Point of Interest
- Enhancement Opportunities Point
- Ditch
- Stream
- Wetland
- Parcels
- SD71 Boundaries
- Environmentally Sensitive Area
- Enhancement Opportunities
- Streamside Protection and Enhancement Area

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	Note: All linework approximate. Not for use or reproduction without consent from the author.

3.15 ARDEN ELEMENTARY

Civic address:	3040 Lake Trail Rd, Courtenay, BC		
PID:	004-193-962 and 003-164-721	**Lot size:**	3.34 hectares
Conservation Value	Nil		

Key Inventory Results:

- The conservation value ranking of this property is nil.
- Three streams along perimeter of subject property within Arden Creek/Morrison Creek watershed:
  - Stream 1 – channelized stream that flows toward Lake Trail Road along western lot boundary and into Arden Creek. May be fish bearing.
  - Stream 2 – channelized stream that flows northeast along southeastern lot boundary, turning north through forest and flowing into Arden Creek along Lake Trail Road. May be fish bearing.
  - Arden Creek – flows northeast along south side of Lake Trail Road in front of school. Confirmed to be fish bearing.
- Few trees on subject property with exception of Douglas fir trees along southeastern and northwestern lot boundaries. Provide habitat for nesting birds.
- Invasive blackberry and Scotch broom along berm by parking lot and riparian area of Stream 1.
- Large second-growth forest surrounding subject property. Wildlife features/habitats in forested area include wetlands, nurse logs, woody debris, amphibian habitat, bat habitat, and bird nesting habitat.
- Species at risk in nearby waterbodies include:
  - Morrison Creek Lamprey (red listed species).
  - Coastal cutthroat trout (blue listed species).
- Outdoor education opportunities:
  - Forest (forested area surrounding subject property).
  - Stream and wetland habitat.
  - Rare species.
- Enhancement opportunities:
  - Maintain boardwalks over aquatic habitat.
  - Invasive species removal and native species planting.

General Description of Property:

Arden Elementary consists of a main building close to Lake Trail Road and a playing field at the back of the property. While there is little forest on the subject property, it is surrounded by a large patch of forest approximately 50-70 years of age that extends all the way back to Swanson Street (just northwest of Cumberland Road). Of note – this property is privately owned and will likely be developed for residential purposes in the future. The wetlands and stream channels adjacent to this property are afforded protection under the City of Courtenay Arden Corridor Local Area and the BC Riparian Areas Protection Regulation.

Photo 1. Front view of Arden Elementary.

Environmentally Sensitive Areas:	
Aquatic habitat	Arden Elementary is located within the Arden Creek/Morrison Creek watershed. Arden Creek supports populations of coho salmon and cutthroat trout, with some populations of pink salmon known to spawn in the lower reaches. Arden Creek also supports populations of the Morrison Creek lamprey, which is a species that only live in the Morrison Creek watershed[42] (see details in the Species at Risk section below). There are three streams located on the perimeter of the school property – these streams are described in further detail below. It is not clear whether these streams are located within the Arden School property; as such they have been detailed here. **Stream 1:** Stream 1 is straightened and flows from a highpoint at the southern corner of the property (Photo 4) towards Lake Trail Road, following the western lot boundary. The stream is just outside of the fence and appears to have been created when the school playing fields were originally created (Photos 2 and 3). Although this aquatic feature looks like a ditch, it is being classified as a channelized stream as it appears to have natural headwaters that seep from the surrounding wet forest. Stream 1 flows through a buried 300 mm wide (approx.) culvert at the road shoulder just before reaching Arden Creek that flows along the south side of Lake Trail Road. Stream 1 has a prescribed SPEA of 30 m as a result of the Critical Habitat designation for the Morrison Creek Lamprey and City of Courtenay Arden Corridor Local Area plan. Stream 1 had significant flows at the time of the site visit in January 2021. Fish presence/absence trapping was not done in Stream 1 as there were no areas deep enough to fully submerge the traps. However, with its generally low gradient and direct connection to Arden Creek (even at this straightened section), fish presence (coho salmon and cutthroat trout) is very likely during the winter months. Higher flow velocities and a lack of habitat complexity indicate that the presence of Morrison Creek lamprey is unlikely. This stream dries during summer months. The riparian area of Stream 1 consists of a Douglas fir/red alder forest on the left bank and a row of young red alder within the channel/on the right bank. At the front of the property beside the parking lot, there is a berm on the right bank of Stream 1 that is overgrown with invasive Himalayan blackberry. **Stream 2:** Stream 2 is also a straightened channel that originates at the same highpoint in the southern corner of the property but flows in a different direction than Stream 1. Stream 2 flows to the northeast along the back property boundary, then turns north through the forest adjacent the property where it joins Arden Creek near Lake Trail Road. Like Stream 1, Stream 2 is being classified as a channelized stream as it appears to have natural headwaters that seep from the surrounding wet forest. Stream 2 appears to have been created when the school playing fields were originally created. Stream 2 has a prescribed SPEA of 30 m (see above). Stream 2 had significant flows at the time of the site visit in January 2021 (Photos 6 and 7). Fish presence/absence trapping was not done in Stream 2 as there were no areas deep enough to fully submerge the traps. However, much like Stream 1, with its generally low gradient and direct connection to Arden Creek (even at this straightened section), fish presence (coho salmon and cutthroat trout) is likely during the winter months; habitat suitability for the Morrison Creek lamprey is low as well. This stream dries during summer months. Riparian vegetation along Stream 2 consists of Douglas fir, red alder, Nootka rose, sword fern, and salmonberry. Stream 2 widens out into long pools once it turns north towards Arden Creek. **Arden Creek:** A main tributary to Arden Creek runs along the south side of Lake Trail Road in front of the school property (Photos 8-10). The stream is highly channelized at this location that and looks like a roadside ditch. The seasonal flow periodicity and presence of a significant headwaters (originates from upstream wetlands, forested areas and residential properties) justifies the classification of this feature a channelized

stream as opposed to a ditch. The culvert under the driveway entrance for the school is approx. 600 mm in size, and further along the stream at the northern corner of the property the culvert size is much larger – 1 m in diameter – to accommodate inflows from the northern ditch line and Stream 2. Arden Creek is confirmed fish bearing at this location – coho salmon juveniles were found during past assessments; cutthroat trout are also likely to utilize this reach. Arden Creek has a prescribed SPEA of 30 m (see above).

Photos 2 and 3. Stream 1 along the western property boundary.

Photos 4 and 5. High point in the southern corner of the lot where flows split towards Stream 1 or Stream 2 (left) and Stream 2 along the southeastern edge of the lot (right).


Photos 6 and 7. Bridges over Stream 2 in the forest adjacent the property.


Photos 8 and 9. Arden Creek along the front of the property showing the entrance to the parking lot (left) and further downstream where the flows merge from the other side of the road (right).

Photo 10. Arden Creek looking downstream from the subject property.

There is a wetland to the northeast of the subject property (off-site) that is part of the Piercy watershed. This wetland receives a 30 m SPEA since it is also within the City of Courtenay Arden Corridor Local Area. Although the wetland is not on the subject property, the 30 m SPEA extends into the property. The wetland was not full delineated since it is outside of the scope of this assessment.

Terrestrial habitat

Vegetation: Most of the subject property has been cleared, except for a few Douglas fir trees that are just inside the fence line along the back of the property. There is also a row of Douglas fir trees along the front of the property by Lake Trail Road. These trees provide habitat for nesting birds.

Photos 11 and 12. Douglas fir trees inside the property boundaries.

Wildlife habitat features	Other than the few trees mentioned above, there are no wildlife habitat features of note on the subject property. However, the forest surrounding the property has many unique features including wetlands, nurse logs, woody debris on the forest floor, amphibian habitat, bat habitat, bird nesting habitat, etc.
Species at Risk	There are several potential occurrences of species at risk in streams adjacent to the subject property, which are outlined in the list below: 1. The Morrison Creek lamprey is provincially red-listed and is listed as Endangered (Schedule 1) under the *Species at Risk Act* (SARA). The Morrison Creek lamprey is found in Arden Creek (nearby). 2. Cutthroat trout has been observed in Arden Creek (nearby) and it is provincially blue-listed (not listed federally). There are no known ecosystems or species at risk on the subject property according to CDC iMap. There are also no known bald eagle or great blue heron nests within 200 m of the subject property. These results were confirmed during the site visit, with no ecosystems/species at risk or raptor/heron nests observed on the subject property.

Outdoor Education Opportunities:

Learning opportunities and ecological points of interest on or near the subject property are provided in the following list. F-Series codes refer to the general description of these habitats and their ecological importance which is provided in the Ecological Points of Interest section of this report (Table 6 in Appendix A).

Forest habitat (See F1): The forest surrounding the property provides a unique learning opportunity for students. There are two openings in the fence that lead to nature trails in the forest behind the school. Students can learn about many different topics in this forest including temperature moderation, forest succession, nurse logs and stumps, bird nesting in the different canopy layers, amphibian habitat, wildlife corridors, etc. As mentioned, it is anticipated that these areas will be protected from development in perpetuity.

Stream and wetland habitat (See F4 and F5): Arden Creek and its tributaries surrounding the subject property provide an opportunity to learn about salmon habitat, seasonality in stream habitat, stormwater management, etc. There is also a wetland in the forest behind the school that connects with Piercy Creek in a separate watershed. This wetland provides a great opportunity for students to learn about wetland habitat, the various species that benefit from this habitat, and the importance of wetlands in a watershed.

Rare Species: The Morrison Creek Lamprey, western screech owl, and coastal cutthroat trout may be present on or near the subject property.

The Morrison Creek Streamkeepers are an excellent resource for information on the Morrison Creek Lamprey and all other issues related to this amazing watershed (www.morrisoncreek.org).


Photo 13 (left). Forest behind school property.
Photo 14 (right). One of the wetlands in the forest behind the school property.

Habitat Enhancement Opportunities:

The following list provides opportunities for habitat enhancement on the subject property. E-Series codes refer to the general description of this type of impact/issue and the general prescription for enhancing these types of areas which is provided in the Habitat Enhancement Opportunities section of this report (Table 7 in Appendix B).

Maintain boardwalks over aquatic habitat (See E3): There are some existing boardwalks over Stream 2 in the natural trails adjacent to the school. These boardwalks are important for keeping students out of this sensitive habitat in the winter months. There are other wet areas at the back of the school that could benefit from boardwalks to protect potential amphibian habitat. It is recognized these features are possibly outside of eh Arden property bounds.

Removal of invasive species along berm (See E2 and E5): Blackberry and Scotch broom should be management and removed along the berm by the parking lot and riparian area of Stream 1. Once removed, this area should be re-planted with native riparian plants (E1, 2, and 4).

Photo 15. Blackberry on the berm beside the parking lot.

Legend

- Invasive Species
- Ecological Point of Interest
- Enhancement Opportunities Point
- Ditch
- Stream
- Wetland
- Parcels
- SD71 Boundaries
- Environmentally Sensitive Area
- Enhancement Opportunities
- Streamside Protection and Enhancement Area

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3.16 CUMBERLAND COMMUNITY SCHOOL

Civic address:	2674 Windermere Ave, Cumberland, BC		
PID:	029-383-579	**Lot size:**	7.28 hectares
Conservation Value	Low		

Key Inventory Results:

- The conservation value ranking of this property is low.
- No streams, ditches, or wetlands on subject property.
- Forested patches around each school and forested area in northern part of subject property with walking trails throughout. Provide nesting habitat for birds, potential bat roosting and foraging, potential terrestrial amphibian habitat, and corridors for deer and small mammals.
- Invasive species throughout subject property including spurge laurel, Himalayan blackberry, Scotch broom, and English holly.
- Moderate trampling in several forested areas.
- Wildlife features on subject property include mature bigleaf maple trees along southern lot that are used by cavity nesters and wildlife stump in northern section of lot.
- No ecosystems or species at risk identified.
- Outdoor education opportunities:
  - Woody debris on forest floor.
  - Wildlife trees.
- Enhancement opportunities:
  - Invasive species removal.

General Description of Property:

The Cumberland Community School consists of two school buildings – one in the north and one in the south portion of the property – each with a playing field and patches of forest. They are separated by Ulverston Avenue. The northern portion of the school property is fenced off from the main playing field and consists of walking trails and young forest.

Photo 1. Front of the southern building. Photo 2. Back of the northern building showing a portion of the field.

Environmentally Sensitive Areas:

Aquatic habitat	There is no aquatic habitat on this property – the school is located on high ground. There are a series of storm drains along the maple grove in the southern portion of the property.
Terrestrial habitat	**Vegetation:** Terrestrial habitat on the subject property consists of patches of Douglas fir/bigleaf maple forest around each school, and a section of forest in the northern part of the property with walking trails

throughout. Tree species in the forested areas include Douglas fir (dominant), bigleaf maple, and western red cedar. Shrubs in the understory include salal (dominant), sword fern, dull Oregon grape, and red huckleberry.

Invasive species on the property included spurge laurel, Himalayan blackberry, Scotch broom, and English holly. A particularly large patch of spurge laurel was found in the southeastern corner of the lot. Scotch broom and some Himalayan blackberry were growing in the northern section of the lot which appears to have been newly restored with native trees.

There are several treed areas that appear to be used by students during recess or for outdoor learning activities – these areas are in front of the northern school and along the eastern strip of forest next to the field. These areas were low to moderately trampled in the understory, but there were still many remaining clusters of shrubs and young trees next to the older trees.

These forested areas provide nesting habitat for birds, potential bat roosting and foraging, potential terrestrial amphibian habitat, and corridors for deer and small mammals.

Photos 2 and 3. Bigleaf maple grove in the southern end of the property (left) and mature trees in front of the northern school building (right).

Photos 4 and 5. Moderately trampled forested playing area in front of the northern school (left) and fenced off forested area at the northern end of the property (right)

Photo 6. Forested area with trails in the northern portion of the lot – young conifers have been planted here next to the strip of forest.

Wildlife habitat features

Wildlife trees: The old bigleaf maple trees along the southern property boundary have some limbs that are dead or dying and there are signs of usage by cavity nesters.

Wildlife stump: There is an interesting wildlife stump in the northern section of the lot that may be providing habitat for small mammals and terrestrial amphibians.

Photo 7. Cavity in a bigleaf maple. Photo 8. Habitat stump in the northern strip of forest.

Species at Risk

There are no known ecosystems or species at risk on the subject property according to CDC iMap. There are also no known bald eagle or great blue heron nests within 200 m of the subject property. These results were confirmed during the site visit, with no ecosystems/species at risk or raptor/heron nests observed on the subject property.

Outdoor Education Opportunities:

Learning opportunities and ecological points of interest on or near the subject property are provided in the following list. F-Series codes refer to the general description of these habitats and their ecological importance which is provided in the Ecological Points of Interest section of this report (Table 6 in Appendix A).

Woody debris on the forest floor (See F3 and F7): There are lots of areas in the forest with woody debris on the forest floor and some habitat stumps throughout the forest.

Wildlife trees (See F8): There are several wildlife trees throughout the property, especially in the bigleaf maple grove in the southern portion of the property.

Habitat Enhancement Opportunities:

The following list provides opportunities for habitat enhancement on the subject property. E-Series codes refer to the general description of this type of impact/issue and the general prescription for enhancing these types of areas which is provided in the Habitat Enhancement Opportunities section of this report (Table 7 in Appendix B).

Manage Sections of Trampled Forest (See E1): There are two areas of trampled forest at this school property, one by the entrance of the northern building, and one along the strip of forest on the eastern edge of the playing field. Although both of these areas only have moderate trampling (i.e. there are still some intact clusters of understory plants), management practices should be applied to these areas to limit the further spread of trampling and to moderate the current impacts to trees and understory plants.

Invasive species removal (See E5): Scotch broom and Himalayan blackberry should be managed in the strip of new forest in the northern section of the lot. Additionally, the spurge laurel in the southwestern corner should be removed as it is a noxious weed.

Photo 9. Spurge laurel by the southern school (left) and Scotch broom in the northern forest (right).

Legend

- Invasive Species
- Ecological Point of Interest
- Enhancement Opportunities Point
- Ditch
- Stream
- Wetland
- Parcels
- SD71 Boundaries
- Environmentally Sensitive Area
- Enhancement Opportunities
- Streamside Protection and Enhancement Area

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3.17 ROYSTON ELEMENTARY

Civic address:	3830 Warren Ave, Royston, BC		
PID:	017-675-855	**Lot size:**	2.16 hectares
Conservation Value	Low		

Key Inventory Results:

- The conservation value ranking of this property is low.
- Two perimeter ditches (non-fish bearing) – Ditches 1 and 2 flow along perimeter of subject property and across Livingston Rd., ultimately outletting onto marine shoreline.
  - Riparian habitat of Ditch 1 is low-functioning.
  - Riparian habitat of Ditch 2 provides habitat for wildlife, stabilizes ditch banks, filters runoff, moderates flows, and contributes food and nutrients to the marine ecosystem.
- Limited vegetation on subject property – narrow patches of trees along riparian area of Ditch 2 and several isolated trees along edge of playing field.
- Tree restoration area at front of school.
- Invasive Himalayan blackberry thicket along northern edge of playing field and Livingston Rd.
- No ecosystems or species at risk identified.
- Outdoor education opportunities:
  - Marine shoreline.
- Enhancement opportunities:
  - Invasive species removal.

General Description of Property:

Royston Elementary school property consists of a main building, two outbuildings, and a playing field behind the school. There is a strip of vegetation along the perimeter of the property, with some landscaping around the front of the school.


Photos 1 and 2. Front view of school (left) and back view of school and playing field (right).

Environmentally Sensitive Areas:

Aquatic Habitat	There are two perimeter ditches at Royston Elementary – Ditch 1 and Ditch 2. Both flow north towards Livingston Road and cross over into the railway corridor. **Ditch 1:** Ditch 1 originates on Hyland Road, then flows down the east side of Warren Ave towards the school, crosses under the round-a-bout in front of the school and runs along the edge of the school property towards Livingston Road. At Livingston Road, Ditch 1 continues to follow the perimeter of the school property until it crosses the road through a culvert and outlets in the railway corridor. Through a series of culverts, Ditch 1 eventually connects into the roadside ditch along Ross Avenue and outlets onto the marine shoreline via a 40-50 m long culvert. With flows drying up in the summer months,

limited fish access through the long culvert at the marine shoreline, and such a large proportion of this ditch being piped underground, this ditch can be deemed non-fish bearing. Ditch 1 has a prescribed SPEA of 2 m.

However, it is still important to maintain a vegetated buffer around this ditch (minimum 2 m) in order to maintain water quality, stabilize banks, and reduce the potential for flooding downstream. The riparian area of Ditch 1 along the school property consists of grass, with emergent vegetation in the ditch consisting of common rush and a few young willow shoots. Overall, this is a low-functioning feature (Photos 3-6).

Ditch 2: Ditch 2 originates on the southern edge of the school property, flows north towards Livingston Road, then wraps around the edge of the school property to the cross culvert on Livingston Road. At the cross culvert, flows enter the railway corridor and merge with Ditch 1 to eventually end up at Ross Avenue and the marine shoreline. As above, this ditch is non fish bearing, however it is still important to maintain a riparian buffer to support biodiversity, maintain water quality, and moderate potential impacts from flooding downstream. Ditch 2 has a prescribed SPEA of 2 m.

The riparian area of Ditch 2 is more naturalized than that of Ditch 1 and consists of red alder, Douglas fir, bigleaf maple, sword fern, salal, and some invasive Himalayan blackberry and spurge laurel. There is a thick patch of Himalayan blackberry along the northern property boundary beside Livingston Road, with young willow, red alder, red osier dogwood, and bigleaf maple shoots. Compared to Ditch 1, this riparian habitat provides some habitat for wildlife, stabilizes ditch banks, filters runoff, moderates flows, and contributes food and nutrients to the marine ecosystem (Photos 7-10).

Photos 3 and 4. Ditch 1 flowing along the edge of the school property towards Livingston Road.


Photos 5 and 6. Ditch 1 along Livingston Road (left) and the cross culvert across Livingston Road (right)


Photos 7 and 8. Ditch 2 along the edge of the playing field at the location of a small walking bridge.


Photos 9 and 10. Ditch 2 along the playing field behind the fence (left) and the start of Ditch 2 closer to the school building (right).

Terrestrial Habitat	**Vegetation:** Vegetation on the property is limited, with thin patches of trees along the riparian area of Ditch 2 (species as described above), and some isolated trees along the edge of the playing field. There

	is a tree restoration area at the front of the school by the parking lot where a cluster of trees have been planted; a thicket of Himalayan blackberry was noted along the northern edge of the playing field.   **Photos 11 and 12. Himalayan blackberry thicket along the edge of the playing field and Livingston Road (left) and tree restoration area near the front of the school (right).**
Wildlife Habitat Features	There are no wildlife habitat features of note on this school property.
Species at Risk	There are no known ecosystems/species at risk on the subject property according to CDC iMap. There are also no known bald eagle or great blue heron nests within 200 m of the subject property. These results were confirmed during the site visit, with no ecosystems/species at risk or raptor/heron nests observed on the subject property.

Outdoor Education Opportunities:

Learning opportunities and ecological points of interest on or near the subject property are provided in the following list. F-Series codes refer to the general description of these habitats and their ecological importance which is provided in the Ecological Points of Interest section of this report (Table 6 in Appendix A).

Marine shoreline: Royston Elementary is located within 500 m of the marine shoreline in Royston. There are public walking trails along the shoreline and out to a sandy spit in the Trent River estuary. While not on the school property itself, the public access to the shoreline nearby provides an excellent outdoor education opportunity.

The shoreline along Royston consists of a mudflat with tidepools and marine animals visible at low tides (bivalves, crustaceans, etc.). Salmon can also be viewed in the Trent River estuary, both during the outmigration in the spring and the fall spawn, and spawning herring can also be viewed along this shoreline in the spring (which also brings a myriad of other wildlife to the shoreline during this time). The Comox Estuary and Trent River Estuary are also part of the K'ómoks Important Bird and Biodiversity Area which is one of the most significant areas for wintering and migratory waterfowl and waterbirds in BC.

Comox Valley Project Watershed Society is a good resource for marine shoreline and estuary information and learning opportunities (www.projectwatershed.ca).

Habitat Enhancement Opportunities:

The following list provides opportunities for habitat enhancement on the subject property. E-Series codes refer to the general description of this type of impact/issue and the general prescription for enhancing these types of areas which is provided in the Habitat Enhancement Opportunities section of this report (Table 7 in Appendix B).

Invasive species removal (See E5 and E4): There is a Himalayan blackberry thicket along the edge of the school playing field and Livingston Road that should be managed and replaced with native species. This strip of vegetation can be maintained as native trees and shrubs, which would provide habitat to nesting birds and water absorption of runoff from the school playing fields.

Photo 13. View of blackberry thicket from Livingston Road.

Legend

- Invasive Species
- Ecological Point of Interest
- Enhancement Opportunities Point
- Ditch
- Stream
- Wetland
- Parcels
- SD71 Boundaries
- Environmentally Sensitive Area
- Enhancement Opportunities
- Streamside Protection and Enhancement Area

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3.18 FIELD ACROSS FROM ROYSTON ELEMENTARY

Civic address:	Across from 3830 Warren Ave, Royston, BC		
PID:	n/a - 8 parcels make up this field.	**Lot size:**	1.21 hectares
Conservation Value	Low		

Key Inventory Results:

- The conservation value ranking of this property is low.
- Ditch 1 (non-fish bearing) flows along field across from Royston Elementary school. Riparian habitat is low functioning.
- Limited vegetation on subject property – small strip of native trees along perimeter of field. Provides habitat to perching and nesting birds, as well as potential bat roosting habitat.
- Woody debris and thick leaf mat in the fall on ground in this strip of trees – may provide habitat to terrestrial amphibians.
- Invasive English ivy and spurge laurel growing in strip of trees along perimeter of field.
- No ecosystems or species at risk identified.
- Outdoor education opportunities:
  - Marine shoreline.
- Enhancement opportunities:
  - Invasive species removal.

General Description of Property:

This playing field is located across the road from Royston Elementary and consist of a series of eight adjacent parcels. Royston Elementary uses this property for their playing fields, however this site is listed separately as it is not a connected parcel. In general, this property consists of an open field with trees and shrubs along the perimeter.

Photos 1 and 2. View of the field from Warren Ave.

Environmentally Sensitive Areas:

Aquatic Habitat	**Ditch 1:** Ditch 1 is the same ditch that is described in the Royston Elementary results. This ditch originates on Hyland Road, then flows down the east side of Warren Ave towards the school, crosses under the round-a-bout in front of the school and runs along the edge of the school property towards Livingston Road. At Livingston Road, Ditch 1 continues to follow the perimeter of the school property until it crosses the road through a culvert and outlets in the railway corridor. Through a series of culverts, Ditch 1 eventually connects into the roadside ditch along Ross Avenue and outlets onto the marine shoreline via a 40-50 m long culvert. With flows drying up in the summer months, limited fish access through the long culvert at the marine shoreline, and such a large proportion of this ditch being piped underground, this ditch can be deemed non-fish bearing. Ditch 1 has a prescribed SPEA of 2 m.

	However, it is still important to maintain a vegetated buffer around this ditch (minimum 2 m) in order to maintain water quality, stabilize banks, and reduce the potential for flooding downstream. The riparian area of Ditch 1 along the school property consists of grass, with emergent vegetation in the ditch consisting of common rush and a few young willow shoots. Overall, this is a low-functioning feature (Photo 3).  **Photo 3. Ditch 1 along the field across from Royston Elementary.**
Terrestrial Habitat	**Vegetation:** Terrestrial habitat on the property is limited, with only a small strip of trees along the perimeter of the field. Dominant trees species along the edge of the field are Douglas fir and bigleaf maple. This strip of trees provide habitat to perching and nesting birds, as well as potential bat roosting habitat. The ground in this strip of trees has some pieces of woody debris and a thick leaf mat in the fall that may provide habitat to terrestrial amphibians.   **Photos 4 and 5. Strip maple and Douglas fir trees along the perimeter of the field across from Royston Elementary.**

Wildlife Habitat Features	There are no wildlife features of note on this property.
Species at Risk	There are no known ecosystems or species at risk on the subject property according to CDC iMap. There are also no known bald eagle or great blue heron nests within 200 m of the subject property. These results were confirmed during the site visit, with no ecosystems/species at risk or raptor/heron nests observed on the subject property.

Outdoor Education opportunities:

There are no outdoor education opportunities of note associated with this field, however as discussed in the results section for Royston Elementary, the primary opportunity for outdoor learning at this school site is the nearby marine shoreline (See results section for Royston Elementary).

Habitat Enhancement Opportunities:

The following list provides opportunities for habitat enhancement on the subject property. E-Series codes refer to the general description of this type of impact/issue and the general prescription for enhancing these types of areas which is provided in the Habitat Enhancement Opportunities section of this report (Table 7 in Appendix B).

Invasive species removal (See E5): There is a substantial amount of English ivy growing up the tree trunks on some of the bigleaf maple and Douglas fir trees along the field (Photos 6 and 7). Ivy can strangle and kill mature trees and can outcompete native plants in the understory. There are also some patches of spurge laurel in the forest understory, especially along the southern edge of the field; spurge laurel is toxic to humans and animals and must be handled with care. These invasive species should be removed from site.

Photos 6 and 7. Spurge laurel growing in the forest understory (left) and English ivy growing up tree trunks (right).

Legend

- Invasive Species
- Ecological Point of Interest
- Enhancement Opportunities Point
- Ditch
- Stream
- Wetland
- Parcels
- SD71 Boundaries
- Environmentally Sensitive Area
- Enhancement Opportunities
- Streamside Protection and Enhancement Area

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3.19 DENMAN ISLAND COMMUNITY SCHOOL

Civic address:	1100 NW Rd, Denman Island BC		
PID:	008-706-191	**Lot size:**	3.2 ha
Conservation Value	Low		

Key Inventory Results:

- The conservation value ranking of this property is low.
- Stream 1 flows west across southern property boundary (unknown whether it is fish bearing).
- Seasonally-wetted and isolated area in forest to north of subject property – likely provides amphibian habitat and hydration opportunities for wildlife.
- Avian nesting habitat in forest to north of subject property.
- Subject property at intersection of three ecosystems polygons (young Douglas fir/salal forest, Western red cedar/Douglas fir/Oregon beaked moss, and seasonally flooded area).
- Limited vegetation on subject property – several isolated stands of Douglas fir mixed with a few western red cedar.
- Invasive species including Scotch broom, Daphne (spurge laurel), reed-canary grass, Himalayan blackberry, and periwinkle present along south side of Stream 1.
- Potential species at risk near or on subject property (not observed during site visit):
  - Masked-occurrence polygon overlapping subject property – likely indicates occurrence of the Taylor's Checkerspot Butterfly (red-listed).
  - Mapped occurrences of coastal wood fern (blue-listed) on a site 800 m southeast and 350 m southwest.
  - Red-legged frogs (blue-listed) in wetted area to north (potential breeding habitat).
- Outdoor education opportunities:
  - Amphibian breeding and terrestrial habitat.
  - Stream habitat.
  - Nearby forested habitat.
- Enhancement opportunities:
  - Invasive species removal.

General description of property:

The Denman Island Elementary school is located near the heart of the Denman Island community. The property has mostly been cleared with a few groves of remaining trees. The perimeter of the property is well vegetated with a wet area north of the field and a small stream flowing along the southern boundary.

Photo 1. Front view of Denman Community School.

Environmentally Sensitive Areas:	
Aquatic habitat	**Stream 1:** A small stream with an approximate 2 m width flows from east to west across the southern boundary of the property. This area is fenced off from the rest of the school property, presumably as a safety measure. The banks are somewhat steep in places and any access should be moderated. The riparian area of the stream has been heavily modified and contains a high concentration of invasive species. This stream is not listed in Islands Trust mapping database or provincial habitat mapping services. It is unknown whether the stream is fish bearing but based on its size and location it is likely to dry seasonally. The prescribed SPEA for Stream 1 is 10 m.   **Photos 2 and 3: Stream 1 that runs across the school property.**  **Photo 4. Fence along riparian area of Stream 1.** **Seasonally wetted area (off-property)**: The forested area north of the property contains an interesting, seasonally wetted area supporting slough sedge with a surrounding canopy approx. 40 years old composed of western red cedar and Douglas fir with understory of red alder, cascara, hardhack, and Nootka rose. The wet area appears localized and isolated from stream flows and remains wetted seasonally. A shallow swale separates the higher elevation ground of the school field from the wet forested swamp to the north. The wet area likely provides amphibian habitat and hydration opportunities for birds, smaller mammals, deer, and other wildlife. Based on aerial photos there appears to be an area of open ponded water located approximately 150 m to the northwest of the property that may provide amphibian breeding opportunities. A minimum SPEA of 10 m is recommended to protect this feature, which extends into the northern edge of the school property.

Terrestrial habitat	**Vegetation:** According to Islands Trust mapping, sourced from TEM ecosystem data, the Denman Island School property is at an intersection of three ecosystems polygons of young Douglas fir/salal forest, Western red cedar/Douglas fir/Oregon beaked moss, and a seasonally flooded area. These mapped areas have been confirmed as being reasonably reflective of conditions observed on site. As mentioned, there are few remaining trees on the property with the exception of some isolated stands of Douglas fir mixed with a few western red cedar and understory including dull Oregon grape. There is a high concentration of invasive plants surrounding Stream 1, primarily on the south side, that includes Scotch broom, Daphne (spurge laurel), reed-canary grass, Himalayan blackberry, and periwinkle. This zone also contains some fruit trees and cleared areas dominated by grasses that were likely an operating orchard in the past.  **Photo 5. View of school from entrance showing playing field past the basketball nets, and the surrounding forest in the background (off the school property).**
Wildlife habitat features	**Amphibian habitat:** Amphibian breeding/foraging in wet area to north of school field. **Bird nesting habitat:** There is good habitat for avian nesting opportunities in the wet area to north.
Species at Risk	A large masked-occurrence polygon (species information not provided) overlaps with most of the east coast of Denman island centered over Baynes sound. It is suspected that this indicates the occurrence of the Taylor's Checkerspot Butterfly – a red listed species. **Taylor's Checkerspot:** Taylor's Checkerspot (a subspecies of Edith's Checkerspot) is a distinctive orange, black, and white checkered butterfly found historically in meadows and grasslands of southeastern Vancouver Island. Taylor's Checkerspot is a butterfly species at risk and was listed as Critically Imperilled (S1; red) by the BC Conservation Data Centre in 2013, and assessed as Endangered in Canada by COSEWIC in 2011.

Photo courtesy of Nick Page.

While Taylor's Checkerspot was historically known from 22 populations on the southern part of Vancouver Island, it is currently known only from two populations in BC: Denman Island; and Oyster River south of Campbell River on Vancouver Island.

Historically, populations typically presented adult forms from mid-April to late May, the Denman Island population flies from early May to mid- June. It was found historically in the coastal bluffs in Helliwell Provincial Park on Hornby Island but was extirpated from that locality in the late 1990s.

Host plants for Taylor's Checkerspot larval food sources in the Pacific Northwest include lance-leaved plantain (*Plantago lanceolata*), common plantain (*Plantago major*), paintbrush species (*Castilleja spp.*), blue-eyed mary (*Collinsia parviflora*), and speedwell species (*Veronica spp.*). The Denman Island and Oyster River populations used speedwell species (*Veronica scutellata*) and thyme-leaved speedwell (*Veronica serpyllifolia*) for egg laying and early larval development; more mature larvae use a broader range of host plants. In general, the property is either cleared/active school grounds, or fallow agricultural area in the southeast near the stream channel. The agricultural zone has a high concentration of invasive species, including tall grasses, that do not support the habitat qualities for the plants needed for the Taylor's Checkerspot's reproduction or life history requirements.

Additional records of SAR in the vicinity of the subject property include coastal wood fern (provincially blue-listed) on a site 800 m southeast and 350 m southwest. This species was not observed on site. No other observations of SAR were made during the site assessment; however, based on the wetland habitat type north of the property it is possible that some amphibian species at risk are present that may include provincially blue-listed red legged frogs as the pond north of the property appears sufficient to support breeding habitat requirements.

There are no known bald eagle or great blue heron nests within 200 m of the subject property. These results were confirmed during the site visit, with no raptor/heron nests observed on the subject property.

Outdoor Education Opportunities:

Learning opportunities and ecological points of interest on or near the subject property are provided in the following list. F-Series codes refer to the general description of these habitats and their ecological importance which is provided in the Ecological Points of Interest section of this report (Table 6 in Appendix A).

Amphibian breeding and terrestrial habitat (See F2): Though offsite, the seasonally wetted area to the north of the property area may support amphibian breeding, and this cool, moist habitat also provides a refuge for adult life stages of aquatic breeding amphibians and hydration opportunities for other wildlife. The surrounding forest areas may also support terrestrial amphibians. There is an opportunity to learn about the life cycle of amphibians.

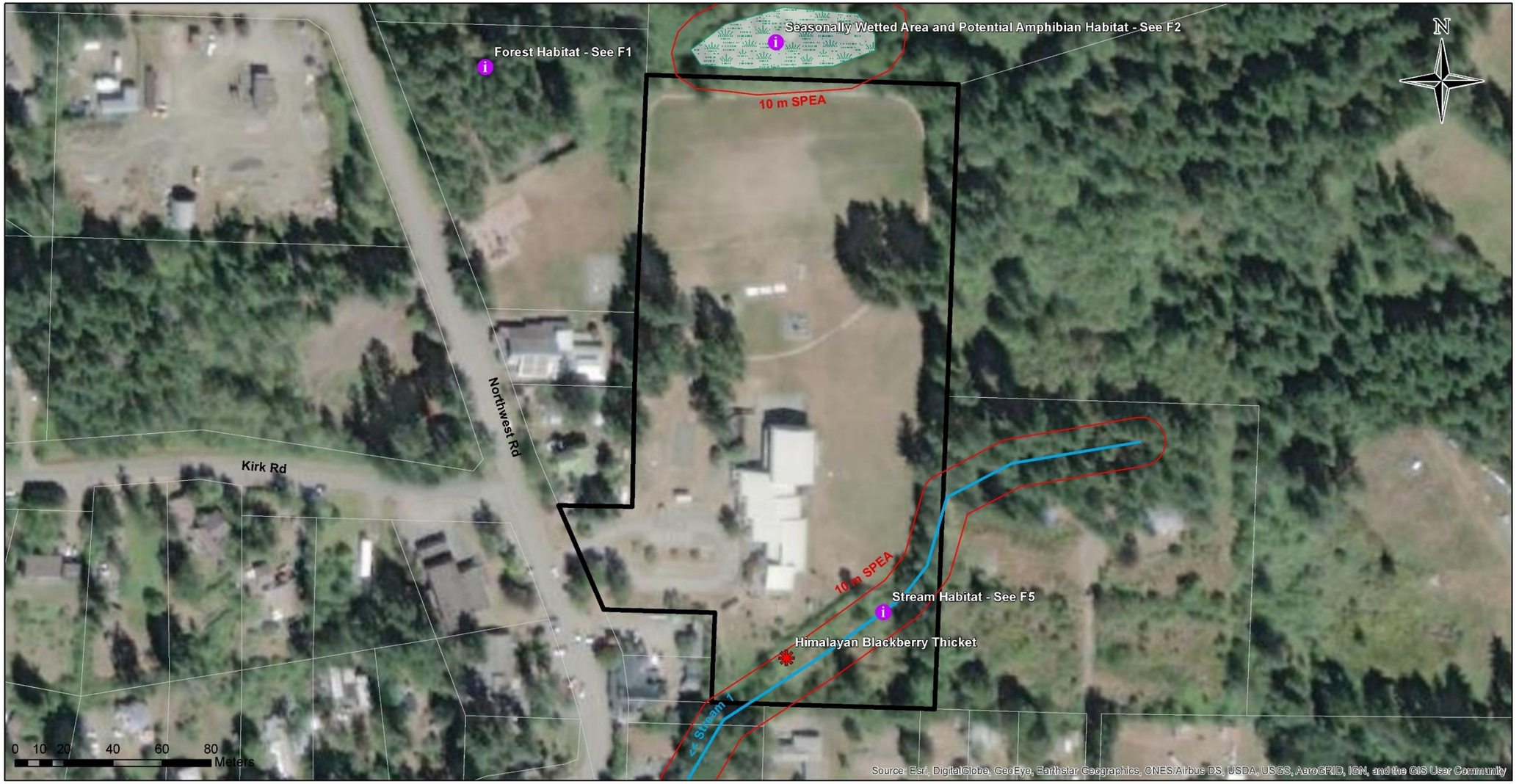
Stream habitat (See F5): The stream along the property provides an opportunity to learn about riparian habitat, seasonal changes in stream habitat, and its function in the landscape.

Nearby forest habitat (See F1, F3, and F8): Students can walk into the forested areas surrounding the property to learn about forests, wildlife trees, nurse logs and stumps, etc. There are forest trails that can be accessed by Centennial Park near the community hall which is adjacent the school property.

Habitat enhancement opportunities:

The following list provides opportunities for habitat enhancement on the subject property. E-Series codes refer to the general description of this type of impact/issue and the general prescription for enhancing these types of areas which is provided in the Habitat Enhancement Opportunities section of this report (Table 7 in Appendix B).

Invasive species removal (See E5): The primary recommendation for this site is the removal of invasive species along the edge of the stream that runs across the property. Once removed, a riparian planting plan can be established and implemented. Being located in a riparian area, this work should occur during the dry summer months between June 15th and September 15th.



Legend

- Invasive Species
- Ecological Point of Interest
- Enhancement Opportunities Point
- Ditch
- Stream
- Wetland
- Parcels
- SD71 Boundaries
- Environmentally Sensitive Area
- Enhancement Opportunities
- Streamside Protection and Enhancement Area

Project: School District 71: Comox Valley Schools Environmental Inventory	Page 19 of 24
Site: Denman Island Community School	Date: March 15th, 2021 Author: C.O'Neill Projection: UTM NAD83 Zn10N
	Note: All linework approximate. Not for use or reproduction without consent from the author. current ENVIRONMENTAL

3.20 HORNBY ISLAND ELEMENTARY

Civic address:	2100 Sollans Road, Hornby Island, BC, V0R 1Z0		
PID:	000-475-752	**Lot size:**	1.76 ha
Conservation Value	High		

Key Inventory Results:

- The conservation value ranking of this property is high.
- Tributary to Beulah Creek – ephemeral watercourse in south end of subject property that contributes flow to Beulah Creek (fish bearing).
- Approximately 30% of subject property is composed of young mixed forest with some older second growth areas (dominated by Coastal Douglas fir and Western red cedar) – provides wildlife corridor and bird habitat.
- Provincially red listed *Pseudotsuga menziesii / Berberis nervosa* (Douglas fir/dull Oregon grape) ecosystem present on subject property.
- Moderate trampling in portion of forested area immediately adjacent playing fields.
- Outdoor education opportunities:
  - Forest habitat and wildlife corridors.
- Enhancement opportunities:
  - Revegetation of disturbed areas when construction complete.
  - Management of trampled forest.
  - Monitor trails in forest to maintain low impact.

General Description of Property:

Hornby Island Community School is currently being rebuilt after being destroyed by a fire in 2018. The rebuilt 95 seat school will continue to serve the Hornby Island population of approximately 1,000 permanent residents. An estimated 70% of the property has been developed to support school infrastructure, including buildings and playing fields. The balance of the undeveloped property supports a young and older mixed forest stand, which is part of the Provincially red listed *Pseudotsuga menziesii / Berberis nervosa* (Douglas fir/dull Oregon grape) ecosystem mapped in this region of Hornby Island.

Photo 1: New school under construction.

Photo 2: Playing field bordered by second growth mixed forest.

Environmentally Sensitive Areas:

Aquatic habitat

Tributary to Beulah Creek: In the south end of the property, there is a small (<500 m^2) ephemeral watercourse that supports facultative hydrophytes (wetland vegetation species), including *Carex obnuta* and *Equisetum telmateia.* The watercourse supplies seasonal flow to the Central Road ditch, which flows southeast for an estimated 1 km before discharging into Beulah Creek (Figure 20-1). Beulah Creek has confirmed presence of cutthroat trout and assumed presence of coho salmon; fish presence is not expected in this tributary. The prescribed SPEA for the Tributary to Beulah Creek is 10 m.

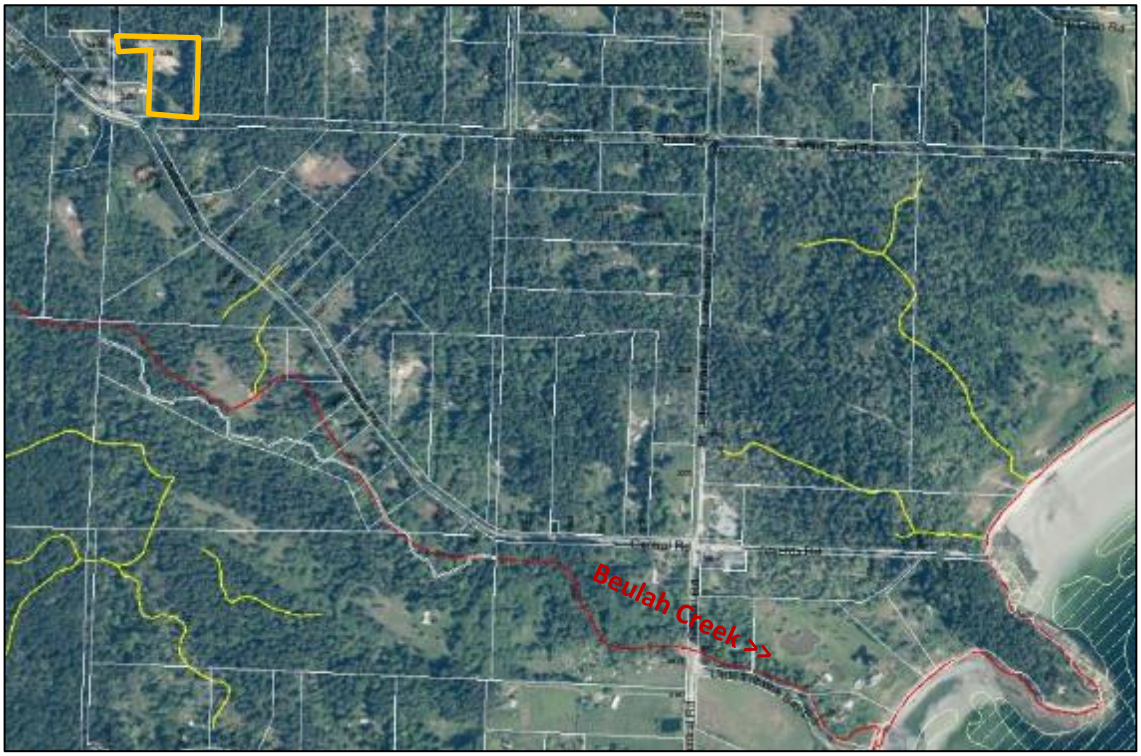


Figure 20-1. Overview map showing location of Hornby Island Community School (outlined in orange) in the headwaters of Beulah Creek.

Photo 3: Ephemeral watercourse located at south end of property.

Terrestrial habitat

Forest: An estimated 30% (0.5 ha) of the property contains moderately open stands of young mixed forest with some older second growth where Coastal Douglas fir and Western red cedar dominate the canopy. Understory species include dull Oregon grape, sword fern, salmon berry and salal. The native plant assemblage observed on the property is consistent with the overlying mapped BC Conservation Data Center occurrence for the Provincially red listed *Pseudotsuga menziesii / Berberis nervosa* (Douglas fir/dull Oregon grape) ecosystem in this region of Hornby Island (Figure 20-2).

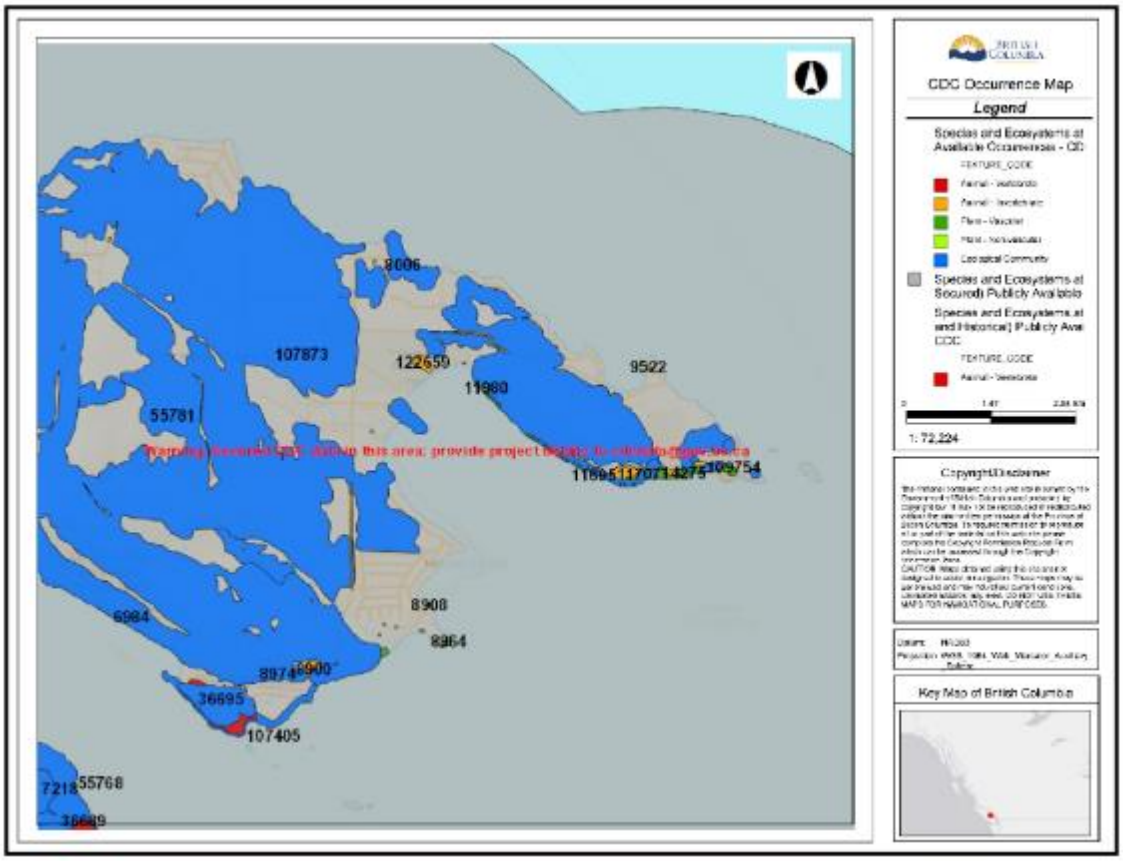


Figure 20-2. CDC occurrence map for Hornby Island showing Hornby Island Community School within the Provincially red listed *Pseudotsuga menziesii / Berberis nervosa* (Douglas fir/dull Oregon grape) ecosystem (adapted from BC Conservation Data Center).

	  **Photos 4 and 5: Typical young mixed forest stand observed near entrance on Sollans Rd (left) and canopy structure (right).**
Wildlife habitat features	The retained forest stand serves as a suitable wildlife corridor for mammals and the well-developed vertical structure of the forest stand support numerous avian species including passerines and raptors.
Species at Risk	There are no known species at risk on the subject property according to CDC iMap. There are also no known bald eagle or great blue heron nests within 200 m of the subject property. These results were confirmed during the site visit, with no species at risk or raptor/heron nests observed on the subject property. However, there is an ecosystem at risk on the subject property, since some of the forest stand can be characterized as a Provincially red listed *Pseudotsuga menziesii / Berberis nervosa* (Douglas fir/dull Oregon grape) ecosystem.

Outdoor Education Opportunities:

Learning opportunities and ecological points of interest on or near the subject property are provided in the following list. F-Series codes refer to the general description of these habitats and their ecological importance which is provided in the Ecological Points of Interest section of this report (Table 6 in Appendix A).

Forest habitat and wildlife corridors (See F1 and F6): Hornby Island Community School playing fields are bordered by moderately open forest stands that provide a safe and natural landscape for students to experience nature year-round. The property supports an estimated 200 m of nature trails that connect to a Chandler Road and Roburn Road - an estimated 800 m east of the school. The main Central Road right-of-way supports a multi-use trail giving students and staff a safe means of travel on foot or bicycle. Opportunity exists to install habitat features on school property for numerous native species, including bats, smaller birds, and mason bees.

Photo 6: Existing multi-use trails that service access to Hornby Island Community School, including connector to Chandler Road and Central Road.

Habitat Enhancement Opportunities:

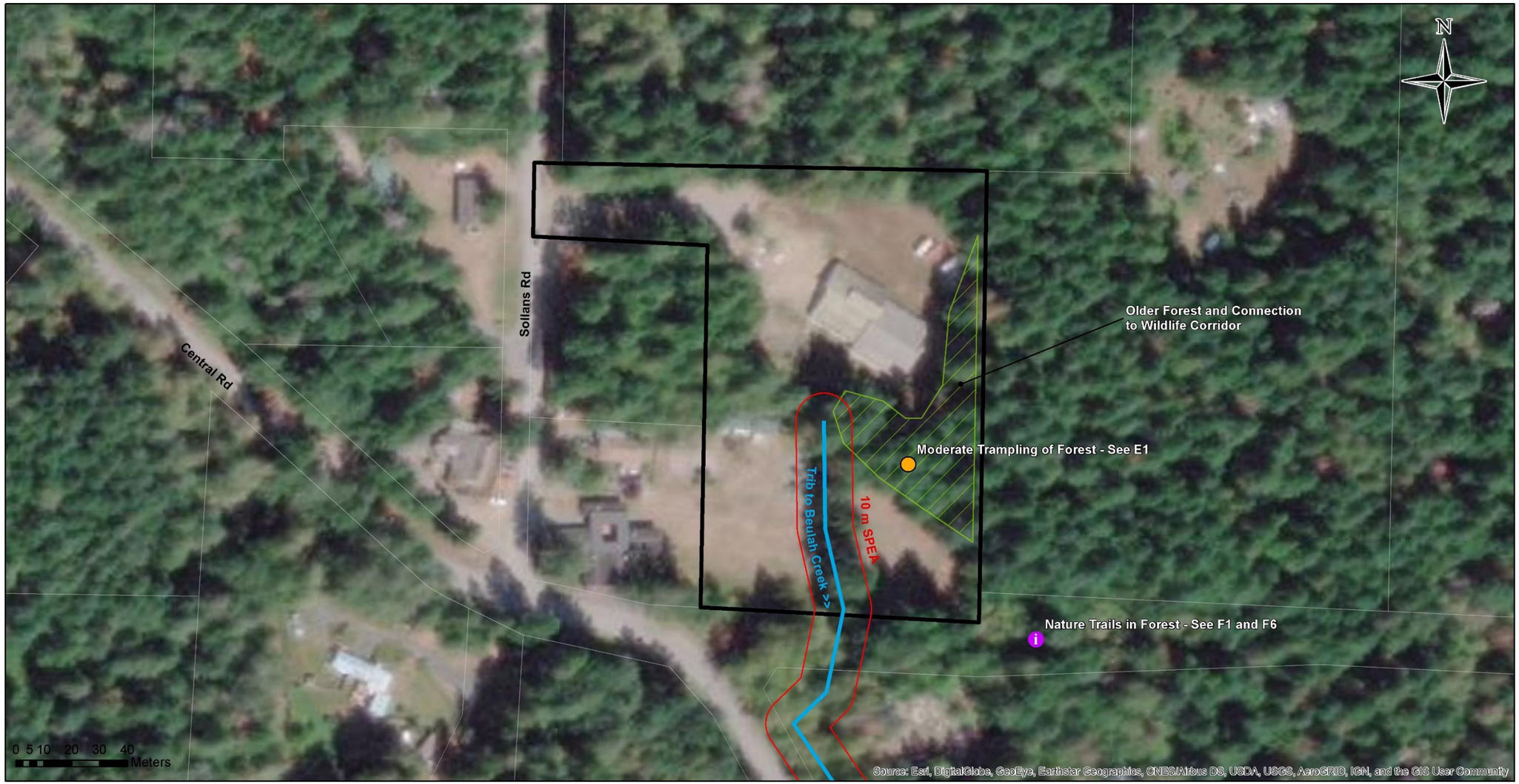
The following list provides opportunities for habitat enhancement on the subject property. E-Series codes refer to the general description of this type of impact/issue and the general prescription for enhancing these types of areas which is provided in the Habitat Enhancement Opportunities section of this report (Table 7 in Appendix B).

Revegetation of Disturbed Areas (See E4): At the time of this survey, the new school was under construction and site remediation had not yet begun. Once construction is complete, there will be opportunities to reinstate areas of disturbance from construction.

Trampled Forest (See E1): A portion of the forested area immediately adjacent the playing fields has been trampled. This has resulted in a lack of understory vegetation in this area, compacted soils, and some exposed tree roots from mature trees. It is important, and valuable, to continue to allow students to play in this forested area, however it would be beneficial to set up small pockets of "plant regeneration areas" among the trampled forest to protect the most severely impacted tree roots and to allow new trees to grow in the understory. Without management of these trampled areas, the mature trees will eventually die, and the forested area will retreat further over time without succession of new trees in the understory.

Low-Impact Trails Through Forest (See E3): Low impact trails are scattered throughout the forest on the subject property. There are no immediate recommendations for enhancement at this site. However, these trails should be monitored and if this area starts to become trampled and stripped of understory vegetation, then an effort should be made to better delineate the trails using logs and/or split rail fencing to prevent the area from being completely trampled in future.

Photo 7: Typical older second growth mixed stand on east boundary adjacent to playing field showing existing trail and ample outdoor education space – part of this forest along the field has been trampled.



Legend

- Invasive Species
- Ecological Point of Interest
- Enhancement Opportunities Point
- Ditch
- Stream
- Wetland
- Parcels
- SD71 Boundaries
- Environmentally Sensitive Area
- Enhancement Opportunities
- Streamside Protection and Enhancement Area

Project: School District 71: Comox Valley Schools Environmental Inventory	Page 20 of 24
Site: Hornby Island Elementary	Date: March 15th, 2021 Author: C.O'Neill Projection: UTM NAD83 Zn10N
	Note: All linework approximate. Not for use or reproduction without consent from the author. current ENVIRONMENTAL

3.21 COMOX ELEMENTARY – NOT IN USE

Civic address:	2085 Fairbairn Avenue., Comox, BC		
PID:	000-101-354	**Lot Size:**	1.52 hectares
Conservation Value	Nil		

Key Inventory Results:

- The conservation value ranking of this property is nil.
- No streams, ditches, or wetlands on subject property.
- Minimal terrestrial habitat – two large topped Douglas fir trees along northern property boundary. May provide perching and nesting sites for birds.
- No ecosystems or species at risk identified.
- No outdoor education opportunities.
- Enhancement opportunities:
  - Planting of shrubs and trees.

General Description of Property:

The old Comox Elementary property consists of an open field with very minimal vegetation around the perimeter. There are some remnants of paved areas in the northeast corner of the property that are not in use.

Photo 1. Old Comox Elementary school field – view from Gladstone Street.

Environmentally Sensitive Areas:

Aquatic Habitat	There is no aquatic habitat on or near this property.
Terrestrial Habitat	**Vegetation:** A cluster of 4 large trees were recently cut down near the eastern edge of this property (species unknown). There are also two large Douglas fir trees along the northern property edge that have been topped. Apart from the remnants of these two fir trees that may provide perching and nesting sites for birds, there is very minimal terrestrial habitat on this property.

	  **Photos 2 and 3. Cluster of trees that were recently removed (left) and Douglas fir trees that have been topped (right).**
Wildlife Habitat Features	There is no wildlife habitat of note on this property.
Species at Risk	There are no known ecosystems or species at risk on the subject property according to CDC iMap. There are also no known bald eagle or great blue heron nests within 200 m of the subject property. These results were confirmed during the site visit, with no ecosystems/species at risk or raptor/heron nests observed on the subject property.
Outdoor Education Opportunities:	
There are no outdoor education opportunities of note on this property.	
Habitat Enhancement Opportunities:	
The following list provides opportunities for habitat enhancement on the subject property. E-Series codes refer to the general description of this type of impact/issue and the general prescription for enhancing these types of areas which is provided in the Habitat Enhancement Opportunities section of this report (Table 7 in Appendix B). **Planting of shrubs and trees (See E4):** If this site were to be used again in the future, there is an opportunity to re-green the edges of this field and provide more nesting habitat for birds. Re-greening of this site would provide valuable benefits to wildlife and humans in this densely populated urban area in the Town of Comox.	

Legend

- Invasive Species
- Ecological Point of Interest
- Enhancement Opportunities Point
- Ditch
- Stream
- Wetland
- Parcels
- SD71 Boundaries
- Environmentally Sensitive Area
- Enhancement Opportunities
- Streamside Protection and Enhancement Area

Project: School District 71: Comox Valley Schools Environmental Inventory	Page 21 of 24
Site: Comox Elementary - Not In Use	Date: March 15th, 2021 Author: C.O'Neill Projection: UTM NAD83 Zn10N
	Note: All linework approximate. Not for use or reproduction without consent from the author.

3.22 UNION BAY SCHOOL – NOT IN USE

Civic address:	5539 Hwy 19A, Union Bay, BC		
PID:	001-227-653	**Lot Size:**	0.98 hectares
Conservation Value	Nil		

Key Inventory Results:

- The conservation value ranking of this property is nil.
- Channelized stream (Stream 1; non-fish bearing) runs along southern property boundary and outlets into the ocean at Baynes Sound.
- Minimal terrestrial habitat on subject property with exception of riparian corridor along Stream 1.
- Invasive Himalayan blackberry thicket encloses Stream 1.
- No ecosystems or species at risk identified.
- Outdoor education opportunities:
  - Marine shoreline.
- Enhancement opportunities:
  - Invasive species removal.
  - Planting of shrubs and trees.

General Description of Property:

The old Union Bay school property is no longer in use. There is an existing old school building on this property, and a playing field at the back of the building along Tappin Street.

Photo 1. Back view of the old school building and playing field along Tappin Street.

Environmentally Sensitive Areas:

Aquatic Habitat	**Stream 1:** There is one channelized stream that runs along the southern property boundary, across the Island Hwy South and into the ocean at Baynes Sound. This aquatic feature is considered a channelized stream as opposed to a ditch as it appears to originate from a significant headwaters area within the forest behind the houses along Tappin Street. This stream is enclosed in a blackberry thicket and is difficult to access (Photos 2 and 3). A trickling flow can be heard halfway down the school property, and flows appear to be very minimal (even in the winter months).

	This stream cross through a long and relatively steep culvert under the highway, the drops down a steep embankment on the east side of the highway to the marine shoreline. This steep drop precludes fish passage into this stream; it is a non-fish bearing watercourse. This riparian habitat provides some habitat for wildlife, stabilizes ditch banks, filters runoff, moderates flows, and contributes food and nutrients to the marine ecosystem (Photos 2 and 3). Stream 1 has a prescribed SPEA of 2 m.   **Photos 2 and 3. Blackberry thicket along Stream 1 on the southern edge of the property.**
Terrestrial Habitat	**Vegetation:** Apart from the small riparian corridor along the southern edge of the lot (along Stream 1), which consists mostly of a blackberry thicket with a few deciduous trees, there is very little terrestrial habitat on the subject property.  **Photo 4. Field along Tappin Street, showing a lack of trees or shrubs around the perimeter.**
Wildlife Habitat Features	There are no wildlife habitat features of note on this property.
Species at Risk	There are no known ecosystems or species at risk on the subject property according to CDC iMap. There are also no known bald eagle or great blue heron nests within 200 m of the subject property.

	These results were confirmed during the site visit, with no ecosystems/species at risk or raptor/heron nests observed on the subject property.

Outdoor Education Opportunities:

Learning opportunities and ecological points of interest on or near the subject property are provided in the following list. F-Series codes refer to the general description of these habitats and their ecological importance which is provided in the Ecological Points of Interest section of this report (Table 6 in Appendix A).

Marine shoreline: If this property were to be used for educational purposes in the future, the proximity to the marine shoreline provides excellent learning opportunities. Public beach access is located across the street at the boat launch and breakwater for Union Bay. Possible educational topics include intertidal creatures, ocean tides, migratory waterfowl, Oyster farming, sediment transport along beaches, etc.

Comox Valley Project Watershed Society is a good resource for marine shoreline and estuary information and learning opportunities (www.projectwatershed.ca).

Habitat Enhancement Opportunities:

The following list provides opportunities for habitat enhancement on the subject property. E-Series codes refer to the general description of this type of impact/issue and the general prescription for enhancing these types of areas which is provided in the Habitat Enhancement Opportunities section of this report (Table 7 in Appendix B).

Invasive species removal and planting of shrubs and trees (See E4 and E5): If this site were to be used again in the future, there is an opportunity to re-green the edges of the field and provide more nesting habitat for birds. There is also an opportunity to remove the blackberry thicket along Stream 1 and enhance this riparian area with native shrubs and trees.

Legend

- Invasive Species
- Ecological Point of Interest
- Enhancement Opportunities Point
- Ditch
- Stream
- Wetland
- Parcels
- SD71 Boundaries
- Environmentally Sensitive Area
- Enhancement Opportunities
- Streamside Protection and Enhancement Area

Project: School District 71: Comox Valley Schools Environmental Inventory	Page 22 of 24
Site: Union Bay School - Not In Use	Date: March 15th, 2021 Author: C.O'Neill Projection: UTM NAD83 Zn10N
	Note: All linework approximate. Not for use or reproduction without consent from the author.

3.23 SANDWICK TECHNICAL EDUCATION PROJECT

Civic address:	2947 Rennison Road, Courtenay, BC		
PID:	005-019-818	**PID:**	005-019-818
Conservation Value	Nil		

Key Inventory Results:

- The conservation value ranking of this property is nil.
- Roadside ditch (Ditch 1; unlikely to be fish bearing) runs along Rennison Rd. along front of subject property. Flows into culvert at corner of Rennison Rd. and Headquarters Rd. and discharges into Portuguese Creek (fish bearing).
- Channelized stream (Stream 1; unlikely to be fish bearing) is piped beneath property. Flows into culvert at corner of Rennison Rd. and Headquarters Rd. and discharges into Portuguese Creek with Ditch 1.
- Limited terrestrial habitat – a few shrubs and trees on southeastern perimeter of lot and a strip of trees along Ditch 1 at front of property.
- No ecosystems or species at risk identified.
- Outdoor education opportunities:
  - Stream habitat – Portuguese Creek and Tsolum River nearby.
- No enhancement opportunities.

General Description of Property:

Sandwick Technical Education Project is located on a relatively small rural property north of the City of Courtenay on the corner of Rennison and Headquarters Roads. There are no playing fields associated with this school, and there are only a few patches of vegetation around the perimeter of the property.

Photos 1 and 2. Back of the school building showing an area that was recently cleared of shrubs (left) and a portion of the intact lawn behind the school (right).

Environmentally Sensitive Areas:

Aquatic Habitat	There is one roadside ditch (Ditch 1) that runs along the front of the property, and one channelized stream (Stream 1) that is piped underneath the property. Both Ditch 1 and Stream 1 feed into a culvert that crosses Rennison Road, and outlets at Portuguese Creek. Portuguese Creek is a

significant fish bearing stream and has known populations of coho salmon, cutthroat trout, and steelhead.

Ditch 1: Ditch 1 originates approximately 500 m upstream of the subject property and flows along the South side of Rennison road. This watercourse has a uniform shape and profile and has recently had riprap placed to stabilize its banks (Photos 3 and 4). Halfway across the front of the subject property, this ditch enters a culvert that crosses Rennison Road and outlets into Portuguese Creek. The culvert under the road is quite long (>25 m long) and a steep gradient (exact gradient was not obtained). This ditch dries seasonally.

With limited wetted habitat, and the steep and long culvert across Rennison Road, fish presence in Ditch 1 is unlikely. However, without a definitive barrier to fish passage, Ditch 1 is still considered to have possible fish presence; it receives a 5 m SPEA. It is important to retain riparian habitat around Ditch 1 as it helps to filter runoff, provides food and nutrients to fish habitat downstream, moderates water temperatures, and regulates the rate of stormwater runoff from the subject property and Rennison Road.

Stream 1: Stream 1 originates approximately 200 m upstream of the subject property in a low lying depression on the neighbouring property. Stream 1 has been channelized just before reaching the subject property and has been piped underneath the entire school property. Flows from Stream 1 merge with Ditch 1 across Rennison Road where they enter Portuguese Creek. Stream 1 dries seasonally.

As with Ditch 1, the culvert across Rennison Road likely precludes fish passage into Stream 1 as it is over 25 m long and set at a relatively steep gradient. However, without a definitive barrier to fish passage, Stream 1 is considered potentially fish bearing and has a SPEA of 10 m (the average width is less than 3 m).

There is no riparian area for Stream 1 along the subject property as this stream is piped, however there is a small cluster of shrubs and trees behind the school that provide some shade and nutrients to the open portion of the stream on the neighbouring property (Photos 5 and 6).

Photos 3 and 4. Ditch 1 along Rennison Road showing the portion in front of the school that has been recently treated with rip rap (left) and the portion further upstream on Rennison Road showing a uniform profile and cross section.

	  **Photos 5 and 6. Location where Stream 1 enters a culvert that runs underneath the school property (right) and riparian vegetation on the school property that helps provide shade and nutrients to the open section of Stream 1 on the neighbouring property.**  **Photo 7. Catch basin where Stream 1 crosses under Rennison Road.**
Terrestrial Habitat	**Vegetation:** Terrestrial habitat on the subject property is limited, with only a few shrubs and trees located on the perimeter of the lot. There is a strip of trees along Ditch 1 at the front of the property that are providing shade and nutrients to Ditch 1.
Wildlife Habitat Features	There are no wildlife features of note on the subject property.

Species at Risk	There are no known ecosystems or species at risk on the subject property according to CDC iMap. There are also no known bald eagle or great blue heron nests within 200 m of the subject property. These results were confirmed during the site visit, with no ecosystems/species at risk or raptor/heron nests observed on the subject property.

Outdoor Education Opportunities:

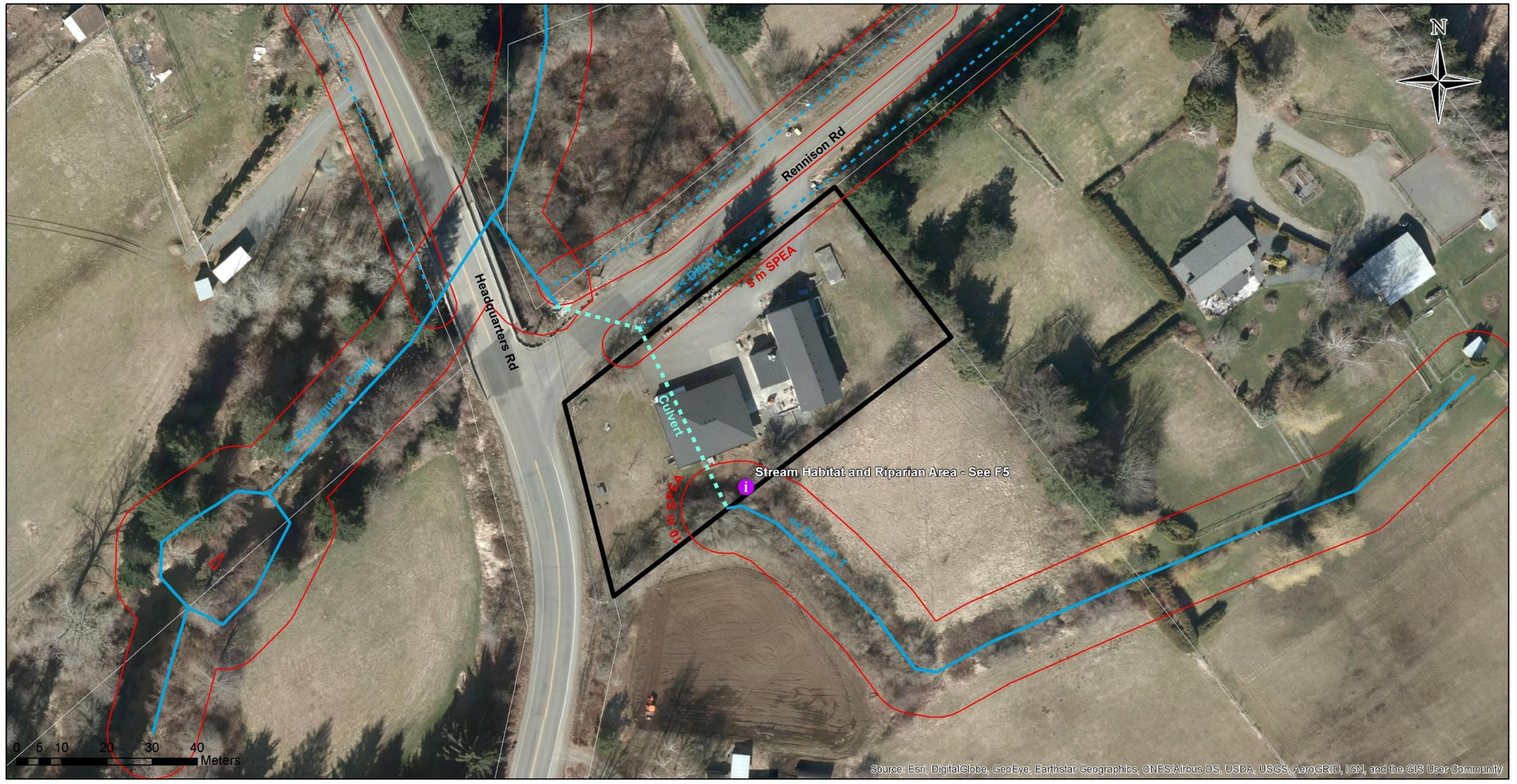
Learning opportunities and ecological points of interest on or near the subject property are provided in the following list. F-Series codes refer to the general description of these habitats and their ecological importance which is provided in the Ecological Points of Interest section of this report (Table 6 in Appendix A).

Stream habitat (See F5): With Portuguese Creek located across the street from the subject property, there is an opportunity to learn about this local creek (moistly via mapping as access is limited). Students might be interested in learning about this creek that meanders through rural properties north of Courtenay and discharges into the Tsolum River approximately 500 m downstream. Portuguese Creek provides valuable rearing habitat for coho salmon and cutthroat trout that remain in stream habitat year-round, searching for cool shaded water and pool habitat to survive the hot/dry summer weather.

The Tsolum River Restoration Society are an excellent source of educational opportunities and information for Portuguese Creek and have resources for teachers on their website (http://www.tsolumriver.org/teacher-resources.html).

Habitat Enhancement Opportunities:

There are no habitat enhancement opportunities to note on this property as space is limited, and the areas that have potential to have riparian habitat are already vegetated.



Legend

- Invasive Species
- Ecological Point of Interest
- Enhancement Opportunities Point
- Ditch
- Stream
- Wetland
- Parcels
- SD71 Boundaries
- Environmentally Sensitive Area
- Enhancement Opportunities
- Streamside Protection and Enhancement Area

Project: School District 71: Comox Valley Schools Environmental Inventory	Page 23 of 24
Site: Sandwick Technical Education Project	Date: March 15th, 2021 Author: C.O'Neill Projection: UTM NAD83 Zn10N
	Note: All linework approximate. Not for use or reproduction without consent from the author.

3.24 ATLAS ROAD PROPERTY

Civic address:	2055 Atlas Road, Comox, BC		
PID:	024-861-359	**Lot size:**	1.98 hectares
Conservation Value	High		

Key Inventory Results:

- The conservation value ranking of this property is high.
- The majority of the site is a second growth forest (50-70 years old) dominated by Douglas fir trees (wildlife trees and snags throughout).
- Invasive Scotch broom and Himalayan blackberry were present along road corridor that bisects property.
- Little brown myotis were recorded at the site (Listed on Schedule 1 [Endangered] in SARA; provincially yellow-listed).
- Outdoor education opportunities:
  - Bat Habitat.
  - Forest Habitat.
- No enhancement opportunities.

General Description of Property:

The Atlas Road property is a 1.98 Ha forested property owned by SD71 without any school buildings. With the exception of a gravel road that bisects the property near the northern boundary, the property is entirely forested.

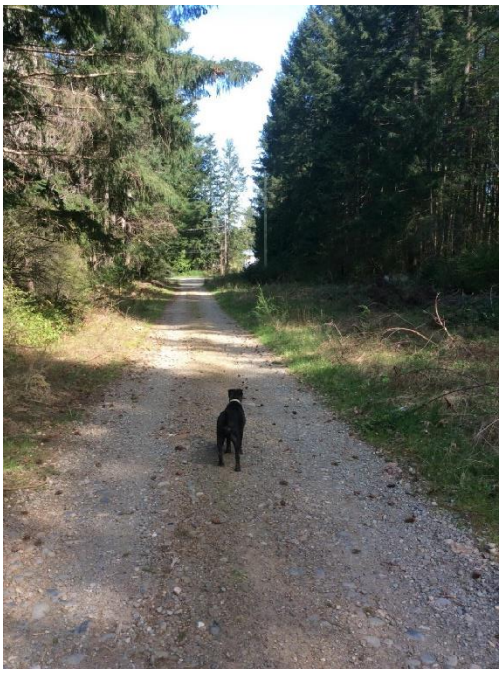


Photo 1. Gravel road that bisects property with forest on either side.

Environmentally Sensitive Areas: (delete categories below if no ESAs for that category)

Aquatic habitat	As evidenced by the vegetation community, the site is quite dry; there were no waterbodies observed on the site.
Terrestrial habitat	**Forest:** The Atlas Road property is mostly forested, with an access road that enters the lot. The forest stand is dominated by Douglas fir trees approximately 50-70 years of age with subpopulations of western red cedar, bigleaf maple, Douglas maple, and cascara with immature western hemlock in the understory. The shrub community was dominated by salal, red huckleberry, dull Oregon grape, and swordfern. There were no trails noted on the property and the presence of invasive species was limited to a Scotch broom and

	Himalayan blackberry along the road corridor that intersects the property. Overall, this site is an intact, second growth forest with minimal impacts from human development. The similar, contiguous forested areas to the east and west of the site contribute to the overall ecological value of the site; as a whole these areas comprise a significant, valuable forested area.   **Photos 2 and 3. Typical forest in Atlas Road property – Scotch broom present between road and forest (left).** **Bat Habitat:** Three species of bats were recorded at this site, with a relative activity of 10.0 bat calls/hour of survey effort. This was the lowest species diversity and bat activity compared to the other two properties surveyed. The Atlas Road property did not have any wetlands, streams/riparian areas, or large trees, which typically serve as roosting and foraging habitat for bats. Bats may use Atlas Road to travel between artificial ponds in the Crown Isle Golf Course for foraging activities. Roosting opportunities may be available for bats in the forest on the subject property. Only one hour of survey was conducted on one day for this property, therefore the lower species diversity and bat activity may be a result of the lower survey intensity rather than a lack of habitat features. See bat survey memo in Appendix D for more details.
Wildlife habitat features	Wildlife trees/snags were observed throughout the forested area on the site.
Species at Risk	Little brown myotis were recorded at the Atlas Road Property. These species are provincially yellow-listed, however they are listed on Schedule 1 (Endangered) of the federal *Species at Risk Act*. Little brown myotis populations have declined quickly throughout North American due to white nose syndrome (WNS), which kills 80-100% of affected colonies[47]. It is expected that WNS will soon affect little brown myotis in BC, since WNS was detected in bats near Seattle, Washington in 2016, which was the first known case of WNS in Western North America[48]. The conservation status of little brown myotis in BC will likely be impacted if WNS begins to affect bats in BC. There are no other known species at risk on the subject property according to CDC iMap. There are also no known bald eagle or great blue heron nests within 200 m of the subject property. These results were confirmed during the site visit, with no species at risk or raptor/heron nests observed on the subject property.
Outdoor Education Opportunities:	
Learning opportunities and ecological points of interest on or near the subject property are provided in the following list. F-Series codes refer to the general description of these habitats and their ecological importance which is provided in the Ecological Points of Interest section of this report (Table 6 in Appendix A).	

Bat Habitat (See F10): The presence of bats and bat habitat on the subject property, as described above, provides an opportunity to learn about this animal.

Forest Habitat (See F1): If this site were used by the school district in the future, it would be important to retain a portion of the forest on the property as it is a valuable teaching site to learn about forest habitat, wildlife features, terrestrial amphibian habitat, bird nesting habitat, etc.

Habitat Enhancement Opportunities:

There are no recommendations for enhancement at this site.

Legend

- Invasive Species
- Ecological Point of Interest
- Enhancement Opportunities Point
- Ditch
- Stream
- Wetland
- Parcels
- SD71 Boundaries
- Environmentally Sensitive Area
- Enhancement Opportunities
- Streamside Protection and Enhancement Area

Project: School District 71: Comox Valley Schools Environmental Inventory	Page 24 of 24
Site: Atlas Road Property	Date: March 15th, 2021 Author: C.O'Neill Projection: UTM NAD83 Zn10N
	Note: All linework approximate. Not for use or reproduction without consent from the author.
	current ENVIRONMENTAL

4 DISCUSSION

This section discusses the key results, recommendations, and suggested management protocols generated during the completion of this report.

4.1 CONSERVATION RANKING

Ascribing a *relative* conservation value that each SD71 property contributes to the region enables an informed prioritization of land management initiatives for the School District. To that end, the conservation ranking assessment completed as part of this larger inventory effort provides a standardized, science-based approach to achieving this.

The results of this work are summarized here, with conservation value rankings provided in Table 3. The full conservation ranking assessment memorandum, completed by Latitude is provided in Appendix G.

Table 3. Conservation Rankings for SD71 properties.

School Name	Conservation Value Ranking
Huband Elementary	Very High
Ecole Puntledge/Lake Trail	Very High
Atlas Rd Property	High
Miracle Beach Elementary	High
Vanier	High
Highland Park Secondary	High
Hornby Elementary	High
Airport Elementary	Medium
Isfeld and Valley View	Low
Denman Elementary	Low
NIDES/Tsolum School	Low
Royston Elementary	Low
Aspen Park Elementary	Low
Cumberland Elementary	Low
Ecole Robb Rd	Low
Glacier View Secondary	Low
Queneesh Elementary	Low
Brooklyn Elementary	Nil
Sandwick Tech Ed Park	Nil
Arden Elementary	Nil
Union Bay	Nil
Comox Elementary	Nil
Courtenay Elementary	Nil

4.1.1 Very High Ranking

Two SD71 properties scored "very high" – the Ecole Puntledge Park/Lake Trail Middle School and Huband Elementary properties. This is not a surprising result in light of the larger, more mature, intact forested communities and adjacency to park areas. These two properties contribute to regional biodiversity in a very significant way; any long-term planning and operational initiatives should be focused on protecting and enhancing the ecological integrity of these sites. Concurrently, the educational opportunities enabled by the high value of the properties will increase over time with conservation-based management approaches. Effective conservation within these properties will be a challenge, particularly so for the Puntledge/Lake Trail site in light of the extensive use of the sensitive areas by students and the local community (including Disc Golfers). Conservation Plans for these two properties, including a consideration of effective legal protection, is recommended.

4.1.2 High Ranking

School district properties that received a "High" ranking include Highland Secondary, G. P. Vanier Secondary, Hornby Island Elementary, and Miracle Beach Elementary. Each of these properties contain natural areas ranked as High conservation value but demonstrate uses that are tied to educational programming or active use by local residents (e.g., greenspace trails). Management efforts that focus on the conservation of natural values including protection and/or enhancement of ecological communities and wildlife habitats while maintaining or advancing educational opportunities or public use is recommended. Note that the proposed Comox Valley Nature-led *Vanier Forest Garry Oaks Restoration & Stewardship Pilot Project* is underway and will help fulfill this recommendation.

The property on Atlas Rd. is also ranked as High – a reflection of the relatively mature stand age and lower level of disturbance and public use. The long-term vision for use of this property is not currently known. The site would be an excellent candidate for designation as a community park with an emphasis on nature conservation.

4.1.3 Medium Ranking

Only one property was ranked as "Medium" conservation value: Airport Elementary. In this case, the natural area is best described as a forested area dominated by mature trees, but with an understory (both shrub and herb layers) that has been significantly impacted by trampling and compaction of soils. This property presents excellent opportunities for ecosystem restoration, while maintaining low-impact public recreational access by way of connective trails. Absence of mitigation of these impacts will likely result in the death of trees in this forest. A restoration prescription informed by a certified arborist be considered, and where possible, be implemented by students.

4.1.4 Low or Nil Ranking

Fifteen school properties were classified as having Low or Nil conservation value. This is a reflection of the aforementioned intensive land use dominated by school buildings and cleared playing fields. It should be noted that every property has the potential for some improvement in its biological condition whether that be through tree planting along the fence lines, changes to the landscaping that emphasize native plants, "pollinator gardens", or the installation of habitat features such as bird boxes or bat houses. There is tremendous opportunity to improve on the conservation value of these sites through projects tied to enhancing conservation values.

4.2 PRIORITY ENHANCEMENT ACTIVITIES

Ecological enhancement opportunities have been provided for all school sites within SD71. Many of these opportunities exist on multiple school properties, such as: trampled forest, riparian planting, removal of invasive species, and the opportunity to plant more native shrubs and trees. Specific methodologies for most of the re-occurring enhancement opportunities are included in Appendix A. The following table (Table 4) provides some guidance on the *priority* of these enhancement activities. Enhancement activities were ranked higher priority in situations where the ecological feature is currently under threat of continued damage if nothing is done. It should be noted that potential locations where bird and bat boxes can be installed have not been identified on the maps, however all schools would benefit from the installation of swallow or other bird nesting boxes, bat boxes, and mason bee houses.

Table 4. Priority Levels of the Enhancement Opportunities on SD71 School Sites

Enhancement Opportunity	Schools Where this Enhancement Opportunity is Recommended	Priority Level	Justification
Managing trampled forest areas (see E1 in Appendix B)	• Miracle Beach Elementary • Queneesh Elementary • Mark R. Isfeld Secondary and Valleyview Elementary • Airport Elementary • Brooklyn Elementary • Ecole Puntledge Park Elementary • Cumberland Community School • Hornby Island Community School	**High**	This activity is rated as high priority as there is a current threat to existing patches of forest on these school properties. If left unmanaged, this threat will increase and there is a risk of losing more trees and understory habitat. Trampled areas have no successional or "upcoming" vegetation to replace damaged trees and shrubs. The highest priority school for restoring trampled forest is Ecole Puntledge Park Elementary as the trampling is occurring in very high-value riparian areas.
Maintaining/installing boardwalk over ephemeral wet habitat (see E3 in Appendix B)	• Huband Park Elementary • North Island Distance Education School (neighbouring property) • Arden Elementary (neighbouring property)	**High**	There are existing trails through wet areas on or near these school sites which are being trampled, eroded, and damaged. In the most sensitive areas that are part of a pond, wetland or ephemeral stream, small sections of boardwalk should be installed to prevent damage to aquatic habitats. Students' shoes will be cleaner too! It is important to note that the wet areas referenced at NIDES and Arden Elementary are not on the school property, but on the neighbouring lots. However, these walking trails connect to these schools and students actively use these areas, therefore these management strategies should be applied to these neighbouring areas with the permission of the landowners. PAC groups may be interested in these projects.

Planting / enhancement of riparian areas (see E2 in Appendix B)	• Miracle Beach Elementary • Ecole Puntledge Park Elementary • Huband Park Elementary • Arden Elementary • Georges P. Vanier Secondary	**High**	The schools identified on this list all have fish-bearing streams, or watercourses that flow into fish habitat on (or along the edge of) their properties. Riparian/streamside areas on these school properties would benefit from some planting. This activity is considered higher priority as these sites are fairly exposed to foot traffic, trampling, and the release of sediment into aquatic habitat. The highest priority school for planting/enhancement of riparian areas is Ecole Puntledge Park Elementary as the riparian areas on this property are very high value and the trampling is extensive.
Address chronic sediment and erosion to Towhee Creek	• Georges P Vanier	**High**	The SD71 maintenance yard and operations are causing chronic sediment release to Towhee Creek. Correcting this issue will involve improving drainage infrastructure and installing settling/filtration features.
Deep, channelized drainage features along the southwestern border of the Vanier Forest are impairing wetland function and impacting hydrological processes.	• Georges P Vanier	**High**	There are two excavated channels along the southwestern boundary of the Vanier Forest that are to be backfilled with a suitable soil matrix and restored to a proper functioning condition.
Removal of Invasive Species (see E5 in Appendix B)	The schools with larger thickets/well established areas of invasive species are: • Georges P. Vanier Secondary • Glacierview Secondary Centre • Mark R. Isfeld Senior Secondary and Valleyview Elementary • Highland Secondary • Brooklyn Elementary • Ecole Robb Road • Aspen Park Elementary • Arden Elementary • Cumberland Community School • Royston Elementary • Denman Island Community School • Union Bay School	**Medium**	Nearly all schools had occurrences of invasive species, with the dominant invasive species being Himalayan blackberry. Some sites had very well-established thickets and patches of invasive species, and others only had isolated plants. The schools listed in this section all have well-established thickets or larger patches of invasive species. Removal of invasive species is considered medium priority, as it is not causing an immediate threat to ecological features, although it is hindering natural plant populations from getting established. Areas of invasive species removal should be replanted with native vegetation communities.
Re-greening of school sites. Planting of native trees/shrubs to enhance overall	The following school sites have minimal vegetation cover and would benefit significantly from	**Medium**	Many of the SD71 school sites provide much needed green spaces in the middle of densely urbanized areas. These green spaces, and specifically the trees and shrubs in these areas,

vegetation cover on school sites (see E4 in Appendix B).	planting more trees and native shrubs: • North Island Distance Education School • Glacierview Secondary Centre (in place of the blackberry thicket) • Brooklyn Elementary (unless a portion of the forest within the municipal parcel to the west of the school gets incorporated into the school property permanently) • Ecole Robb Road • Aspen Park Elementary • Courtenay Elementary • Arden Elementary • Cumberland Community School (enhance the northern strip) • Royston Elementary (in place of the blackberry thicket) • Denman Island Community School • Comox Elementary • Union Bay School		provide a number of important benefits to these urban areas not only for animal habitat and species diversity, but also for human health and well-being. Many of the school sites in SD71 would greatly benefit from the addition of trees and native shrubs to the edges of playing fields and around the school buildings. This enhancement activity is considered medium priority as does not involve an immediate threat to ecological features on site, however it is still an important consideration for improving the overall habitat quality at these sites. This is an excellent climate change action item and learning opportunity. PAC groups may be interested in these projects.
Installing swallow or other bird nesting boxes, bat boxes, and mason bee houses.	All school sites would benefit from the additional of these habitat features. However, the following school sites stand out as being especially good candidates: • North Island Distance Education School (swallow nesting boxes) • Huband Park Elementary (bat boxes) • Puntledge Park Elementary (bat boxes) • Hornby Island Community School (swallow and bat boxes) • Denman Island Community School (swallow boxes)	**Low**	Installation of these habitat features is easy, effective, and of low cost. PAC groups may be interested in these projects.

4.3 ENHANCEMENT ACTIVITY TIMELINE

4.4 TREE MANAGEMENT ON SD71 PROPERTIES

Trees are a highly valued component of school properties; they provide critical wildlife value, sequester carbon, enhance esthetic aspects of the landscape, moderate temperatures, and are simply cherished and enjoyed by children and the community as a whole. Unfortunately, trees pose risks to the safety of people and property. Unexpected failure of trees and larger limbs can result in serious injury and/or damage to buildings, cars, infrastructure, and recreational amenities. As a result, the management of trees is a complicated issue governed by conflicting parameters: decaying trees provide outstanding habitat value (See Table 6; F8) and yet pose the highest risk to safety and property.

Photo D-1. Topped tree providing wildlife habitat value.

Recognizing that this is an issue that must involve input from various professions and administrative agencies, this section focuses only on the ecological value of trees on SD71 properties and measures to minimize negative environmental impacts related to their management. Ultimately, the level of risk assumed by the SD71, supported by information provided by consulting arborists, will fall on the side of human safety and property protection. It is recommended that SD71 undertake the creation and adoption of a tree management policy to improve decision making protocols regarding tree management.

4.4.1 Objectives

The objectives of tree management initiatives should include:

1. Ensure human safety and protect property and infrastructure.
2. Minimize negative impacts on valued ecological components on school properties.
3. Ensure compliance with regulatory legislation.

4.4.2 Best Management Practices[49]

Tree management BMP's have been divided into two broad categories – Context Evaluation, and Operational Works.

4.4.2.1 Context Evaluation

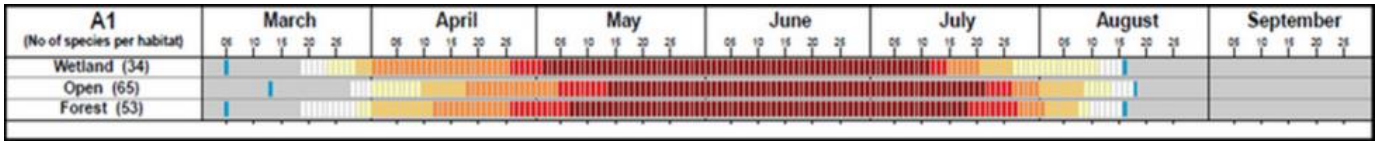
Context Evaluation is work that is to be completed by the tree management contractor prior to undertaking the actual tree management works. These BMP's are aimed at ensuring appropriate consideration of regulatory and environmental settings are considered prior to executing the tree manipulation work.

1. Confirm the need to remove or abate the tree.
    a. Usually, a tree will be designated as a "Hazard Tree" by a Qualified Environmental Professional (QEP) – particularly a qualified arborist certified as a Wildlife Danger Tree Assessor to trigger removal.

[49] The BMP's have been largely based on Best Management Practices for Tree Topping, Limbing, and Removal in Riparian Areas. BC Ministry of Environment. 2012.

2. Determine if the targeted tree lies within 30 m of an aquatic habitat.
    a. Aquatic habitat locations are provided on the school property specific Mapsheets.
    b. The 30 m distance is measured from the high-water mark of the waterbody.
    c. Riparian areas are important areas of biodiversity and should be managed carefully (see Table 6; F5).
3. If the targeted tree lies within 30 m of an aquatic habitat, consult with a QEP to ensure that there is no contravention of the Federal *Fisheries Act* or BC *Riparian Areas Protection Regulation*.
4. Confirm the tree does not contain a bird or its egg, or a raptor nest (heron, eagle, osprey, peregrine falcon or gyrfalcon).
    a. Raptor nests are indicated on the property-specific mapsheets, however, the locations of nests can change over time.
    b. If a raptor nest or active nest is encountered do not complete the work until consulting the services of a QEP.
5. If the management action is proposed to occur during the increased risk migratory and passerine nesting window for the South Coast (March 15 – Aug 15; Table 5) and has the potential to disturb bird nesting habitat, works should be delayed until this window closes.
    a. If these works must proceed during the nesting window, impact mitigation can be implemented through a pre-clearing survey conducted by QEP. If nest sites are encountered during the pre-clearing survey or the progress of work, suitable measures to avoid harm must be implemented.

Table 5. Nesting calendar for migratory bird species in Zone A (South Coast) showing the expected timing and number of nesting species by percentage.



Legend for calendars: Number of species in percentage (Blue markers shows extreme dates predicted for some atypical parts of the nesting zone where nesting could be earlier or later)

4.4.2.2 Operational Works

Operational Works includes all activities executed by the tree management contractor in the field. Essentially, it is the act of tree removal, limbing, topping, etc.

1. Where deemed safe to do so, **the preferred option is limbing or topping rather than removing the entire tree (Photo D-1 above).**
    a. Topped wildlife trees provide tremendous habitat and educational value within all landscapes – particularly urban areas[50].
    b. A preferred height of 7 m is generally recommended, though any retained tree portion is of benefit.
    c. Creating a jagged platform at the topping point to mimic natural habitat conditions is a good practise (Photo below).
    d. Maintain large branch stubs as much as possible to provide perching sites for wildlife.

[50] An excellent resource for understanding the value of wildlife trees in BC landscapes is Wildlife and Trees in British Columbia. 2006. Mike Fenger; Todd Manning & John Cooper. Lone Pine Press.

2. Limit vegetation removal to only that area which is required to avoid a hazard.
    a. Maximize tree and shrub understory retention.
3. Avoid falling, limbing or topping trees into any watercourse or wetland. Fine materials such as leaves and branches may block flows and are to be removed by hand.
    a. Trees may be felled across or into a water body ONLY where no other method of tree removal is possible due to safety concerns.
4. Retain large woody debris and the stubs of large diameter trees – the most valuable stubs and large woody debris is greater than 10 cm diameter and longer than 3 meters.
    a. LWD provides important, long lasting habitat for wildlife (see Table 6; F3).
    b. Where required, small branches and limbs may be removed offsite to reduce fire hazards.
5. Replant with native species of trees, shrubs and herbaceous plants ecologically suited to the site conditions.
    a. Choose native plants suited to the site conditions (i.e. suited to the Biogeoclimatic sub zone and site series).
        i. A native plant selection tool is provided in Appendix F of this report.
    b. Adjacent undisturbed riparian areas can be used as reference areas for suitable species.
    c. Where entire trees have been removed the BC Tree Replacement Criteria[51] are to be applied (see Figure 2 below).
6. All equipment and procedures used for vegetation management must prevent the discharge of deleterious substances into water bodies.
    a. Ensure equipment and machinery is in good operating condition (power washed), free of leaks or excess oil and grease.
    b. No equipment refuelling or servicing should be undertaken within 30 m of any watercourse or surface water drainage.
    c. Ensure all hydraulic machinery to be used around streams is clean and uses environmentally sensitive hydraulic fluids which are non-toxic to aquatic life, and which are inherently biodegradable.
    d. Keep a spill containment kit readily accessible onsite in the event of a release of a deleterious substance to the environment.
7. Timing windows – If proposed works pose risks to fish and wildlife and their habitat, then the works are to take place during the instream works reduced risk timing window provided by the regional Ministry of Environment (MOE) Office.
    a. As a guideline, the general fisheries work window for the SD71 area is June 15th to September 15th.
        i. Certain streams, particularly Morrison Creek, have different timing windows based on the populations of fish that inhabit the watercourses. The timing window for Morrison Creek is August 15th to September 15th.
    b. It is recommended that the tree management contractor retain records to demonstrate compliance with BMPs and due diligence in meeting the requirements of applicable legislation. Photo documentation prior to and after completion of works may be requested during follow-up monitoring by regulatory agencies.

[51] http://srmwww.gov.bc.ca/sry/csd/downloads/forms/vegetation_riparian/treereplcrit.pdf

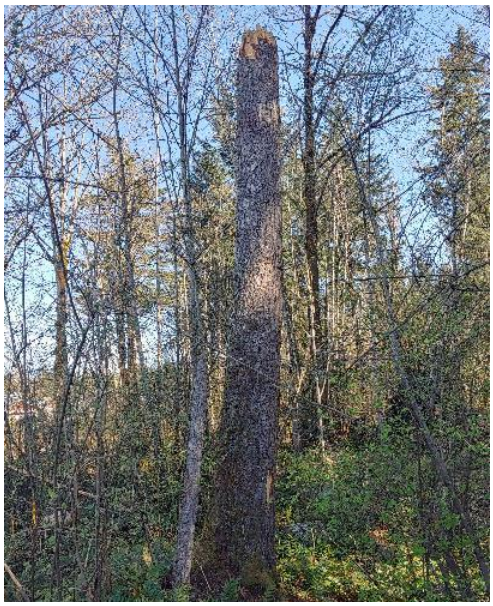


Photo D2. Broken top of a wildlife tree providing habitat.

TREE REPLACEMENT CRITERIA:

The criteria below apply to the replacement of trees authorized for removal under the *Fisheries Act*, *Wildlife Act* or *Land Title Act* by BC Environment, Fish, Wildlife and Habitat Protection. Requests for authorization should be accompanied by a tree survey and replacement planting plans completed by a professionally certified environmental consultant and detailing numbers, sizes and species. Species suitable for replacement will be based on site specific conditions.

• 0 mm - 151 mm (6") dbh◆	2 replacement trees (min height 1.5 m), or, 4 shrubs (for up to 50% of trees being replaced in this range);
• 152 mm - 304 mm (12") dbh	3 replacement trees (min height 1.5 m);
• 305 mm - 456 mm (18") dbh	4 replacement trees (min height 2.0 m);
• 457 mm - 609 mm (24") dbh	6 replacement trees (min height >* 2.0 m);
• 610 mm - 914 mm (36") dbh	8 replacement trees (min height > 2.0 m).

Trees > 914 mm dbh (36") will require individual approval and replacement criteria prior to removal.

Every effort must be made to retain 20% of trees > 304 mm dbh (12") as wildlife snags at minimum height of 3 m.

◆ dbh = diameter breast height
* > = greater than

Figure 2. Provincial Tree Replacement Criteria

4.5 MANAGEMENT OF AQUATIC SPEAS/SETBACK AREAS

As mentioned, SD71 properties are exempt from regulation under the *BC RAPR*[3] "institutional" body. However, development, including land alteration and tree management activities, are still subject to the Federal *Fisheries Act*[4] and BC *Water Sustainability Act*[13].

To support SD71 operational maintenance, enhancement, and development works on the properties, each aquatic feature on the property has been prescribed a SPEA using the RAPR Assessment methods to help ensure compliance with the abovementioned regulations. A SPEA is an ecologically critical riparian habitat area within which development of any kind, including vegetation removal, is not permitted. As much as possible, these areas should be comprised of healthy communities of native vegetation to support ecological processes such as shading of aquatic features, bank stability, food production for aquatic life, and water quality maintenance. In terms of site enhancement efforts such as revegetation, invasive species removal, and location of trails, SPEA areas should be an area of focus.

Prescribed SPEA widths are provided spatially on mapsheets and listed in the property descriptions in Section 3.

4.5.1 Ditches

By nature, school properties have a lot of ditches – particularly on the edges of playing fields. Usually, the SPEA width along a ditch is 5 m assuming fish presence within the ditch; rarely the SPEA width is 2 m (non-fish bearing ditches). Recognizing the need to mow grass along playing fields, this is an acceptable practice. However, extreme caution must be exercised to ensure valued vegetation such as native shrubs and trees is not harmed. Oftentimes, recently planted shrubs and trees can be unwittingly mowed by grounds staff if the correct information is not conveyed.

4.5.2 Summary of SPEA Management on SD71 Properties.

1. Absolutely no development within SPEA's.
2. Focus areas for enhancement initiatives (planting native species, removal of invasives, etc.) due to their high riparian value.
3. Mowing is permitted in areas of turf grasses only; it is preferable to encourage the establishment of shrub and tree species.

5 SUMMARY OF KEY FINDINGS AND RECOMMENDATIONS

The following section outlines the key findings and recommendations generated by the completion of this report.

1. **Conservation Value of School Properties**

    a. Two SD71 properties scored "Very High" – the Ecole Puntledge Park/Lake Trail Middle School and Huband Elementary properties.

        i. Long-term planning and operational initiatives should be focused on protecting and enhancing the ecological integrity of these sites. Concurrently, the educational opportunities enabled by the high value of the properties will increase over time with conservation-based management approaches. Effective conservation within these properties will be a challenge, particularly so for the Puntledge/Lake Trail site in light of the extensive use of the sensitive areas by students and the local community (including Disc Golfers).

ii. Conservation Plans for these two properties, including a consideration of effective legal protection, is recommended.

b. School district properties that received a "High" ranking include Highland Secondary, G. P. Vanier Secondary, Hornby Island Elementary, and Miracle Beach Elementary.

i. Management efforts that focus on the conservation of natural values including protection and/or enhancement of ecological communities and wildlife habitats while maintaining or advancing educational opportunities or public use is recommended.

ii. Management Plans for these two properties to implement, including a consideration of effective legal protection, is recommended.

iii. The proposed Comox Valley Nature-led *Vanier Forest Garry Oaks Restoration & Stewardship Pilot Project* is underway and will help fulfill this recommendation.

iv. The property on Atlas Rd. is also ranked as High – a reflection of the relatively mature stand age and lower level of disturbance and public use. The long-term vision for use of this property is not currently known. The site would be an excellent candidate for designation as a community park with an emphasis on nature conservation.

c. One property was ranked as having "Medium" conservation value: Airport Elementary.

i. The natural forest area of this property is threatened by trampling and compaction of soils that may result in the death of trees. This property presents excellent opportunities for ecosystem restoration, while maintaining low-impact public recreational access by way of connective trails. A restoration prescription to address this issue should be considered; the plan could then be implemented by students.

2. Trampling of Forest/Loss of Trees

Trees are beloved by students, staff, and community residents. With the exception of a few schools, all SD71 lands contain stands of trees. They are also absolutely critical to ecosystemic function and provide ancillary benefits to our schools and communities such as temperature regulation, esthetic value, and carbon sequestration. Because of these values, they also afford tremendous outdoor educational opportunities. Unfortunately, a recurring observation across all the school sites is the chronic degradation of the health of trees. Most significantly, soil compaction and concurrent loss of understory vegetation resulting from pedestrian traffic is slowly killing trees throughout the district.

Enhancement efforts provided in this report, including native plantings, demarcation restoration areas, mulching, and programmed access should be considered a priority.

a. Tree Management Plan

Further to the above, it is recommended that an SD71 Tree Management Plan be completed by a suitably qualified Arborist. The plan can build on the inventory work completed for this assessment.

3. Invasive Species

The frequent location of schools within developed urban and residential areas and heavy use by students and local community members means that their grounds are exposed to the introduction of invasive species. The project results definitively support this statement. Thickets of Himalayan blackberry were frequently observed along playing field edges and in riparian areas. English ivy – a species known to kill large trees over the long term was observed in many locations. Of particular note, a population of English holly has literally "exploded" in the Vanier Forest at an alarming rate.

Invasive species locations for each school are noted on mapsheets and detailed in in the property descriptions in Section 3. Prompt remediation of these areas is recommended and can be part of an educational outdoor learning program.

4. Ecological Enhancement Opportunities

The primary ecological enhancement opportunities detailed in this assessment include addressing trampled forest and compacted soil areas, invasive species removal, and revegetation of specific areas. Enhancement opportunities for each school are noted on mapsheets and in the property descriptions in Section 3. In general, riparian areas are a good area of focus due to their significant ecological value. Details on these enhancement opportunities are provided in Table 7 (Appendix B).

The placement of man-made avian nest and bat roosting boxes would be of benefit on all SD71 properties.

5. Tree Management

Trees are a highly valued component of school properties; they provide critical wildlife value, sequester carbon, enhance esthetic aspects of the landscape, moderate temperatures, and are simply cherished and enjoyed by children and the community as a whole. Unfortunately, trees pose risks to the safety of people and property. Unexpected failure of trees and larger limbs can result in serious injury and/or damage to buildings, cars, infrastructure, and recreational amenities. As a result, the management of trees is a complicated issue governed by conflicting parameters: decaying trees provide outstanding habitat value and yet pose the highest risk to safety and property.

Recognizing that this is an issue that must involve input from various professions and administrative agencies, this report focused only on the ecological value of trees on SD71 properties and measures to minimize negative environmental impacts related to their management. Ultimately, the level of risk assumed by the SD71, supported by information provided by consulting arborists, will fall on the side of human safety and property protection.

a. It is recommended that SD71 undertake the creation and adoption of a tree management policy to improve decision making protocols regarding tree management.
b. Numerous BMP's to protect habitat value during tree management on SD71 properties are provided in this report (Section 4.3.2).
    a. In addition to the protection of trees from trampling through restoration efforts mentioned elsewhere, the most important of these measures is to, as much as safely possible, limb or top decaying trees rather than removing the entire tree.
        i. Topped wildlife trees provide tremendous habitat and educational value within all landscapes – particularly urban areas.

6. Management of Aquatic SPEA/Setback Areas

a. SD71 properties are exempt from regulation under the *BC RAPR* "institutional" body but must maintain compliance with the Federal *Fisheries Act* and BC *Water Sustainability Act*.

b. All aquatic habitats and SPEA setback areas on school properties are outlined on property-specific mapsheets.
    i. SPEA/Setback areas are ecologically critical riparian habitat areas within which development of any kind, including vegetation removal, is not permitted.

ii. Focus areas for enhancement initiatives (planting native species, removal of invasives, etc) due to their high riparian value.
iii. Mowing is permitted in areas of turf grasses only.

7. Outdoor Education Opportunities

As the SD71 curriculum continues to increase focus on outdoor education opportunities, the project team have endeavoured to outline viable and interesting educational opportunities noted on the school properties. Locations of educational opportunity sites are indicated on the property-specific mapsheets and in the property descriptions in Section 3.. Where similar opportunities and topics arose at several sites, general ecological features of interest were described in Table 6 provided in Appendix A. This program can be expanded and developed over time.

8. Rare Species

a. Rare animal species.

Several rare animal species were noted to be within or in close proximity to SD71 lands. These include:

Species Reported or Observed		School Property*	BC Listing
Morrison Creek Lamprey	*Lampetra richardsoni pop. 1*	Lake Trail/Puntledge Park	Red
Western Screech-owl	*Megascops kennicottii kennicottii*	Lake Trail/Puntledge Park	Blue
Great Blue Heron	*Ardea herodias fannini*	Lake Trail/Puntledge Park	Blue
Band-tailed Pigeon	*Patagioenas fasciata*	Lake Trail/Puntledge Park	Blue
Black Swift	*Cypseloides niger*	Lake Trail/Puntledge Park	Blue
California Gull	*Larus californicus*	Lake Trail/Puntledge Park	Blue
Townsend's Big-eared Bat	*Corynorhinus townsendii*	Lake Trail/Puntledge Park	Blue
Fringed Myotis	*Myotis thysanodes*	Lake Trail/Puntledge Park	Blue
Little Brown Myotis	*Myotis lucifugus*	Lake Trail/Puntledge Park and Atlas Rd.	Yellow**
Taylor's Checkerspot Butterfly	*Euphydryas editha taylori*	Denman	Red
Tundra Swan	*Cygus columbianus*	NIDES	Blue
Barn Swallow	*Hirundo rustica*	NIDES	Blue
Northern Red-legged Frog	*Rana aurora*	Huband	Blue
*Most of these species listed were found off of, but within 100 m of school properties in similar habitats.			
** Federally listed as endangered (COSEWIC).			

b. No rare vegetation species were found throughout the SD71 lands.

Due to their biodiversity value and promise from an educational perspective (helped by their stationary location), it was hoped that an assessment of rare populations of vegetation species would be of benefit. Unfortunately, no rare plant species were located during the study.

c. There are several Garry oak tree stands and individual trees located throughout the Vanier property.

9. Aquatic Habitats

There are a variety of aquatic habitats located throughout the SD71 properties. Aquatic habitats include wetlands, streams, ditches, swales, and isolated depressions. These are explicitly outlined on mapsheets and in the property descriptions in Section 3 of the report. When working in proximity to aquatic habitats, the management of deleterious materials – particularly the release of sediment and toxic materials such as fuels, other hydrocarbons and concrete wash – must be carefully handled to ensure they are properly contained.

6 CLOSURE

We trust that this report satisfies the requirement to provide an Environmental Inventory of the 24 properties within School District 71 in the Comox Valley. Should you have any questions or concerns about the material presented in this report, please don't hesitate to contact the undersigned.

Sincerely,

Caitlin O'Neill, Technologist,
Current Environmental Ltd.

and

Warren Fleenor, R.P.Bio.,
Current Environmental Ltd.

7 DISCLAIMER

This report was prepared exclusively for School District 71 by Current Environmental Ltd. The quality of information, conclusions and estimates contained herein is consistent with the level of effort expended and is based on: i) information available at the time of preparation; ii) data collected by the authors and/or supplied by outside sources; and iii) the assumptions, conditions and qualifications set forth in this report. This report is intended to be used by School District 71 only, subject to the terms and conditions of its contract or understanding with Current Environmental Ltd. Other use or reliance on this report by any third party is at that party's sole risk.

APPENDIX A: ECOLOGICAL POINTS OF INTEREST AND OUTDOOR LEARNING OPPORTUNITIES

(Following 11 pages)

Ecological Points of Interest

The following table (Table 6) provides a description of some of the key ecological points of interest and outdoor learning opportunities identified on school sites throughout the Comox Valley. With many of these features present on multiple school sites, these descriptions provide a general overview of the ecological function of these features. The letter and number references (F1, F2, etc.) are indicated on property-specific maps and descriptions in Section 3.

Table 6. General descriptions of ecological features and outdoor education opportunities on Comox Valley school properties.

F1. Forest Habitat

Forested habitats are ubiquitous features of the temperate Comox Valley region, which is located within the Coastal Western Hemlock Very Dry Maritime (CWHxm) Biogeoclimatic (BGC) zone. These BGC zones are differentiated by the different communities of vegetation and wildlife present that result from the unique biophysical conditions (soil, weather, topography, elevation, etc.) of a region. The CWHxm zone occurs between sea level and 700 m of elevation along the east side of Vancouver Island. The CWHxm has warm, dry summers and moist, mild winters with relatively little snowfall; growing seasons are long. CWH forests are dominated by Douglas fir trees, accompanied by western hemlock and minor populations of western red cedar. Major understory species include salal, dull Oregon-grape, and red huckleberry. Less common species include vanilla-leaf, sword fern, twinflower, and bracken fern.

None of the forested lands on SD71 properties are characterized as "old growth" – this designation requires a stand age of greater than 250 years! Some forests on SD71 lands – the Vanier Forest, Miracle Beach Elementary Forest, Hornby Island Community School Forest, and Puntledge Park/Lake Trail forest for example – are classified as "mature" – with stand ages of between 60 to 80 years of age. Despite the forests on SD71 properties being of varying age class, stand quality, and structure composition, all are valuable habitats that in time will become mature forests.

Forested areas on SD71-held lands provide numerous functions that are foundational to the health of our local ecosystems. They provide diverse structural habitats for various wildlife and plants, provide food, shade and nutrients to watercourses and wetlands, create soil, filter water, and clean the air. Forests also catch and store carbon from our atmosphere helping us to reduce the impacts of climate change. All forested areas on SD71 properties are very significant from an environmental perspective. The usual urban or residential-based settings of school properties mean that forest habitats are heavily and increasingly fragmented; this underscores the regional significance of these areas and the need to protect and steward them. Older forests support higher levels of biodiversity due to their more diverse structure, higher number of wildlife or snag trees, well developed soil structure, and lower history of disturbance. Over time, the ecological value and educational potential of forested areas on SD71 properties will increase tremendously as they mature; it is recommended that they be treated with high levels of care and stewardship. Several aspects of forest care and enhancement are discussed in subsequent sections.

Intact Forest at Miracle Beach Elementary

F2. Amphibian Habitat

An amphibian is an animal like a frog, toad, or salamander that is part of a specific group of animals that typically have two main life stages: an aquatic stage and a terrestrial stage. Amphibians usually begin their lives as eggs in the water, hatch into a larval phase that live in the water, and eventually undergo metamorphosis and become adults. Adults may spend a lot of time on land but also like to return to water and need water to breed. Exceptions to this rule exist; some amphibians in BC do not start in water and remain terrestrial for their whole lives (but still like moist habitat) and some *individuals* of certain species have "neotenic" life stages which means they keep some of their larval characteristics and remain in aquatic habitats as adults.

Most amphibians (except neotenic individuals) require terrestrial habitat as part of their adult life stages. Important terrestrial habitat elements for amphibians include damp forest with decaying stumps, logs, and dense understory vegetation (like ferns) where amphibians take refuge as well as forage in rotting logs, piles of bark, rodent burrows, or other cavities on the forest floor. Amphibians breathe through their lungs and skin (and some ONLY breathe through their skin); as such their skin needs to stay wet to absorb oxygen. Moist forest habitat helps amphibians with moisture retention and temperature regulation (amphibians are cold-blooded).

Wetted habitat for breeding amphibians is a critical ecosystem element. As most amphibian species lay eggs in water, they typically require wetted habitat through the end of July to support development of eggs to larval and adult stages.

The native amphibians that live in the Comox Valley (species from this area that have not been introduced by people) are:

1. **Pacific treefrog –** Small frog that breeds in ephemeral or seasonally wetted depressions.
2. **Northern red-legged frog –** Medium sized frog, breeds in seasonally wetted ponds; provincially blue-listed (i.e., rare).
3. **Western toad –** Medium sized toad, has bumpy/warty skin, breeds in seasonally wetted ponds.
4. **Northwestern salamander –** Large "mole" salamander that breeds in aquatic habitat. If a pond is wetted year-round this species can adapt to become neotenic adults meaning the adults do not metamorphose and stay in their aquatic form as adults.
5. **Roughskin newt –** Medium sized aquatic breeding salamander that has brown "dry" looking skin with an orange belly.
6. **Long-toed salamander –** Medium sized aquatic breeding salamander.
7. **Western red-backed salamander** – Small terrestrial breeding salamander, often has a red stripe down its back.
8. **Ensatina –** Small terrestrial breeding salamander, yellow to cream in colour.
9. **Wandering salamander –** Small terrestrial breeding salamander; provincially blue-listed (i.e., rare).

Wandering salamander (left), Pacific treefrog (center) and a northwestern salamander egg mass (right).

F3. Large Woody Debris on Forest Floor

Large woody debris (LWD) is any type of large, intact piece of wood, like a tree trunk or stump, that rests on the forest floor. LWD provides important habitat for wildlife and plant species. Small mammals and terrestrial amphibians depend on them for shelter and foraging. Some terrestrial amphibians, like the wandering salamander, rely on LWD for breeding as well; females lay eggs in crevices in decaying logs and stay with them until they hatch. The larger the piece of wood the longer it takes to decompose compared to small pieces of wood or leaf litter. As the wood decays, it transitions between different types of habitat that provide specific needs for wildlife and vegetation species. As such, a large tree can provide a huge range of habitats and services for a diverse group of plants and animals.

LWD can also help the forest and its inhabitants in less obvious ways; fallen trees are a major source of organic matter and provide essential nutrients during decomposition. The Comox Valley is home to temperate rainforests, which get their name from the mild, wet climate that they are found in. High rainfall amounts, which are caused by Pacific air hitting mountain ranges and releasing its moisture, means nutrients are quickly leached out of soils. Vegetation holds a huge amount of the nutrient content of a forest and rotting wood on the forest floor releases those nutrients, making them available to new plant growth.

Woody debris on forest floor providing habitat and nutrients

Other functional roles provided by LWD include:

1. Provides nutrient sources and growing substrates for various bacteria and fungi (including important mycorrhizal fungi), as well as mosses and lichens, which are important in decay, nitrogen production, and other nutrient and moisture cycling.
2. Carbon sequestration/storage.
3. Soil stability and erosion control.
4. Improves overall forest structural diversity.
5. Influences vertebrate abundance and richness by providing[52]:
    a) Sheltered areas for reproduction for a range of vertebrates from salamanders to black bears and cover from aerial predators.
    b) Necessary substrate, energy, and nutrients for many invertebrates upon which a wide range of amphibian, reptile, bird, and small mammal species forage.
    c) Runways for small mammals and display or lookout posts for birds.

An excellent resource for understanding the value of wildlife trees and woody debris in BC is *Wildlife and Trees in British Columbia*, by Mike Fenger; Todd Manning & John Cooper. Lone Pine Press[21].

[52] F.L. Bunnell, Kremsater, L. L., and Wind, E. (2020). *Managing to sustain vertebrate richness in forests of the Pacific Northwest: relationships within stands*. Centre for Applied Conservation Biology, University of British Columbia, Vancouver, BC V6T 1Z4, Canada

F4. Wetland Habitat

Wetlands are areas where water covers the soil or saturates the soil up to the surface. The water level in a wetland usually changes throughout the year; some dry completely during summer months (a seasonal wetland), and some remain wet all year round (a perennial wetland). The water level and amount of time a wetland is wet helps to determine what kinds of plants grow in the wetland and what types of animals live there. More water and longer saturation time mean the plant community will have more "water loving" plants, which are also called "hydrophytes".

There are a lot of different kinds of wetlands. These are determined by how long they stay wet, the depth of water, water chemistry, the plant community that grows in it, and soil types. In BC, we commonly see wetlands like bogs, fens, swamps, and marshes. Some wetlands are isolated and have no other waterbody connected to them aboveground. Others are fed by a stream, ditch, or other type of watercourse, and in turn drain into a watercourse downstream.

Wetlands are extremely important, both to humans and the wide variety of wildlife and plant communities that use them. Almost all species use wetlands at some point in their life cycle. Some animals depend on them to survive, such as fish, certain insects, and amphibians and hydrophytic vegetation communities. Wetlands also filter surface water and help maintain water quality by removing sediment and excess nutrients. They also help protect property and habitats from both flooding and drought thanks to their "spongelike" function. In flood situations, wetlands can hold extra water and release it more slowly downstream, preventing flooding and erosion of downstream habitats and properties. In very dry conditions, wetlands retain water and release it slowly over time to keep areas wetted longer. Another benefit of wetlands is that they can store greenhouse gases and ultimately help protect us from climate change.

Wetlands support landscape biodiversity by providing unique habitat conditions for hydrophytic and semi-terrestrial vegetation communities and many species of wildlife.

Skunk cabbage swamp wetland in the Comox Valley (left) and slough sedge swamp in the forest behind Vanier Secondary (right)

F5. Stream and Riparian Habitat

A stream is a flowing body of water that collects local runoff and groundwater and conveys it out to sea. Streams can flow year-round (perennial) or they can dry up in the summer months (seasonal); all types of streams provide important habitat and functions in the landscape.

Streams provide important habitat for animals; the most obvious being fish (salmon, trout, lamprey, stickleback, etc.), amphibians (frogs, salamanders, etc.), and invertebrates (dragonfly larvae, worms, crayfish, etc.). Streams help supply water to downstream areas and habitat. Along with water, sediments, nutrients, and organic matter are also conveyed to downstream areas. Upper reaches (headwater reaches) of streams that do not directly provide habitat to fish provide critical functions such as food sources (debris and leaf litter to drive food webs and invertebrates) to downstream reaches.

Streams change seasonally in our region, with more water in the winter rainy months and less water (or sometimes no water) in the dry summer months. Animals have adapted to this seasonality in our streams. For example, salmon return to the rivers and streams to spawn in the fall during the onset of winter rains when there is more water available for swimming upriver. They lay their eggs in the gravel and rely on cool winter water temperatures and rain to keep the eggs underwater and well oxygenated while they incubate. Most juvenile salmon hatch and emerge from streams into the ocean in late winter/early spring before streams start to dry up in the summer. Some species, like Coho salmon, stay in freshwater for a year before heading out to the ocean, so they rely on a portion of their stream habitat staying wetted year-round.

Riparian areas are the vegetated areas or buffers that border any aquatic habitat (ditches, streams, lakes, and wetlands). These areas provide many critical functions for fish habitat including shade/temperature regulation, shelter from predators, nutrient inputs, food sources (insect drop), bank stability, and large woody debris inputs that provide in-stream refuge habitat. Healthy riparian areas also provide many other benefits to the urban landscape including reducing flood hazards, increasing water storage during droughts, improving water and air quality, lowering the costs of stormwater management, increasing aesthetic values, providing more bank stability, decreasing heating and cooling costs, and also providing habitat to a wide range of plant and animals species. Species richness or biodiversity is highest in riparian areas relative to other habitat types in temperate rainforests.

Riparian areas are important habitat features within temperate forest landscapes. The productivity and complexity of riparian habitats – typified by a proximity to water, mixes of conifer and deciduous trees, high density of shrub cover, large trees, snags, and downed wood – create a complex array of niche habitats that support species richness. Riparian areas also provide moderated microclimate areas and conditions not commonly available in upslope areas, and linear nature provides critical landscape connectivity across diverse geographic scales. Combined, these features make important contributions to local and regional biodiversity. As an example, the proportion of terrestrial vertebrate species that utilize riparian habitats is relatively consistent and large: 48 to 55 % of all vertebrate species in BC use these areas[52].

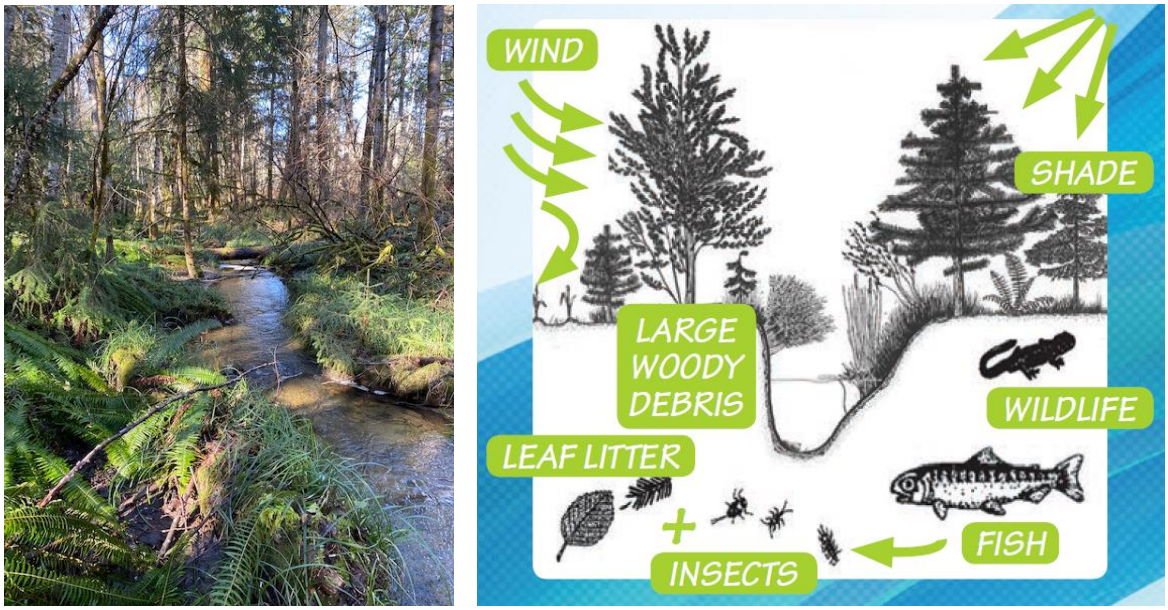
The various components that contribute to healthy riparian areas are as follows (also shown in the figure below):

- Sources of large organic debris, such as fallen trees and tree roots that provide instream cover and wildlife habitat;
- Tall coniferous and deciduous trees and shrubs that provide shade and leaf litter to the stream;
- Accumulated leaf litter on the forest floor and stream edges that attract insects (food sources for fish) and provide nutrients to the stream;
- Areas for stream channel migration and high flow channels;
- Established roots that anchor the soil and mitigate against bank erosion; and
- Vegetative networks that help to filter sediment laden water and pollutants in surface run-off.

Habitat fragmentation is a serious issue impacting our native plant and wildlife species and communities. As a result of their linear form, streams and riparian areas provide important landscape connectivity to maintain resilience against this

habitat loss. These corridors support wildlife migration (see below) and biodiversity by connecting populations and communities across the spectrum of various ecosystem types (e.g., mountain habitats to lowland areas) and over longer distances.

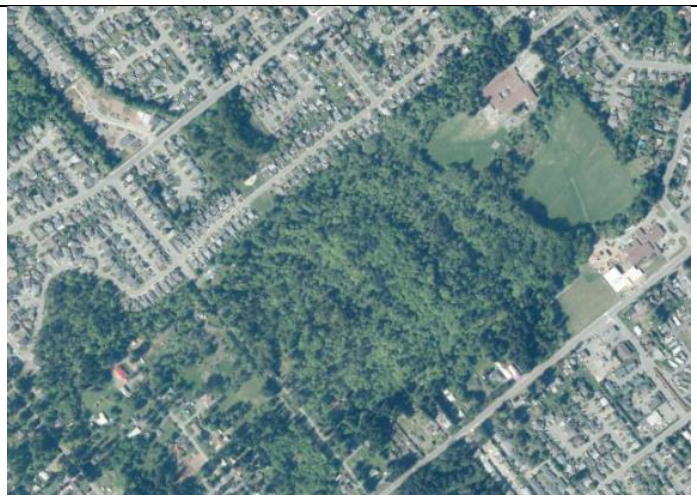
DFO provides resources for teachers about watersheds, salmon, and riparian habitat:
https://www.pac.dfo-mpo.gc.ca/education/resources-ressources-eng.html



Stream habitat adjacent to the Miracle Beach Elementary School property (left) and a diagram from the BC Riparian Areas Protection Regulation that represents the various functions of riparian areas (right).

F6. Wildlife Corridor

An important way to meet the habitat needs of wildlife is to ensure that ecosystems are still connected to each other. Wildlife corridors are areas of relatively undisturbed habitat that can act as a connection between important habitat areas. They support wildlife movement between different areas and ultimately help maintain viable populations with genetic diversity in both animals (moving around to breed with others in different areas) and plants (movement of animals, water, and wind between areas can help pollinate plants and transfer seeds). Wildlife corridors can help connect areas of intact habitat now that habitat loss and fragmentation are causing large impacts to biodiversity. Wildlife corridors can range in size from a small strip of riparian vegetation along a stream to huge, forested areas. The minimum size of a wildlife corridor depends on what kind of species will traverse it and what functions it will serve. In general, the larger the corridor, the better the ecological value.



Landscape connectivity at Puntledge Park and Lake Trail Schools. Source: CVRD iMap service (https://www.comoxvalleyrd.ca/about/about-cvrd/imap).

F7. Nurse Logs and Stumps

Nurse logs and stumps are dead pieces of wood that facilitate growth of new plants by providing light, nutrients, water, and protection from disease, meaning they may have a better chance of survival growing on top of a nurse log compared to on the ground. Perched up on a nurse log, a new seedling may have better access to light than the seedlings below on the forest floor.

While nutrients can be scarce on the forest floor in our region, nurse logs provide an excellent source of nutrients as they are decomposed by microorganisms. As nurse logs and stumps begin to rot, pockets of soil form and seedlings can take root. Large pieces of wood can take a long time to rot completely; by this time, the new plant will have strong roots and will be able to support itself. Soil may also dry out on the forest floor, but a decomposing log may retain moisture and make it available to a new plant.

As well, compared to soil, a nurse log may contain fewer pathogens, meaning a safer growing substrate for a new plant. A new plant growing on an old log may benefit from its old host's "connections" – old trees would have established mycorrhizal associations. Mycorrhizal fungi are types of fungus that grow on the root system of a plant and help it absorb more water and nutrients and can also help protect against pathogens.

Nurse stump at Queneesh Elementary

F8. Wildlife Trees ("Snags")

Wildlife trees, also referred to as "snags", are dead or dying trees that are still standing. While many people see these as eyesores to be removed, closer inspection will reveal that they provide essential habitat and ecological function to our Vancouver Island ecosystems. Wildlife trees are one of the most valuable components of forest biodiversity. Notable functions provided by these features include:

1. The decaying wood in these trees support huge biomass and diversity of inspect species (millipedes, mites, beetles, spiders, ants, worms, etc.), which in turn provide food sources for other wildlife (birds, amphibians, mammals).

2. The softer wood of these trees is excavated by primary cavity nesting species as they forage for food (woodpeckers, flickers, nuthatches, and sapsuckers). Woodpeckers are generally known as a "keystone species" due to the important influence they have on other species and ecosystem function through their prolific creation of cavities in wildlife trees.

3. Excavated cavities in snags are then used by countless other wildlife (small mammals like bats, rodents, and squirrels), other birds, amphibians, and mollusks for food, shelter and protection from predation.

4. The broken or sparsely vegetated tops of these trees provide nesting platforms or hunting perches for raptors (eagles, osprey, etc.), flycatchers, swallows, and other birds.

5. Certain lichens and fungi rely on decaying wood[52].

6. In most forest types about 25 to 30% of the vertebrate fauna use cavities for reproduction or roosting[52].

Of course, wildlife or snag trees present some risk to personal safety and property as a result of the loss of their structural integrity. Limbing or topping these trees to a safe height can reduce this risk. The ecosystem benefits and wildlife viewing opportunities to be gained by protecting these features are very worthwhile (See Section 4.3).

An excellent resource for understanding and learning of the value of wildlife trees in BC is *Wildlife and Trees in British Columbia*, by Mike Fenger; Todd Manning & John Cooper. Lone Pine Press[21].

Example owl roosting in wildlife tree (left) and woodpecker holes in a wildlife tree providing primary and secondary nesting habitat (right).

LIVE		DEAD					DEAD FALLEN	
Decay class								
1	2	3	4	5	6	7	8	9
								
Description								
Live/healthy; no decay; tree has valuable habitat characteristics such as large, clustered or gnarled branches, or horizontal, thickly moss-covered branches.*	**Live/unhealthy;** internal decay or growth deformities (including insect damage, broken tops); dying tree.*	**Dead;** needles or twigs may be present; roots sound.	**Dead;** no needles/twigs; 50% of branches lost; loose bark; top usually broken; roots stable.	**Dead;** most branches/bark absent; some internal decay; roots of larger trees stable.	**Dead;** no branches or bark; sapwood/ heartwood sloughing from upper bole; decay more advanced; lateral roots of larger trees softening; smaller ones unstable.	**Dead;** extensive internal decay; outer shell may be hard; lateral roots completely decomposed; hollow or nearly hollow shells.		**Debris;** downed trees or stumps.
Uses and users								
Nesting (e.g., Bald Eagle, Great Blue Heron colonies, Marbled Murrelet); feeding; roosting; perching.	Nesting/roosting [1]— strong PCEs[2] (woodpeckers); SCUs[3]; large-limb and platform nests (Ospreys); insect feeders.	Nesting/roosting— strong PCEs; SCUs; bats.	Nesting/roostin g —PCEs; SCUs; insect feeders.	Nesting/roosting— weak PCEs (nuthatches, chickadees); SCUs; bats; insect feeders.	Weaker PCEs; SCUs; insect feeders; salamanders; small mammals; hunting perches.	Insect feeders; salamanders; small mammals; hunting perches; occasionally used by weak cavity excavators such as chickadees.		Insect feeders; salamanders; small mammals; drumming logs for grouse; flicker foraging; nutrient source.

[1] Large witches' brooms provide nesting/denning habitat for some species (e.g., fisher, squirrels).
[2] PCE = primary cavity excavator
[3] SCU = secondary cavity user
* This classification system does not recognize root disease trees specifically. Such trees become unstable at or before death.

Different classes of wildlife trees and habitat provided. Taken from the BC Forest Practices Code – Biodiversity Guidebook. September 1995. BC Ministry of Environment.

F9. Garry Oak Habitat

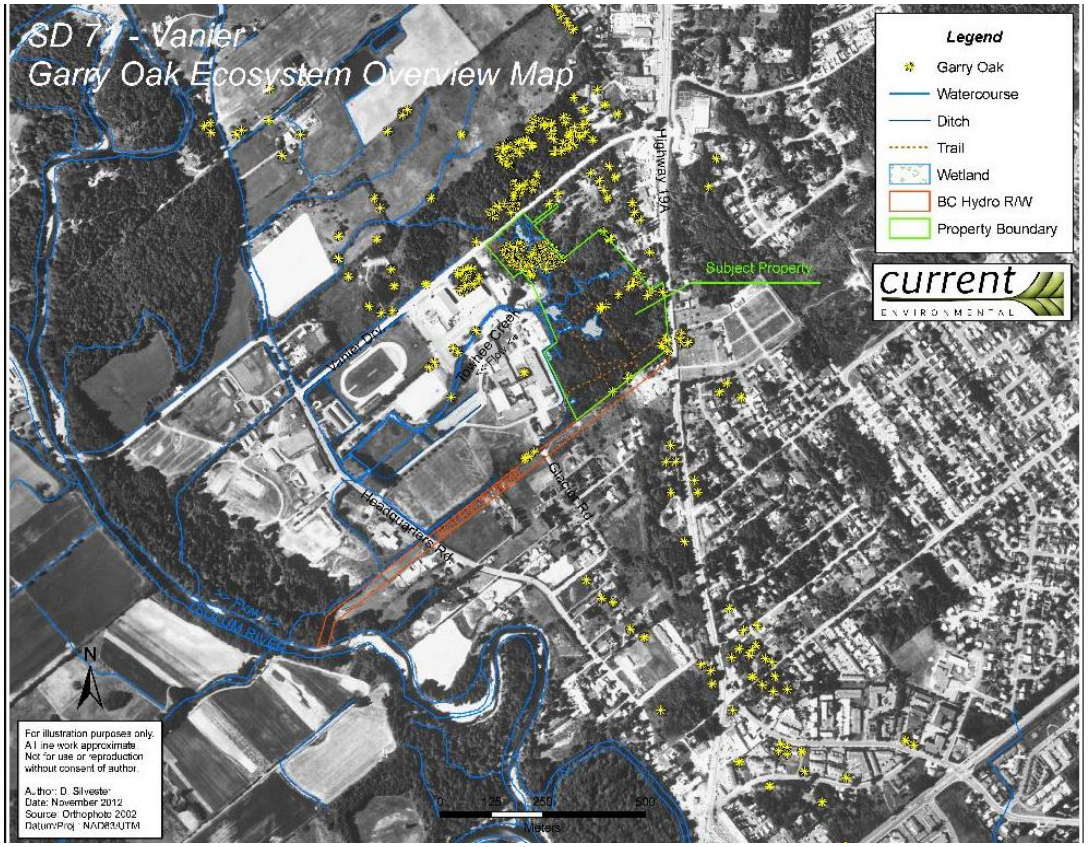
Garry oak trees are concentrated in the north-central portion of the mixed forest in the municipally-held park behind Vanier High School (the "Vanier Forest"). These trees represent the largest surviving concentration of native Garry Oak groves in the Comox Valley. Furthermore, these trees are quite unique in that they are located within a water-receiving area rather than the generally better-known rocky habitat seen in more southern Vancouver Island areas (e.g., Victoria). More isolated Garry oak tree specimens are also found in the SD71-held portion of the Vanier Forest behind, and throughout the grounds of the school, as well as adjacent private properties including larger stands north of Vanier Dr.

Garry oak woodlands and more open grasslands were a unique and prominent vegetation landscape in the Comox Valley prior to colonial contact and settlement. Extensive open grasslands ("upper and lower prairie") in the Tsolum River Valley attracted early settlers to the area. First Nations burning practices for the management of food plants and hunting resources led to the development of oak and grassland vegetation in an area otherwise dominated by dense conifer forest. The rapid establishment of Douglas-fir to the east of the Garry oaks at the Vanier site suggest that First Nations land management rather than soil conditions or other environmental factors favoured the establishment of oaks.

Note that some of the oaks on the site have been overtopped by rapid growth of conifers and as such are declining because of dense shading. Continued health of the oak stand will require active management of the stand, including the possible removal of some conifers. Comox Valley Nature is currently developing a restoration plan (*Vanier Forest Garry Oaks Restoration & Stewardship Project*, Comox Valley Nature, March 1, 2021). From this report:

"The Vanier Forest Garry Oaks Restoration and Stewardship Pilot Project is a small-scale, dual-purpose proposal to conserve and restore a now rare example of wetlands Garry oak ecosystem and in the process provide environmental education and experience to SD71 students in the stewardship of Vanier Nature Park."

This plan provides an excellent and in-depth overview of the Garry oak ecosystem located in the Municipal Park and SD71-held properties of the Vanier Forest. Teachers interested in integrating curriculum specific to Garry oak and rare species should utilize the wealth of information available in this report and project.



Map of Garry Oak Ecosystems surrounding Vanier Drive. Source: Current Environmental Ltd. 2012.

Garry oak meadow, left source: Nature Conservancy of Canada and right source: Jamie Fenneman, E-Flora BC.

F10. Bat Habitat

Bats are misunderstood animals and are often driven away by humans. However, bats are harmless to humans and in fact play an important role in ecosystems. Bats are insectivores that consume an incredible amount of nocturnal insects – they can eat more than half of their own body weight in nocturnal insects each night! Many of these nocturnal insects are pests to agriculture and forests in BC.

There are 15 species of bats known to occur in BC, and approximately half of those species are listed as "species-at-risk". Some of the main threats to bats include habitat loss, direct persecution from humans, predation (especially domestic cats), and White-Nose Syndrome – a disease that is quickly spreading across Canada.

There are many knowledge gaps regarding bat habitat utilization on Vancouver Island[53]. However, as discussed in the bat survey memo in Appendix D, there are several broad habitat features that are likely to be used by bats:

- Winter hibernacula – sites where bats spend the winter hibernating; these include caves, rock crevices, and abandoned mines[54].
- Foraging areas in the spring, summer, and fall – foraging areas depend on the species and their primary food source[54]. Bats forage over water (streams, lakes, wetlands), or above fields, trees, or open spaces[54].
- Day roosts – where bats roost during daylight hours. Roosts can be in tree cavities, under sloughing bark, in buildings, or in rock crevices[54]. These are called "maternal colonies" for some bat species since female bats often roost in large groups to raise their pups[54].
- Night roosts – where bats roost during nighttime hours when they are not actively hunting.
- Commuting routes – bats use commuting routes to travel between roosts and foraging areas.

SD71 could reach out to the BC Community Bat Program (BCCBP) to initiate conversations about developing bat education opportunities. The North Island Chapter of the BCCBP is operated by the Comox Valley Land Trust (CVLT) and is based locally (northisland@bcbats.ca). CVLT, through its role with the BCCBP, regularly provides educational programming to the general public and to SD71 students, typically upon request by specific teachers. Most recently this has included the nature kindergarten program at the Cumberland Community School and a Grade 11 science class at Mark R. Isfeld Senior Secondary. Lake Trail, Ecole Puntledge Elementary, Miracle Beach, Huband Elementary and others all have bat habitat steps away from the classroom and would be ideal schools to develop pilot programs.

Little Brown Myotis – Source: Bob Hamilton, Canadian Wildlife Federation.

[53] Habitat Acquisition Trust (n.d.). About Bats. Accessed from <https://www.hat.bc.ca/bats>

[54] Brigham, M (2020). *Bats of British Columbia*. In: Klinkenberg, Brian (Editor) 2020. E-fauna BC: Electronic Atlas of the Fauna of British Columbia [www.efauna.bc.ca]. Lab for Advanced Spatial Analysis, Department of Geography, University of British Columbia, Vancouver.

APPENDIX B: HABITAT ENHANCEMENT OPPORTUNITIES

(Following 13 pages)

Enhancement Opportunities

The following table (Table 7) provides general guidance on habitat enhancement opportunities for Comox Valley school properties. With many of these opportunities present on multiple school sites, these descriptions capture a general overview of the enhancement techniques that can be applied to individual school sites. Specific restoration site locations (denoted as orange dots labelled E1, E2, etc.) are presented on the mapsheets and site descriptions for each property in Section 3, as these enhancement opportunities were identified on individual school properties.

Table 7. General guidance and habitat enhancement techniques for Comox Valley School sites.

E1. Trampled Forest

Many of the school properties in the Comox Valley had forested areas that have been severely trampled by students. This has resulted in a complete lack of understory (shrub and herb-type) vegetation in these areas, compacted soils, and exposed tree roots. In some cases, such as Puntledge Park Elementary and Lake Trail School, this trampling has led to tree mortality and tree removal due to hazardous designations.

Recognizing the importance and value to continue to allow students to play and learn in these forested areas, urgent management of these areas is needed to ensure that they last into the future.

The recommended approach to management within these areas is to section off small pockets of "plant regeneration zones" among the trampled areas. These restoration areas should include groups of 3-5 mature trees, ideally the ones with the most severe impacts, and should cover approximately 20-30 % of the trampled area, leaving room in between these restoration areas for students to play. SThe following steps should be taken in these restoration areas:

1) Soils need to be de-compacted in these areas prior to planting. This can be done with hand tools – shovels and picks – or very carefully with small machinery if available (exercise caution to not disturb tree roots).

2) Once loosened up, the soil may need amendments such as a layer of topsoil or compost spread no thicker than 4 inches deep to help cover up but not suffocate exposed tree roots.

3) Native plants, in 1- or 2-gallon pots purchased from a native plant nursery, should be planted around the mature trees in the restoration areas. Plants should be a mix of young conifers for forest succession and understory shrub species that are found in natural areas of similar biophysical character adjacent to the trampled forest.

4) Potted plants should be planted in early spring or fall when there is enough moisture in the soil for plants to get established. Plants may need to be watered a few times after planting if there is no rain in the forecast. Immediately watering plants after planting significantly increases survival.

5) General plant spacing should be 1-2 m between each shrub, and 4-5 m between trees. Planting in clusters (2-3 plants together) of like species is a best practice.

6) Once planted, the restoration areas should be fenced with either split rail fencing, wooden posts, and rope fencing, or by placing logs around the perimeter of the planted areas. Signs can be mounted on the fence to educate and remind students not to traverse through these restoration areas. Examples of fencing are provided below.


Trampled area behind Valleyview Elementary (left). Example re-planted and mulched area (right).


Examples of split rail fencing to protect vegetated areas.

E2. Riparian Vegetation Enhancement

Riparian areas are critically important ecosystem elements that directly impact the health of adjacent aquatic habitat, and that provide habitat to a diverse range of plant and animal species. Some riparian areas located on Comox Valley school properties have been identified as priority habitats that would benefit from enhancement.

General measures to enhance riparian areas on Comox Valley School properties include the following:

1) Remove invasive species where present (using techniques described in E5).
2) Discourage foot traffic in sensitive riparian areas by installing fencing or thicket-like plants such as Nootka rose to help form a barrier. Realigning pathways away from riparian areas is also a recommended.
3) Leave woody debris on the forest floor where possible to provide nutrients, help maintain soil moisture, help stabilize soils, and provide habitat for amphibians and other wildlife.
4) Plant native species to enhance vegetation cover in the following cases:

a. Where there are mature trees of a similar age class without successional layers in the forest. In other words, younger trees and shrubs should be proactively planted among the mature trees to ensure a natural progression of ecological function continues over the long term. Usually, more shade tolerant trees such as western hemlock should be used in these cases.

b. Where there has been recent disturbance from invasive plant removal, etc.; these areas should be planted immediately to minimize the risk of invasive species getting re-established.

c. Where the ground has been trampled by students and the public on unofficial trails or edges of playing fields; the soil in these areas will need to be loosened and de-compacted prior to planting.

d. Where shade cover is lacking; taller conifers or tall shrubs should be planted in these areas to restore shade and cover. Overhanging vegetation species (willow or red osier dogwood for example) provide excellent cover, shade, and food for aquatic wildlife.

General approach to species selection in riparian areas:

1) Always plant native species in riparian areas, as they are more resilient and adapted to the local growing conditions.

2) Prior to selecting the appropriate native species, gather the following information about a site:

    a. Inventory of existing native plants surrounding the planting site;

    b. Soil moisture regime (i.e. dry or moist site? Floodplain? Steep slope?);

    c. Sun exposure (i.e. Full sun, partial sun or shade?);

    d. Proximity to stream bank;

    e. Potential wind exposure; and

    f. Type of soil (i.e. clay, sand, silt, etc.).

3) Identify the primary goals of planting (i.e. stabilize the soil, provide more shade, provide nutrients, etc.).

4) Once the above information is gathered, use a plant selection tool like the one provided in Appendix F to choose the appropriate species for that site. A Qualified Environmental Professional can also assist with a native plant restoration plan. Choose a combination of groundcover plants, shrubs, and trees where possible.

5) Native shrubs and trees can be obtained from a local native plant nursery (1 gallon, 2 gallon, or 5 gallon size).

6) Potted plants should be planted in early spring or fall when there is enough moisture in the soil for plants to get established. Watering immediately after planting significantly increases survival of planted stock.

7) General plant spacing should be 1-2 m between each shrub, and no less than 5 m between trees. Planting in clusters of like species is best practice.

Mulching:

Mulching is a great technique for maintaining soil moisture surrounding tree roots and to suppress the growth of invasive species around native plants. Mulching can be done around existing trees, or around newly planted shrubs and trees using the following guidelines:

1) Use mulches without artificial dyes or weed suppressing chemicals.

2) Do not exceed 4” deep when mulching – burying tree roots too deep can suffocate the roots.

3) Use native materials for mulching, including leaves, wood chips, or bark chips.

4) Ensure the source of mulch is invasive plant free.

Example riparian planting (left) and fencing (right) along the edge of a school playing field in the Comox Valley (Gaglardi Academy Private School, 2016).

E3. Low Impact Trails Through Forest

There is a myriad of trails scattered through many of the forested areas on SD71 properties. Some of these trails are located within riparian areas (adjacent to streams and wetlands). While most trails are fairly low impact, it is important to consider some management techniques to prevent pathways from spreading out or branching off and turning into large, trampled areas with low ecological function. The following techniques should be applied to existing forest trails:

1) Maintain as much natural vegetation as possible along the edges of the trail to form a barrier and prevent trail widening.
2) Consider installing fencing (like cedar split rail fencing) or planting thicket-like plants such as Nootka rose in select areas to discourage new pathways off the main trail. Other techniques include placing logs or branches along the edges of the trail to better define the path.
3) Consider establishing fenced in vegetation protection areas in high traffic pedestrian areas to protect tree roots and understory vegetation, and to prevent soils from being compacted in vegetated areas off the main walking trail (See E1). If soils have already been compacted in an area off the main trail, restoration efforts may be needed to loosen soils, revegetate, and protect these areas from future trampling (See E1).
4) Install sections of boardwalk where the trail goes over seasonally wetted areas. Amphibians often breed in seasonally wetted areas, and their larvae sometimes burrow into the mud.
5) Where an excessive number of trails have been built, consider de-commissioning some areas by placing woody debris and mulch over trail areas and blocking the entrance.
6) Use educational signs as needed to encourage students and the public to stick to the main trails.
7) If trails are being re-aligned or new trails are being established, route trails outside of the riparian areas of streams and wetlands where possible. Use porous materials such as woodchips to encourage infiltration and allow tree roots to breathe. Also maintain wildlife corridors where possible, siting new trails where it will not conflict with a known greenway/corridor for animal movement.

E4. Planting of Trees and Shrubs to Encourage Bird Nesting Habitat

Many of the SD71 school sites provide much needed green spaces in the middle of densely urbanized areas. These green spaces, and specifically the trees and shrubs in these areas, provide a number of important benefits to these urban areas including:

1) **Climate moderation** – Concrete, asphalt, and other hard surfaces in urban areas absorb heat and reflect it back into the urban environment, significantly raising local air temperatures. Trees and shrubs moderate this warming effect through transpiration, where water vapour is released into the air around them during photosynthesis, thereby lowering local air temperatures. Trees and shrubs also provide shade and moderate the force of strong winds in urban landscaped.

2) **Increase biodiversity** – Clusters of trees and shrubs in an urban area attract many animals and create microclimates where other plants can get established. They also provide nutrients and moisture retention that improves the health of the soil microbiome.

3) **Nesting and refuge habitat** – Urban trees and shrubs provide important nesting habitat and shelter for birds in an urban landscape.

4) **Provides food sources** – Urban trees and shrubs provide important food sources to birds, small mammals, bats, and insects through their berries, fruit, nectar, and pollen.

5) **Improves air quality** – More trees and shrubs in an urban environment increases the amount of oxygen in the air and makes the local air quality better.

6) **Reduces flooding** – Clusters of trees and shrubs help to retain rainwater on the landscape, encourage water to infiltrate into the soil around them, and slow the rate of stormwater runoff on a given property.

7) **Reduces noise** – Trees and shrubs buffer the noises of traffic and construction in city environments.

8) **Improves human health and well-being** – Research on the benefits of urban trees on human health has shown that trees in an urban area not only provide aesthetic value but can also improve people's overall health and wellbeing. Studies have shown that the presence of trees in an urban area can lower cortisol levels (i.e. the stress hormone), provide a sense of vitality, improve creativity, promote psychological restoration, and even improve attention spans in people who live or spend time in these areas.[55]

Some schools in SD71 have an opportunity to plant more trees and shrubs to provide more "green scaping" and create more habitat, particularly for birds. The schools that would benefit most from planting trees and shrubs are those with full sun exposure in the center of dense urban areas such as Courtenay Elementary. Thicket habitat created by planting taller shrubs in dense clusters or rows can provide excellent habitat for smaller passerine birds can be a worthwhile project for classroom activities. Red flowering currant, oceanspray, Nootka rose, Pacific crabapple, thimbleberry, snowberry, red osier dogwood, salmonberry, and red elderberry are all excellent plant species; most of them also provide food sources for birds as well.

[55] City of Chicago (2016). Gateway Green Project - How Trees Improve Your Mental Health | Chicago Gateway Green.

Red flowering currant in bloom – an excellent option for bird habitat.

E5. Invasive Plant Removal

Many of the Comox Valley school properties have well established areas of invasive plants. Occurrences of invasive plants were recorded for each school site, with a focus given to invasive plants considered to be noxious by the Coastal Invasive Species Committee of BC[56]. The most common invasive plant on SD71 school sites was Himalayan blackberry, and in some cases this plant was growing in very large, well established thickets that will require substantial effort to remove.

General Best Management Practices for invasive species management within Comox Valley School properties:

1) Using this environmental inventory as guidance, conduct a survey of the known areas of invasive species on Comox Valley School properties, especially high traffic areas.
2) Contact the Coastal Invasive Species Committee for guidance and assistance with invasive plant removal - https://www.coastalisc.com/.
3) Make a staged plan to remove all invasive plants from high-traffic areas, prioritizing any areas that will be disturbed through maintenance activities.
4) Depending on the level of infestation, plants should either be regularly cut at the base during bloom, or in the case of a larger infestation, machinery can be used to dig out the roots and soil surrounding invasive plants. Contaminated plant materials and soil should be bagged, and carefully hauled away to an appropriate landfill or receiving site. It is best to cut plants in bloom, but before they have produced seeds.
5) Make sure to wear gloves and keep out of contact with skin.
6) If using equipment during vegetation maintenance, thoroughly clean equipment and machinery to remove seeds and vegetative plant material before moving to a new site.
7) Carefully clean clothes, boots, hand tools, and other equipment used for removal invasive plants before leaving a site.
8) Ensure road or trail material (e.g. sand, gravel, fill, topsoil), originates from invasive plant-free pits.

[56] Coastal Invasive Species Committee (2021). Accessed from <https://www.coastalisc.com/>

9) Maintain invasive plant-free buffer zones along roads, trails, playing fields, parking lots and other high-traffic sites.

10) Reseed bare soil with grass immediately after disturbance, and when soil moisture and weather conditions are suitable for germination.

Exceptions to the general procedures:

1) If any Giant Hogweed is encountered, immediately section off this area to the public and contact the Coastal Invasive Species Committee for assistance and guidance on proper handling procedures, as this plant is highly toxic to humans. https://www.coastalisc.com/invasive-species/giant-hogweed/

2) When handling Giant Hogweed or Spurge Laurel, which are both toxic to humans, follow the safety procedures outlined in the following Worksafe BC bulletins:

    a. Worksafe BC safety information on Spurge Laurel: https://www.worksafebc.com/en/resources/health-safety/information-sheets/toxic-plant-warning/severe-skin-irritation-from-spurge-laurel-daphne-laureola?lang=en.

    b. Worksafe BC safety information on Giant Hogweed: https://www.worksafebc.com/en/resources/health-safety/information-sheets/toxic-plant-warning/severe-skin-damage-from-giant-hogweed-heracleum-mantegazzianum?lang=en.

3) If Japanese knotweed is encountered, proper removal requires intensive site disturbance and remediation, as it can regenerate from small root or stem fragments. Improper removal can actually worsen the issue in the long run. Contact the Coastal Invasive Species Committee for the most up to date methodology for removal. https://www.coastalisc.com/?s=japanese+knotweed

Specific Methodology for Himalayan Blackberry Removal:

Himalayan blackberry is the most common invasive species encountered on Comox Valley school properties, and therefore a species-specific removal plan is provided below.
Removal of small patches of Himalayan blackberry typically works best when completed in two phases:

1) Removal of above ground vegetation.

    a. Cut back canes, leaving enough of the stem to be able to identify where the root system for the plant is located in the ground.

    b. It is best to cut back canes in the winter, before seasonal leaf out has begun.

2) Removal of root crown.

    a. Using a small pick or shovel, dig at the base of the blackberry stem until the root crown is located. The root crown can be located well below the soil surface.

    b. After locating the root crown, remove it and any major lateral roots.

After removal is complete, **bag or tarp all plant parts (and seeds if present)** and dispose of the material at an appropriate facility (e.g. landfill). Landfill operators must be informed that the load contains invasive plant materials.

Himalayan blackberry crown. Source: https://www.invasive.org/gist/moredocs/rubarm01.pdf

E6. Installing Bat Boxes, Bird Boxes, and Pollinator Houses

One way to improve habitat on SD71 properties, especially the properties that were rated as low or nil ecological conservation value, would be to install bat roosting boxes, bird nesting boxes (especially swallows), and pollinator houses such as mason bee houses. These are projects that can be built and installed by students at each school site. This enhancement activity was not identified at individual school sites as it applies to all locations. Two priority sites for these features would be NIDES for installing swallow boxes, and Huband and Puntledge for installing bat boxes.

The following documents from the Canadian Wildlife Federation and National Geographic provide guidance on construction and installation of these features.

CANADIAN WILDLIFE FEDERATION / FÉDÉRATION CANADIENNE DE LA FAUNE

HOW TO BUILD A BAT HOUSE

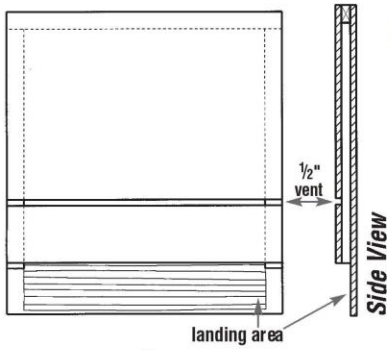
SINGLE-CHAMBER BAT HOUSE (WALL MOUNTED)

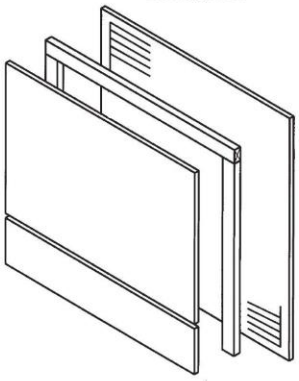
RECOMMENDED TOOLS

- Table saw or handsaw
- Caulking gun
- Variable-speed reversing drill
- Paintbrushes
- Screwdriver bit for drill
- Hammer (optional)
- Tape measure or yardstick
- Tin snips (optional)

MATERIALS (MAKES ONE HOUSE)

- ¼ sheet (2' x 4') ½" AC, BC or T1-11 (outdoor grade) plywood
- One piece 1" x 2" (¾" x 1½" finished) x 8' pine (furring strip)
- 20 to 30 exterior-grade screws, 1"
- One pint dark, water-based stain, exterior grade
- One pint water-based primer, exterior grade
- One quart flat, water-based paint or stain, exterior grade
- One tube paintable latex caulk
- 1" x 4" x 28" board for roof (optional, but highly recommended)
- Black asphalt shingles or galvanized metal (optional)
- 6 to 10 roofing nails, ⅞" (if using shingles or metal roofing)





CONSTRUCTION

1. Measure and cut plywood into three pieces:
   26½" x 24" 16½" x 24" 5" x 24"
2. Roughen inside of backboard and landing area by cutting horizontal grooves with sharp object or saw. Space grooves ¼" to ½" apart, cutting 1/32" to 1/16" deep.
3. Apply two coats of dark, water-based stain to interior surfaces. Do not use paint, as it will fill grooves.
4. Cut furring strip into one 24" and two 20½" pieces.
5. Attach furring strips to back, caulking first. Start with 24"piece at top. Roost chamber spacing is ¾".
6. Attach front to furring strips, top piece first (caulk first). Leave ½" vent space between top and bottom front pieces.
7. Caulk all outside joints to further seal roost chamber.
8. Attach a 1" x 4" x 28" board to the top as a roof (optional but highly recommended).
9. Apply three coats of paint or stain to the exterior (use primer for first coat).
10. Cover roof with shingles or galvanized metal (optional).
11. Mount on building (south or east sides usually best).

OPTIONAL MODIFICATIONS TO THE SINGLE-CHAMBER BAT HOUSE

1. Wider bat houses can be built for larger colonies. Be sure to adjust dimensions for back and front pieces and ceiling strip. A ¾" support spacer may be needed in the center of the roosting chamber for bat houses over 24" wide to prevent warping.

2. To make a taller version for additional temperature diversity, use these modifications: From a 2' x 8' piece of plywood, cut three pieces: 51" x 24", 33" x 24" and 12" x 24". Cut two 8' furring strips into one 24" and two 44" pieces. Follow assembly procedure above.

3. Two bat houses can be placed back-to-back, mounted between two poles, to create a three-chamber nursery house. Before assembly, cut a horizontal ¾" slot in the back of each house about 9" from the bottom edge of the back piece to permit movement of bats between houses. Two pieces of wood, 1" x 4" x 4¼", screwed horizontally to each side, will join the two boxes. Leave a ¾" space between the two houses, and roughen the wood surfaces or cover the back of each with plastic mesh (see item 5 below). Do not cover the rear exit slots with mesh. One 1" x 4" x 34" vertical piece, attached to each side over the horizontal pieces, blocks light but allows bats and air to enter. A galvanized metal roof, covering both houses, protects the center roosting area from rain. Eaves should be about 3" in southern areas and about 1½" in the north.

4. Ventilation may not be necessary in cold climates. In this case, the front should be a single piece 23" long. Smaller bat houses like this one will be less successful in cool climates. However, those mounted on buildings maintain thermal stability better and are more likely to attract bats.

5. Durable plastic mesh can be substituted to provide footholds for bats. Attach one 20" x 24½" piece to backboard after staining interior, but prior to assembly.

HELP THE BATS.ca

These plans are provided free through the Bat Conservation International website at **www.batcon.org**, where you can also find a wealth of other great information on bats and bat houses.

CWF would like to thank Bat Conservation International for their help in the creation of this pamphlet.

REQUIREMENTS FOR YOUR FAVORITE CAVITY NESTING BIRDS

Species	Nesting Habitat	Box Height	Hole Size	Minimum Spacing
Purple Martin	Broad open areas (meadows, fields, farmland, swamps, ponds, lakes, rivers) with unobstructed space for foraging on flying insects; there should be no trees or buildings within 40 feet of the martin pole in any direction; houses should be painted white	Local success placing boxes on pilings in intertidal zone.	2 1/8" round	10 feet
Tree Swallow	Open fields near water, expansive open areas, marshes, meadows, wooded swamps; on a post in open areas near tree or fence	5-6 feet	1 3/8" round, east facing	35 feet
Violet-green Swallow	Open or broken deciduous or mixed deciduous-coniferous forests, wooded canyons, edges of dense forest	9-15 feet	1 3/8" round	30 feet

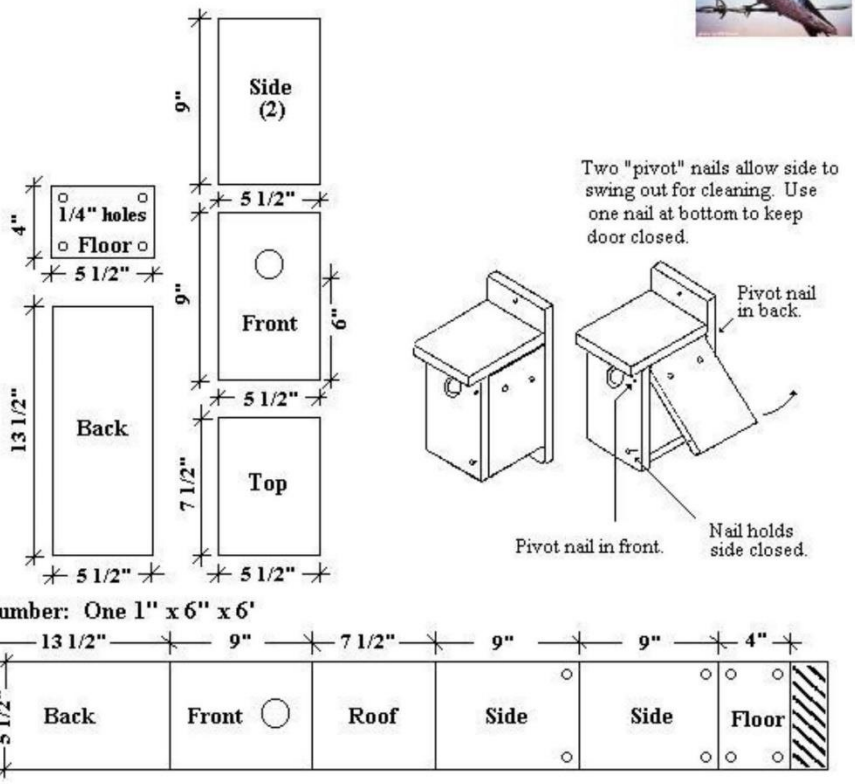
NOTES:

- Boxes should be mounted on posts which cats and other predators cannot climb: steel or round wood posts with minimum 30 cm section of slippery plastic pipe or similar slipped over, part way up pole.
- Box should face east (1st choice) or south (less preferred choice).

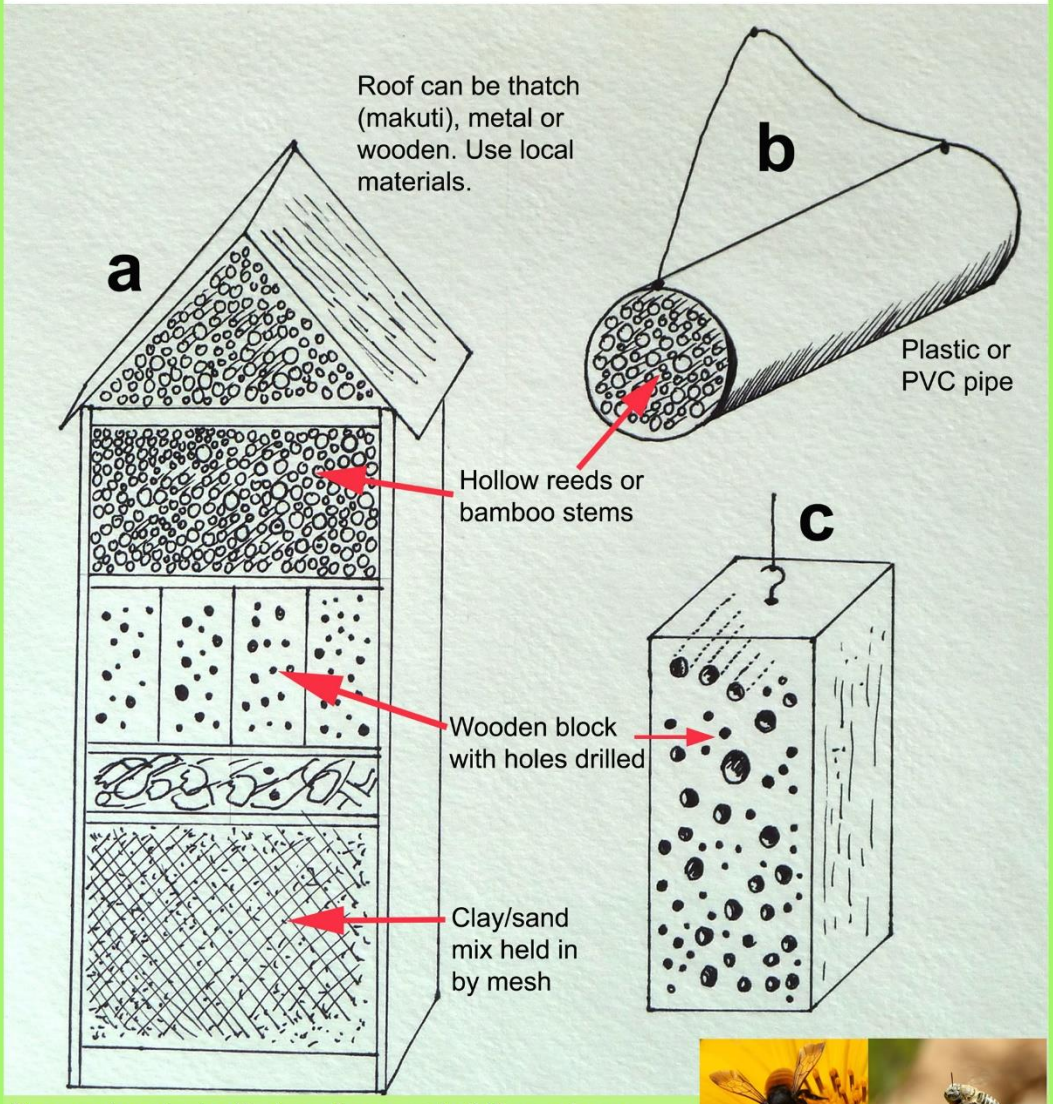
Figure 1. Tree swallow nest boxes

Tree Swallow Nest Box Plans

Entrance hole is 1 and 3/8", no wider.



Build Your Own Wild Bee Hotel!



Bees are important pollinators of crops and wildflowers in our farms and gardens. You can help wild solitary bees by providing a safe nesting site for them:
(a) This is the deluxe 'Bee Hotel'. Adjust the size to your local materials. The different layers provide nesting sites for different species of bees. Place in a sheltered area where it will not be disturbed. This will provide a nesting site for many years.
(b) A simple plastic or PVC pipe packed with hollow reeds or bamboo stems of assorted sizes. Hang or tie to tree/fence.
(c) Wooden block or post or old stem/trunk with holes of different sizes drilled in it. Hang or tie in a sheltered area.

Above: Leafcutter bees are some of the solitary bees that will use the Bee Hotel

For more information:
insects@naturekenya.org

Insect Committee of Nature Kenya
The East Africa Natural History

NatureKenya
Connecting nature and people

Research, writing and illustrations by Dino J. Martins

APPENDIX C: RARE PLANT ASSESSMENT MEMORANDUM

(Following 5 pages)

Latitude Conservation Solutions Company

Latitude Conservation
Solutions Company
PO Box 1311
Cumberland, BC V0R-1S0

Phone: 250-650-9561
time@telus.net

MEMORANDUM

TO: **Warren Fleenor, Current Environmental**
FROM: **Tim Ennis, Latitude Conservation Solutions Company**
DATE: **January 27th, 2021**

RE: Rare plant assessment of School District 71 managed lands

1. INTRODUCTION

Latitude Conservation Solutions Company (Latitude) was retained by Current Environmental (Current) to conduct rare plant surveys for each of the School District 71 (SD71)-managed properties (Project Area; n=24) in the Comox Valley during the 2020 growing season. This assessment was completed as a sub-contract to Current who is completing a larger environmental values assessment for this suite of properties managed by SD71.

2. METHODS

Rare plants were defined as any vascular or non-vascular plant (Kingdom Plantae) which is:

1. blue or red-listed by the Province of British Columbia (BC Conservation Data Centre) or,
2. listed as Special Concern, Threatened or Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) or,
3. listed on Schedule-1 of the Canadian *Species at Risk Act (2002)* as of May 2020.

A list of potentially occurring rare plants was generated by compiling the results of several queries to the BC Conservation Data Centre Species and Ecosystems Explorer tool (S&EE)[1]. The S&EE database was first queried to produce a list of all rare plant species that are known to occur in the Comox Valley Regional District (CVRD). Assuming that the CVRD may not have been extensively surveyed for rare plants the database was queried subsequently to produce lists of known rare plant occurrences in all adjacent regional districts, as well as in all biogeoclimatic subzones/variants that are relevant to the Project Area (CWHxm1 and CDFmm). The results of these queries were compiled into a master list of all rare plants that could potentially occur in this region.

Cadastral data for each SD71 property was provided to Latitude by Current. The cadastral data was layered with remote sensing data (e.g., satellite imagery, terrain etc.) and Sensitive Ecosystem Inventory (SEI) data in GIS and each parcel of land was individually reviewed in GIS to determine the broad ecosystem and terrain-types present. This desktop GIS analysis indicated that the Project Area does not include habitats such as alpine, subalpine, estuary, sand dune, sand spit, grassland, savannah,

[1] https://a100.gov.bc.ca/pub/eswp/

woodland or rocky bluff habitats. Neither were talus slopes, cliffs, caves, or other macro-habitat features noted. The Project Area primarily includes developed (anthropogenic) areas, but also some remnant riparian areas, and forests (coniferous, deciduous, and mixed) including forested wetlands and floodplains in the lowland zone.

The master list of potentially occurring rare plants was screened in consideration of the specific habitat requirements of each species, and the broad ecosystem and terrain-types present in the Project Area. Determination of the habitat requirements of each species was done through a review of the data available in the S&EE database, as well as a review of data published by NatureServe[2], E-Flora BC[3], the Illustrated Flora of British Columbia[4], and the Flora of the Pacific Northwest: An Illustrated Manual (Second Edition[5]). Species which are known only from ecosystem and/or terrain types which are not present on SD71 lands were removed from the master list to create a list of potentially occurring rare plants.

Each species on the list of potentially occurring rare plants was reviewed in E-flora's occurrence maps and on the BCCDC iMap tool[6] to consider their known geographic distribution in the province. Where available, additional biophysical attributes of these element occurrences was also considered. The likelihood of occurrence was interpreted very conservatively, and therefore, several species remained on the list of potentially occurring species even though the biophysical attributes of the sites or geographic distributions of known occurrences were strongly suggestive that these species had a very low if not negligible likelihood of occurring on SD71 property.

Special consideration was given to rare plants associated with Garry Oak (*Quercus garryana*) ecosystems as there are some well-known remnant oak habitats on Denman and Hornby Islands and in the Courtenay/Comox area. However, after reviewing the aerial photography of the Project Area on Denman and Hornby, it was clear that these do not include Garry Oak ecosystems, leaving only the forested areas adjacent to the Vanier Oak Grove (Georges P. Vanier Secondary) as potentially having some Garry Oak associated rare-plant species. This is a property that has been carefully inventoried in the past. Given the closed canopy nature of the largely coniferous forests there (lacking meadows, woodlands etc.) only three Garry Oak associated rare plants were considered as potentially occurring, all of which can sometimes persist under these conditions.

[2] https://explorer.natureserve.org/
[3] https://ibis.geog.ubc.ca/biodiversity/eflora/
[4] Douglas, G. W., G.B. Straley, D. V. Meidinger, and J. Pojar (Editors). 1998-2002. Illustrated Flora of British Columbia, Vol. 1-8. B.C. Min. Environ., Lands and Parks, and B.C. Min. For., Victoria, B.C.
[5] Hitchcock, C. L., and A. Cronquist. 2018. Flora of the Pacific Northwest: An Illustrated Manual (second edition). Giblin, D. E., et al. Eds. University of Washington Press and University of Washington Herbarium at the Burke Museum. Seattle, WA.
[6] http://maps.gov.bc.ca/ess/hm/cdc/

Twelve species of rare plants were identified as being potentially present in the Project Area, of which three were specific to Vanier. These are described in Table 1.

Scientific Name	English Name	Global Status	Prov Status	COSEWIC	BC List	SARA	Liklihood of occurrence
Sanicula bipinnatifida	purple sanicle	G5	S2	T (May 2001)	Red	1-T	Vanier Only - Moderate
Sericocarpus rigidus	white-top aster	G3	S3	SC (Apr 2009)	Blue	1-SC	Vanier Only - Moderate
Viola praemorsa var. *praemorsa*	yellow montane violet	G5T3T5	S1	E (Nov 2007)	Red	1-E	Vanier Only - Moderate
Cephalanthera austiniae	phantom orchid	G4	S2	E (Nov 2014)	Red	1-T	Low
Euonymus occidentalis var. *occidentalis*	western wahoo	G5TNR	S1	-	Red	-	Moderate
Fraxinus latifolia	Oregon ash	G5	S1S2	-	Red	-	Low
Mitellastra caulescens	leafy mitrewort	G5	S3	-	Blue	-	Low
Montia chamissoi	Chamisso's montia	G5	S3	-	Blue	-	Low
Prosartes smithii	Smith's fairybells	G5	S2S3	-	Blue	-	Low
Thelypteris nevadensis	Nevada marsh fern	G4	S1	-	Red	-	Low
Viola howellii	Howell's violet	G4	S1S2	-	Red	-	Moderate
Woodwardia fimbriata	giant chain fern	G5	S3	-	Blue	-	Low

Table 1. Potential Rare Plants on SD71 property

Each SD71 property in the Project Area was visited and assessed for rare plants with ground-based searches during the growing season between June and August 2020. Prior to conducting fieldwork, the cadastral data for each property was uploaded to a GPS-enabled iPad Air (Apple Inc.) (+/- 5 m accuracy) equipped with GIS Pro software (Garafa Inc.). This enabled confidence that the ground searches were being conducted in the correct locations, and a track log of the areas searched was recorded for larger natural areas within the Project Area. Dichotomous keys relating to the potentially occurring rare plants were printed from the Illustrated Flora of BC and brought into the field along with The Plants of Coastal British Columbia[7], a 20x hand lens and a 50m nylon tape.

SD71 properties that no longer include any natural vegetation were visited only briefly, with a search effort of approximately 0.25 hours/ha. Developed areas including buildings, parking lots, soccer fields

[7] Pojar, J. and A. MacKinnon. 2004. Plants of Coastal British Columbia including Washington, Oregon, and Alaska (Revised). B. C. Ministry of Forests and Lone Pine Publishing. Vancouver, B. C.

and playgrounds were not assessed other than to identify any remnant trees. SD71 properties with remnant natural areas were traversed either on existing trails where present or with transects spaced roughly 10m apart or a combination of both. These were assessed much more closely with a search effort of approximately 1.5 hours/ha of natural area. For example, the Comox Elementary property is 1.52-ha in size and includes 0-ha of natural area. Only 0.3 hours were spent assessing that site for rare plants. By contrast, Lake Trail/Ecole Puntledge Elementary is 24.8-ha in size with 14.76-ha in natural cover. Over 20 hours were spent doing ground searches at that site.

3. RESULTS

No rare plants were detected during any of the ground-based searches at any of the SD71 properties.

4. DISCUSSION

The majority of rare-listed plants known from eastern Vancouver Island are associated with specialized habitats such as Garry oak meadows and terrestrial herbaceous communities including coastal bluffs, estuarine habitats, and coastal sand ecosystems. These habitats are absent from SD71 properties despite being present in the surrounding landscape. In addition, due to the developed nature of most SD71 properties and the neighbourhoods surrounding them, it is unlikely that most SD71 properties could support viable populations of rare plants. However, there are five potential exceptions: GP Vanier Secondary, Lake Trail/Ecole Puntledge Elementary, the Atlas Rd property, Huband Elementary and Miracle Beach Elementary. Each of these properties include and are adjacent to intact natural areas, including conservation areas in at least two cases, Vanier and Lake Trail.

While the survey effort at these sites was sufficient to be confident in our results, these natural areas are important reservoirs of native plant species diversity on the landscape and are effectively contributing to biodiversity conservation in ways that are significant at the regional scale (and global scale in respect to vertebrate animals). It is important to note that as development pressures increase throughout southwestern BC, plant species that are considered common now, may be rare listed in the future.

Threats to native plant species diversity at these sites include increasing recreational access pressures (e.g., Lake Trail), invasive plant species (e.g., Vanier) and small-scale, high intensity trampling, presumably by students (e.g., Miracle Beach). While excessive trampling presents a direct threat to native plants, particularly but not exclusively herbaceous species, we recognize that access to natural areas by students confers tremendous societal and environmental benefits as well. Similarly, the opportunity to engage students in natural area conservation and stewardship is tremendous on some properties within the Project Area.

5. RECOMMENDATIONS

1. Develop conservation management and stewardship plans for the five high-value sites that protect and restore native plants through actively addressing the threats to them.
2. Build partnerships with local stewardship groups to assist with implementation of conservation management and stewardship plans, involving students where possible.
3. Consider developing restoration plans or native plant gardens for SD71 properties where there are remnant fringes of native tree cover and highly degraded understories, involving students where possible.
4. Periodically reassess natural areas on SD71 properties in the event that status ranks change for species that are currently considered not-at-risk.

Yours truly,

Latitude Conservation Solutions Company

Tim Ennis, President

Disclaimer:

APPENDIX D: INVENTORY OF BAT SPECIES MEMORANDUM

(Following 6 pages)

Latitude Conservation Solutions Company

Latitude Conservation
Solutions Company
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Cumberland, BC V0R-1S0

Phone: 250-650-9561
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MEMORANDUM

TO: **Warren Fleenor, Current Environmental**
FROM: **Tim Ennis, Latitude Conservation Solutions Company**
DATE: **January 27th, 2021**

RE: Inventory of Bat (Chiropteran) species on School District 71 managed lands

1. INTRODUCTION

Latitude Conservation Solutions Company (Latitude) was retained by Current Environmental (Current) to conduct bat surveys for School District 71 (SD71)-managed properties in the Comox Valley during the summer of 2020. This assessment was completed as a sub-contract to Current who is completing a larger environmental values assessment for this suite of properties managed by SD71.

2. METHODS

Bats are herein defined as all members of the Order Chiroptera known to occur on Vancouver Island regularly or occasionally, all of which happen to belong to the Family Vespertilionidae (evening bats) and all of which are "microbats" that are insectivorous and utilize echolocation to locate and capture prey.

The utilization of specific habitat features by bats on Vancouver Island is poorly understood. However, bats are likely dependant on several broad habitat features: winter hibernacula, foraging areas (spring, summer and fall), day roosts (places where bats roost during the day), night roosts (places where bats take refuge between episodes of nocturnal hunting), and commuting zones (routes that bat use to travel between day roosts, night roosts and foraging areas). In respect to reproductive female bats, day roosts are also sometimes referred to as "maternal colonies" for some species.

In this study we relied entirely on ultrasonic acoustic recording technology to record the echolocation calls of bats at a subset of SD71-managed properties that seemed likely to provide suitable habitat for foraging and/or roosting. The SD71 properties were reviewed in GIS using cadastral data provided to Latitude by Current and remote sensing data (aerial photography) to determine a subset of SD71 properties where bat activity was likely. Given resource constraints, bat inventories were conducted at only three SD71 properties: Lake Trail/Ecole Puntledge Elementary (Puntledge), Huband Park Elementary (Huband), the Atlas Rd. property. Puntledge was surveyed three times in July 2020, Huband twice in July 2020 and the Atlas Rd property once in July 2020.

Huband Elementary was surveyed from 9:45 pm – 12:15 am on July 7th (2.5 hrs) and again from 9:30 pm – 11:30 pm on July 16th (2 hrs). Surveys were conducted by way of walking transects on existing trails. Puntledge was surveyed on July 6th from 9:45 pm– 11:15 pm (1.5 hours), July 8th from 10:00

pm – 11:30 pm (1.5 hours) and again July 9th from 9:30 pm – 11:30 pm (2 hrs). Surveys were conducted by way of walking transects on existing trails. The Atlas Rd. property was surveyed on July 14th from 9:30 pm – 10:30 pm (1 hr). The survey was conducted by way of a walking transect on the gravel road (Atlas Rd.) that bisects the property. The weather during the sampling period was optimal for bat surveys. There was no rain, no wind and no full moon, and the temperatures ranged from 15 – 24 degrees Celsius.

Ultrasonic bat echolocation calls were recorded using an EchoMeter Touch 2 Pro (Wildlife Acoustics) paired with and iPad Air (Apple Inc.) and the EchoMeter app (Wildlife Acoustics) Version 5.4.0. The EchoMeter app was set to classify/Auto-ID echolocation calls of bats from North America, with only the most common bat species known to occur on Vancouver Island selected (n=10). Auto-ID Sensitivity, Trigger Sensitivity and Gain were all set to "medium". The Trigger Window was set to 2 seconds, Max Trigger Length set to 15 seconds. The EchoMeter App automatically records a GPS track-log of the area surveyed, and geo-stamps as well as timestamps each echolocation call recorded. To improve the accuracy of GPS data, the iPad Air was paired via Bluetooth to a Garmin GLO GPS unit (Garmin Inc).

Echolocation calls were manually reviewed in the EchoMeter app after each sampling session, and noise files (not bat recordings) were manually deleted. All bat recordings were downloaded to a PC and then subsequently analysed using Kaleidoscope software (Wildlife Acoustics). Low confidence bat recordings, including those with <5 pulses and those with <0.6 match ratio when compared to the classifier were discarded. Bat recordings that exceeded the parameters of "low confidence" were Auto-ID'd in Kaleidoscope and the Auto-ID result was considered to be reliable to the species level. These results should be treated with caution, however, as some bat species in our area produce echolocation calls that are extremely similar and may not always be accurately identified.

3. RESULTS

Bats were detected at each site. Puntledge had the highest species diversity (n=8) followed closely by Huband (n=7). Huband had the highest bat activity (19.8 bat calls recorded/hour of survey effort) followed closely by Puntledge (15.6 bat calls/hour of survey effort) (Table 1.).

	HUBAND	PUNTLEDGE	ATLAS
EPFU	49	28	0
TABR	10	2	1
LACI	15	16	0
LANO	1	0	0
MYLU	0	6	2
MYVO	2	5	1
MYYU	0	0	1
MYCA	3	12	5
MYEV	8	7	0
COTO	1	2	0
TOTAL CALLS	89	78	10
SURVEY EFFORT (hours)	4.5	5	1
RELATIVE ACTIVITY (Calls/hour)	19.8	15.6	10.0
SPECIES DIVERSITY	7	8	3

Table 1. Acoustic sampling results;

EPFU = Eptescicus fuscus (Big Brown Bat); TABR = Tadarida brasilliensis (Mexican Free-tailed Bat); LACI = Lasiurus cinereus (Hoary Bat); LANO = Lasionycteris noctivagans (Silver-haired Bat); MYLU = Myotis lucifugus (Little Brown Myotis); MYVO = Myotis Volans (Long-legged Myotis); MYYU = Myotis yumanensis (Yuma Myotis); MYCA = Myotis californicus (California Myotis); MYEV = Myotis evotis (Long-eared Myotis); COTO = Corynorhinus townsendii (Townsend's Big-eared Bat);

4. DISCUSSION

Acoustic sampling is a very convenient, non-invasive and useful technique for conducting bat surveys, however the results of acoustic sampling require significant interpretation. These results clearly indicate that several species of bat utilize habitats provided by the three properties surveyed, and we can be reasonably confident in which species were detected. Gaining a more complete understanding of bat utilization of the properties would require much more detailed study.

4.1. Species Identification

One limitation with acoustic analysis is the confidence associated with identification of a given acoustic recording to the species level for some species, or groups of species. For example, our results indicate

that we detected Mexican Free-tailed Bats at each site. While possibly true, it is more likely that the computer algorithms misidentified these recordings. Mexican Free-tailed Bats are considered an "accidental" species by the BC Conservation Data Centre, however, there is compelling evidence from Salt Spring Island (2015 – current) that this species has made a range-shift north and may now be a more regularly occurring species on the south coast of BC. As a result, bat biologists in coastal BC have been advised to include Mexican Free-tailed Bats as a potential option when analysing acoustic recordings in software packages used to automatically identify bat echolocation calls. The challenge is that Mexican Free-tailed Bats are very difficult to distinguish from Big Brown Bats and other species with low-frequency echolocation calls (Silver-haired and Hoary Bats).

In this study we recorded Mexican Free-tailed bats on 13 occasions, primarily at Huband. The Kaleidoscope software returned results indicating that in one case, 32 of 37 "pulses" in a bat recording were a perfect match for Mexican Free-tailed Bat. In other cases, 22/25, 17/19 and 10/11 pulses were a perfect match. These recordings have a relatively high match-ratio and are reasonably long calls (much greater than our minimum threshold of 5-pulses), so it is tempting to think that the automatic identification result could be correct. Capturing a specimen would be the only way to verify this. Based on this data, it would be prudent to consider this species as possibly occurring at Huband and unlikely at the other two sites.

Notwithstanding the above, other bat species detected in this survey are readily identifiable from their echolocation calls, and for these species we can be much more confident in our results. Perhaps the best example of this is the Townsend's Big-eared Bat. This species is less likely to be detected by acoustic sampling because it uses echolocation less often and with less volume, relying instead on its particularly large ears to hear its prey (e.g., moths) moving through the air. However, when recorded, the characteristics of its echolocation calls are hard to confuse with any other species. Given that Townsend's Big-eared Bats are a species at risk in BC, and very seldom recorded by the author in other projects in the Comox Valley, it is notable that this species was recorded at both Huband and Puntledge.

We can be similarly confident in the recordings of the Long-eared Myotis. Despite being in an entirely different Genus from the Townsend's Big-eared Bat, the Long-eared Myotis is very similar in respect to its hunting strategy, so it too is seldom recorded. Its echolocation calls are also unlikely to be confused with any other species.

On Vancouver Island, California Myotis can be confused with Yuma Myotis (and vice versa), Little Brown Bat and Long-legged Myotis can be difficult to tell apart, and Silver-haired, Hoary and Big Brown bats can sometimes also be difficult to distinguish from one another. With this in mind, and in consideration of the sensitivity analysis published by Wildlife Acoustics and our conservative screening methods, it is reasonable to conclude that the results provided in Table 1, again, with the

possible exception of the Mexican Free-tailed Bat, are a very reasonable approximation of bat diversity and relative abundance but are likely not 100% accurate.

4.2. Habitat

The Atlas Rd. property appears to be lacking in several of the notable habitat features typically associated with bat roosting and foraging such as standing water (e.g., wetlands), riparian areas, and large-diameter trees. This may explain the relatively lower bat activity levels recorded at that site, however, with only one hour of survey effort on one day, any inferences are highly speculative. The gravel road (Atlas Rd.) that bisects the property appears to end in very close proximity to a series of artificial ponds associated with the Crown Isle Golf Course. It seems somewhat likely that the bats recorded at this site were using Atlas Rd as a movement corridor to navigate to and from foraging areas associated with those water features. The young-mature coniferous-dominated forest on the property may also offer night-roost or day-roost opportunities for bats.

The Huband property includes several notable bat-habitat attributes including wetlands, riparian areas and mature forest including large-diameter trees both alive and dead as well as a mixture of coniferous and deciduous trees. It is also situated in a landscape that is relatively natural, including close proximity to Seal Bay Nature Park and the Northwest Woods. The results indicating that bat activity was highest here compared to the other two sites likely signals that this property benefits from both directly providing bat habitats and being in a landscape that is relatively more intact. The property likely provides foraging as well as roosting (both day and night) opportunities for bats.

The Puntledge property also includes notable bat-habitat attributes including riparian areas and mature forest that includes a mix of deciduous and coniferous large-diameter alive and dead trees. While it is situated in a landscape that is more urbanized than the other sites, it is also immediately adjacent to a large nature park that also includes these same habitat attributes. The property is also very close to a major river and the author has confidential knowledge of a maternal colony of Little Brown Bats in a residential building within 250 m from the property. The Puntledge property likely plays an important role in supporting bat diversity and abundance in the City of Courtenay.

During the survey of the Puntledge property, the author observed California Myotis feeding directly above Arden Creek (1-10m above the ground) while simultaneously observing Big Brown Bats foraging at 20-30m, roughly at the canopy level. In this location, it appeared that the destruction of riparian shrubs from excessive trampling along a short reach of Arden Creek may have improved the access to water on behalf of the California Myotis. Any revegetation plans for this area could be informed by the needs of this and other species of bat.

5. RECOMMENDATIONS

1. Considerably more survey effort would be required to gain a more fulsome understanding of bat utilization of SD71 properties. Any expanded inventory work should target properties with suitable foraging or roosting habitats including the three properties described here, but also potentially including Miracle Beach Elementary and G.P. Vanier Secondary School. It would be reasonable to expect that bats would forage or commute in the night skies over all of the SD71 properties to a greater or lesser degree due to the ubiquitous nature of this group of species. Land management decisions would be most appropriately focused on only the subset of properties that include distinctive roosting or foraging habitats.
2. The presence of Townsend's Big-eared Bat at Huband and Puntledge is notable and likely warrants further investigation in an attempt to determine the habitat utilization of these properties by this species.
3. Older and/or inactive school buildings are typical examples of anthropogenic structures utilized by bats for maternal colonies (e.g., Denman, Peachland etc.). These features were not assessed as a part of this project but may be highly relevant to local bat conservation and mayb e providing habitat to species at risk. Additional work would be required to assess bat utilization of SD71 buildings such as the Union Bay school and perhaps others.

Yours truly,

Latitude Conservation Solutions Company

Tim Ennis, President

Disclaimer:

APPENDIX E: eBIRD RESULTS AT NEARBY HOTSPOTS

(Following 3 pages)

COURTENAY – BARBARA ROAD GREENWAY HOTSPOT (NEAR HUBAND PARK ELEMENTARY)

Species Name	Provincial Listing
American Robin	Yellow
American Wigeon	Yellow
Anna's Hummingbird	Yellow
Bald Eagle	Yellow
Bewick's Wren	Yellow
Black-headed Grosbeak	Yellow
Black-throated Gray Warbler	Yellow
Brown Creeper	Yellow
Brown-headed Cowbird	Yellow
Bushtit	Yellow
Cassin's Vireo	Yellow
Cedar Waxwing	Yellow
Chestnut-backed Chickadee	Yellow
Chipping Sparrow	Yellow
Common Raven	Yellow
Common Yellowthroat	Yellow
Dark-eyed Junco	Yellow
Downy Woodpecker	Yellow
Eurasian Collared-Dove	Exotic
European Starling	Exotic
Fox Sparrow	Yellow
Gadwall	Yellow
Golden-crowned Kinglet	Yellow
Golden-crowned Sparrow	Yellow
Green-winged Teal	Yellow
Hammond's Flycatcher	Yellow
Hermit Thrush	Yellow
House Finch	Yellow
House Sparrow	Exotic
House Wren	Yellow
MacGillivray's Warbler	Yellow

Species Name	Provincial Listing
Mallard	n/a
Merlin	Yellow
Northern Flicker	Yellow
Northwestern Crow	Yellow
Orange-crowned Warbler	Yellow
Pacific Wren	Yellow
Pacific-slope Flycatcher	Yellow
Pileated Woodpecker	Yellow
Pine Siskin	Yellow
Purple Finch	Yellow
Red Crossbill	Yellow
Red-breasted Nuthatch	Yellow
Red-breasted Sapsucker	Yellow
Red-winged Blackbird	Yellow
Ruby-crowned Kinglet	Yellow
Rufous Hummingbird	Yellow
Savannah Sparrow	Yellow
Song Sparrow	Yellow
Spotted Towhee	Yellow
Steller's Jay	Yellow
Swainsons' Thrush	Yellow
Townsend's Warbler	Yellow
Tree Swallow	Yellow
Turkey Vulture	Yellow
Varied Thrush	Yellow
Violet-green Swallow	Yellow
Warbling Vireo	Yellow
White-crowned Sparrow	Yellow
Willow Flycatcher	Yellow
Yellow Warbler	Yellow
Yellow-rumped Warbler	Yellow

COURTENAY – ROY STEWART MORRISON NATURE PARK (NEAR ECOLE PUNTLEDGE PARK ELEMENTARY/LAKE TRAIL MIDDLE SCHOOL)

Species Name	Provincial Listing
American Crow	n/a
American Goldfinch	Yellow
American Robin	Yellow
Anna's Hummingbird	Yellow
Bald Eagle	Yellow
Band-tailed Pigeon	Blue
Barred Owl	Yellow
Belted Kingfisher	Yellow
Bewick's Wren	Yellow
Black Swift	Blue
Black-headed Grosbeak	Yellow
Black-throated Gray Warbler	Yellow
Brown Creeper	Yellow
Brown-headed Cowbird	Yellow
Bushtit	Yellow
California Gull	Blue
Cassin's Vireo	Yellow
Cedar Waxwing	Yellow
Chestnut-backed Chickadee	Yellow
Chipping Sparrow	Yellow
Common Nighthawk	Yellow
Common Raven	Yellow
Common Yellowthroat	Yellow
Cooper's Hawk	Yellow
Dark-eyed Junco	Yellow
Downy Woodpecker	Yellow
Eurasian Collared-Dove	Exotic
European Starling	Exotic
Evening Grosbeak	Yellow
Fox Sparrow	Yellow
Glaucous-winged Gull	Yellow
Golden-crowned Kinglet	Yellow
Golden-crowned Sparrow	Yellow
Great Blue Heron	Blue
Hairy Woodpecker	Yellow
Hammond's Flycatcher	Yellow
Hermit Thrush	Yellow
House Finch	Yellow
House Wren	Yellow
Hutton's Vireo	Yellow
Iceland Gull	Yellow

Species Name	Provincial Listing
MacGillivray's Warbler	Yellow
Mallard	n/a
Marsh Wren	Yellow
Merlin	Yellow
Mew Gull	Yellow
Northern Flicker	Yellow
Northern Harrier	Yellow
Northwestern Crow	Yellow
Orange-crowned Warbler	Yellow
Pacific Wren	Yellow
Pacific-slope Flycatcher	Yellow
Pileated Woodpecker	Yellow
Pine Siskin	Yellow
Purple Finch	Yellow
Red Crossbill	Yellow
Red-breasted Nuthatch	Yellow
Red-breasted Sapsucker	Yellow
Red-eyed Vireo	Yellow
Red-tailed Hawk	Yellow
Ruby-crowned Kinglet	Yellow
Rufous Hummingbird	Yellow
Sandhill Crane	Yellow
Savannah Sparrow	Yellow
Song Sparrow	Yellow
Sooty Grouse	Yellow
Spotted Towhee	Yellow
Steller's Jay	Yellow
Swainson's Thrush	Yellow
Townsend's Warbler	Yellow
Turkey Vulture	Yellow
Varied Thrush	Yellow
Violet-green Swallow	Yellow
Warbling Vireo	Yellow
Western Screech-owl	Blue
Western Tanager	Yellow
White-crowned Sparrow	Yellow
White-winged Crossbill	Yellow
Willow Flycatcher	Yellow
Wilson's Warbler	Yellow
Yellow Warbler	Yellow
Yellow-rumped Warbler	Yellow

TSOLUM FIELDS HOTSPOT (NEAR NORTH ISLAND DISTANCE EDUCATION NAVIGATE ACADEMY)

Species Name	Provincial Listing
American Kestrel	Yellow
American Robin	Yellow
Anna's Hummingbird	Yellow
Bald Eagle	Yellow
Belted Kingfisher	Yellow
Bewick's Wren	Yellow
Brewer's Blackbird	Yellow
Brown Creeper	Yellow
Bushtit	Yellow
Cackling Goose	Yellow
Canada Goose	Yellow
Chestnut-backed Chickadee	Yellow
Common Loon	Yellow
Common Raven	Yellow
Cooper's Hawk	Yellow
Downy Woodpecker	Yellow
Eurasian Collared-Dove	Exotic
European Starling	Exotic
Glaucous-winged Gull	Yellow
Golden-crowned Kinglet	Yellow
Golden-crowned Sparrow	Yellow
Greater White-fronted Goose	Yellow
Hairy Woodpecker	Yellow
Harlequin Duck	Yellow
House Sparrow	Exotic
Mallard	n/a
Mew Gull	Yellow

Species Name	Provincial Listing
Northern Flicker	Yellow
Northern Harrier	Yellow
Northern Shrike	Yellow
Northwestern Crow	Yellow
Pacific Wren	Yellow
Peregrine Falcon	n/a
Pileated Woodpecker	Yellow
Pine Siskin	Yellow
Purple Finch	Yellow
Red-breasted Nuthatch	Yellow
Red-breasted Sapsucker	Yellow
Red-tailed Hawk	Yellow
Red-winged Blackbird	Yellow
Ring-necked Pheasant	Exotic
Rock Pigeon	Exotic
Ruby-crowned Kinglet	Yellow
Rufous Hummingbird	Yellow
Snowy Owl	n/a
Song Sparrow	Yellow
Spotted Towhee	Yellow
Steller's Jay	Yellow
Trumpeter Swan	Yellow
Tundra Swan	Blue
Turkey Vulture	Yellow
Varied Thrush	Yellow
Yellow-rumped Warbler	Yellow

APPENDIX F: NATIVE PLANT SELECTION TOOL (BC NATURE)

(Following 4 pages)

Native Plant Species

The plants on this list are widely available across the province; local native plant nurseries may be able to suggest additional suitable species. We recommend planting nursery grown stock except where noted, although propagation is often possible using a variety of techniques. Conifers are best purchased as small trees (plugs) from local forestry nurseries. **CAUTION:** Always check with local nurseries, resource people such as naturalists, and web sites to ensure that the plants you have selected are appropriate for your area, elevation and site conditions. Plants which are limited to specific elevations are noted in the chart.

Trees	shore stabilization	marine suitability	sun	part shade	shade	dry	some moisture	wet	maximum height (metres)	comments (also see notes Pg 137)
Grand Fir *(Abies grandis)*			●	●		●	●		60	best conifer for soil binding roots, adapted to broad range of habitats, drought-tolerant, well-drained soil
Vine Maple *(Acer circinatum)*	●	●	●	●	●		●		10	showy autumn colour, sprouts from roots, forms tree in open, more shrubby in shade, shade-tolerant, propagate from seed
Douglas Maple *(Acer glabrum)*	●		●	●	●		●		10	showy autumn colour, propagate from seed, well drained soil
Big-leaf/Broadleaf Maple *(Acer macrophyllum)*		●	●	●	●		●		30	fast-growing, propagate from seed, rich soil
Red Alder *(Alnus rubra)*		●	●	●			●		25	fast-growing, hardy, nitrogen-fixing
Paper or White Birch *(Betula papyrifera)*			●			●	●		30	fast-growing, yellow fall leaves, white peeling bark
Black Hawthorn *(Crataegus douglasii)*	●	●	●				●	●	10	thorns, white flowers, good autumn colour, moist sites along streams and ponds, does not tolerate dry, cold climate
Western Crabapple *(Malus fusca)*		●	●				●		10	thorns, fragrant pink-white flowers, small edible fruits, low elevation, forms dense thickets, does well near salt water, sloughs and estuaries
Pacific Crabapple *(Malus diversifolia)*		●	●	●			●	●	2-12	good in swamps and edges of standing or flowing water
Sitka Spruce *(Picea sitchensis)*	●	●	●	●	●		●	●	70	tolerates flooding but is shallow rooted, often found in wet forests or wetlands
Lodgepole or Shore Pine *(Pinus contorta)*		●	●			●	●		9-30 5-15	adaptable to many sites, salt-tolerant, fast-growing shorter maximum height on coast
Ponderosa Pine *(Pinus ponderosa)*			●			●	●		15-30	tolerates heat and drought
Black Cottonwood or Balsam Poplar *(Populus balsamifera)*	●	●	●				●	●	30-65	very fast-growing, fragrant leaves, hardy, shallow-rooted, short-lived, low to mid elevation, trees will resprout when cut, valuable in restoring flooded lands or other wet habitat, propagate from cuttings
Trembling Aspen *(Populus tremuloides)*			●			●	●		20-30	fast-growing, hardy, yellow fall leaves, low elevation, forms dense groves by suckering, likes sandy or gravelly soils
Bitter Cherry *(Prunus emarginata)*		●	●	●		●	●		2-15	attractive white flowers, red fruits, likes loamy, sandy or gravelly soils
Pin or Bird Cherry *(Prunus pensylvanica)*			●				●	●	5-12	white flowers, fruit attractive to birds
Choke Cherry *(Prunus virginiana)*			●			●	●		10	white flowers, edible red fruit, rich moist soil preferred but adapts to dry, exposed sites
Douglas Fir *(Pseudotsuga menziesii)*	●	●	●	●		●			75	grows rapidly, good soil binding roots, good for streamside, buffer zone plantings, well drained soil
Garry or Oregon Oak *(Quercus garryana)*		●	●	●		●			20	low-elevation, exposed sites, S. Vancouver Is. and Gulf Islands, slow-growing but beautiful, easily propagated from seed (acorn) or cutting
Cascara *(Rhamnus purshiana)*	●	●	●	●	●	●	●	●	10-12	good for soil binding, grows well on disturbed sites, south-coastal BC
Pussy Willow *(Salix discolor)*							●			lower elevation, southern two-thirds of BC, propagate from cuttings
Pacific Willow *(Salix lucida spp. lasiandra)*	●	●	●	●			●	●	9-12	fast-growing, likes to be near water, new growth is showy yellow, tolerates flooding, propagate from cuttings

Trees	shore stabilization	marine suitability	sun	part shade	shade	dry	some moisture	wet	maximum height (metres)	comments *(also see notes Pg 137)*
European Mountain Ash *(Sorbus aucuparia)*							●	●	1-5	several-stemmed, berry clusters attractive to birds
Sitka Mountain Ash *(Sorbus sitchensis)*			●	●		●	●		1-4	white flower clusters, showy red fruit, red fall colour
Western Red Cedar *(Thuja plicata)*		●	●	●	●		●	●	60	rapid-growing, moisture-loving, can be hedged, low elevation, tolerates seasonal flooding, excellent choice for wetland sites
Western Hemlock *(Tsuga heterophylla)*		●	●	●	●		●	●	60	low elevation, long-lived, suitable for wetland edges and buffer zones
Shrubs and Shrubby Trees										
Sitka or Slide Alder *(Alnus sinuata or sitchensis)*			●	●			●		1-5	roots fix nitrogen, good for poor soils, disturbed sites and bare areas, high flood and snow resistance
Saskatoon, Serviceberry *(Amelanchier alnifolia)*	●		●	●		●	●		1-5	showy white flowers, edible fruit, upright, spreading, good for dry sites, well-drained soil
Red-Osier Dogwood *(Cornus stolonifera or sericea)*	●	●	●	●	●		●		1-6	showy red twigs, white flowers, fast-growing, hardy, good in open sites and seepage areas, propagate from cuttings, well-drained soil
Beaked Hazelnut *(Corylus cornuta)*		●	●	●	●	●	●		1-4	yellow autumn colour, edible nuts, low elevation, good streamside plant, intolerant of saturated soil
Salal *(Gaultheria shallon)*	●	●	●	●	●	●	●		5	good slope stabilizer, prefers some shade, tolerant of poor soils
Ocean Spray *(Holodiscus discolor)*	●	●	●	●		●	●		4	showy white flowers, drought-tolerant, good on steep slopes or disturbed sites, resprouts readily, prefers rocky, gravelly hillsides
Black Twinberry *(Lonicera involucrata)*	●	●			●		●	●	0.5-3	low to mid elevation, fast-growing erect shrub, likes moist forest, clearings, streamsides, wetlands
Tall Oregon Grape *(Berberis aquifolium)*			●	●		●	●		1-2	tough prickly leaves, evergreen, can be spindly in shade, drought-tolerant, slow-growing, will grow in dry shade or full sun
Indian Plum *(Oemleria cerasiformis)*		●	●	●		●	●		1.5-5	good for edges of stream banks, rivers and wetlands, very early flowering
Mock Orange *(Philadelphus lewisii)*			●	●		●	●		3	spreading, fast growing, early fragrant white flowers, good for dry, open sites, good land reclamation plant, no pests
Pacific Ninebark *(Physocarpus capitatus)*	●	●	●	●		●	●		4	likes wet , open places like edges of lakes and streams
Shrubby Cinquefoil *(Potentilla fruticosa)*			●			●	●		1	showy yellow flowers, good for ground layer on dry open sites
Red-Flowering Currant *(Ribes sanguineum)*		●	●	●			●		1-3	showy red flowers, blooms early, attracts hummingbirds, good for dry sites
Nootka Rose *(Rosa nutkana)*		●	●	●			●		3	thorns, pink flowers, red hips, hardy, fast growing, spreading, poor erosion control by roots, tolerates wet soils, will grow near salt water
Clustered Wild Rose *(Rosa pisocarpa)*			●	●			●	●	2.5	wetland margin plant, hardy, tolerates flooding, fast-growing, suckering, also tolerant of dry conditions and infertile soils.
Prairie Rose *(Rosa woodsii)*			●	●		●	●		2	poor erosion control through roots, needs water for establishment at low elevations
Thimbleberry *(Rubus parviflorus)*	●	●	●	●			●		0.5-3	thornless, spreads by underground stems, good soil-binder for steep, drier slopes, open sites, or exposed stream areas
Salmonberry *(Rubus spectabilis)*	●	●	●	●	●		●	●	4	excellent erosion control by dense thickets, spreads rapidly by underground stem system, good for eroded or disturbed sites
Scouler's Willow *(Salix scouleriana)*	●	●	●	●			●	●	2-12	fast-growing, tolerates flooding, drought-tolerant, propagate from cuttings
Sitka Willow *(Salix sitchensis)*	●	●	●	●			●	●	1-8	dense, fast-growing, tolerates flooding, propagate from cuttings
Blue Elderberry *(Sambucus cerulea)*	●		●	●		●	●		6	needs good drainage, good for dry, open sites, grows fast once established, edible berries

Shrubs	shore stabilization	marine suitability	sun	part shade	shade	dry	some moisture	wet	maximum height (metres)	comments *(also see notes Pg 137)*
Red Elderberry *(Sambucus racemosa)*	●	●	●	●	●		●	●	6	white flower clusters, showy red fruit, aggressive once established, berries edible when cooked
Hardhack *(Spirea douglasii)*		●	●	●	●		●	●	1-2	showy pink flowers, no pests, forms dense thickets, suckers profusely, adaptable, tolerates moist soil, can be invasive in shallow wet areas
Snowberry *(Symphoricarpos albus)*	●	●	●	●		●	●	●	1	forms dense thickets, suckers readily, mid to high elevations
Evergreen Huckleberry *(Vaccinium ovatum)*	●	●		●	●		●		2	glossy evergreen, white flowers, edible black fruit, tolerant of salt spray
Red Huckleberry *(Vaccinium parvifolium)*				●	●	●	●		4	edible red fruit, attracts hummingbirds and deer, good for upland, wooded areas, may grow on rotting wood
Ground Covers, Wetland Plants and Herbaceous Perennials										
Kinnikinnick *(Arctostaphylos uva-ursi)*	●		●	●		●	●		20 cm	trailing evergreen groundcover, drought tolerant, bright red berries, prefers full sun
Western Maidenhair Fern *(Adiantum aleuticum)*				●	●		●		30-60 cm	close to streams and waterfalls, humus soils
Western Columbine *(Aquilegia formosa)*							●			open to protected sites, southern half of BC, flowers attractive to birds and butterflies
Lady Fern *(Athyrium filix-femina)*			●	●	●		●	●	0.6 -1.5	grows rapidly, highly adaptable
Low Oregon Grape *(Berberis nervosa)*			●	●	●	●			1.2	slow-growing, thicket-forming, evergreen, good easy-care ground cover, well-drained soil
Deer Fern *(Blechnum spicant)*			●	●	●	●	●		0.5-1	prefers shade, acid soils
Iyngby's Sedge *(Carex lyngbyei)*	●	●	●	●				●		salt water, tidal marshes and mud flats
Slough Sedge *(Carex obnupta)*	●							●		wetlands, lake and stream edges, low elevations, southern BC
Beaked Sedge *(Carex rostrata)*			●	●			●	●	1.2	southern half of BC
Canada Bunchberry *(Cornus canadensis)*				●	●		●		5-25 cm	prefers shelter, low to sub-alpine elevations, along edges of wetlands, looks like mini dogwood in flower, acid soils
Common Rush *(Juncus effusus)*	●	●					●	●		grows in clumps in wet soils or shallow standing water, open areas, disturbed sites, low to mid-elevations, south coast, can be invasive
Twinflower *(Linnaea borealis)*				●		●	●		under 5cm	forest, small fragrant flowers, acid soils
Skunk Cabbage *(Lysichiton americanum)*		●						●	0.3 -1.5	forest and seepage areas, coastal BC and wet interior, strong odour, prominent yellow "flower"
False Lily-of-the-Valley *(Maianthemum dilatatum)*	●	●		●	●		●		8-30 cm	coastal BC, near stream banks or wetlands, spreads rapidly
Sword Fern *(Polystichum munitum)*			●	●	●		●		0.6 -1.5	Vanc. Is and Lower Mainland, drought-tolerant, hardy, prefers some shade
Hardstem Bulrush *(Scirpus acutus or lacustris)*	●	●	●	●				●	1-3	wetlands, fresh to brackish water less than 1 m deep, low elevations, southern BC
Seacoast Bulrush *(Scirpus maritimus)*		●						●		marshes, fresh and brackish water, low elevation
Small-Flowered Bulrush *(Scirpus microcarpus)*	●		●	●				●	1.5	marshes, streambanks, ditches
False Solomon's Seal *(Smilacina racemosa)*				●			●		0.5-1	forest, south of Fort St. John, fragrant white flowers, showy red berries
Cattail *(Typha latifolia)*	●		●	●				●	2+	wetlands, ditches, slow-moving water

Notes to Native Plant List

Shore stabilization: These species help stabilize an eroding bank. Marine suitability: These species are also suitable for a marine shoreline.

Coastal residents may want to consider working with shoreline restoration groups to restore lost eelgrass *(Zostera marina)* beds, and to locate sources of other ocean plants such as Surfgrass *(Phyllospadix spp.)*, Dunegrass *(Elymus mollis)* and sea rocket.

Grass mixes for riparian revegetation can be purchased from various sources (see our website). Take care that any seed mix you buy has a good balance of species and that it does not contain seeds of invasive species; avoid seed mixes labelled "Ground Cover" or "Forage" for this reason.

For further information, consult a standard reference book, resources listed in *Appendix 1*, or any of the following:

Streamkeepers Handbook. 1995. Fisheries and Oceans Canada. Native Species Suited for Riparian Revegetation Projects.

Access Near Aquatic Areas: A Guide to Sensitive Planning, Design and Management (The Stewardship Series). 1996. Appendix 3. Suggested Live Barrier Species for Coastal BC (Native Plants).

Naturescape BC, Native Plant and Animal Booklets for Southern Interior, Georgia Basin and other areas.

Grow Your Own Native Landscape. 1999. Michael Leigh. The Native Plant Salvage Project, Washington State University.

Devil's Club Streamside Native Plants mars.ark.com/~barport/streamside.htm

BC Landscape Nursery Association - Native Plants, A, B and C lists. www.canadanursery.com/bclna/natives.html

Alien Invasive Plant Species

Below is a partial list of alien invasive plants of greatest concern for BC. There may be additional plants that are problematic in your specific area; check with local experts and resource agency staff such as provincial and federal agrologists, local naturalists, and research scientists at Agriculture and Agri-food Canada. *See websites listed in Appendix 1.*

Plants will often become invasive only if particular climatic and site conditions are met; for example, English Ivy, an aggressive invader in many south coastal areas, is generally not a problem in the more extreme climate of the BC Interior. However, a plant may grow in a wider range of conditions than previously observed, and the current effects of climate change may actually increase the range of some plants, so it's best to err on the side of caution. *For further information, see Resources in Appendix 1.*

The Lower Mainland, Vancouver Island and the Gulf Islands:

(Buddleia davidii) - Butterfly bush
(Cytisus scoparius) - Scotch broom**
(Daphne laureola) - Spurge laurel
(Hedera Helix) - English ivy
(Ilex aquifolium) - English holly
(Polygonum cuspidatum) - Japanese knotweed or bamboo
(Rubus discolor) - Himalayan blackberry
(Senecio jacobaea) - Tansy ragwort
(Ulex europaeus) - Gorse
(Lythrum salicaria) - Purple loosestrife (aquatic plant)**
(Spartina pantens) - Salt-meadow grass (in salt marshes)

The Interior:

(Acroptilon repens) - Russian knapweed**
(Centaurea biebersteinii) - Spotted knapweed**
(Centaurea diffusa) - Diffuse knapweed**
(Chondrilla juncea) - Rush skeletonweed**
(Cirsium palustre) - Marsh thistle
(Cirsium arvense) - Canada thistle
(Cynoglossum officinale) - Hound's tongue
(Euphorbia esula) - Leafy spurge**
(Linaria genistifolia spp. dalmatica) - Dalmatian toadflax**
(Hieracium aurantiacum) - Orange hawkweed
(Potentilla recta) - Sulphur cinquefoil**
(Tribulus terrestris) - Puncturevine
(Elaeagnus angustifolia) - Russian olive (tree)
(Lythrum salicaria) - Purple loosestrife (aquatic plant)**
(Myriophyllum spicatum) - Eurasian water-milfoil (aquatic plant)**

Of particular concern – very aggressive, or potential threat to sensitive ecosystems

APPENDIX G: CONSERVATION RANKING ASSESSMENT MEMORANDUM

(Following 6 pages)

Latitude Conservation Solutions Company

Latitude Conservation
Solutions Company
PO Box 1311
Cumberland, BC V0R-1S0

Phone: 250-650-9561
time@telus.net

MEMORANDUM

TO: **Warren Fleenor, Current Environmental**
FROM: **Tim Ennis, Latitude Conservation Solutions Company**
DATE: **April 19th, 2021**

RE: Conservation Ranking assessment for School District 71 managed lands

1. INTRODUCTION

Latitude Conservation Solutions Company (Latitude) was retained by Current Environmental (Current) to complete a conservation assessment for School District 71 (SD71)-managed properties in the Comox Valley. This assessment was completed as a sub-contract to Current who is completing a larger environmental values assessment for the suite of properties managed by SD71.

The purpose of this conservation assessment is to rank the *relative* contributions of each property to the conservation of biological diversity at the regional scale. This assessment therefore considers only a subset of environmental values. It does not directly assess carbon sequestration potential, environmental education and outreach opportunities, ecosystem services (natural asset management), nature-based recreation opportunities or other environmental values.

It is important to note that the ecological integrity of all SD71 properties is impaired to some degree by things like the extensive anthropogenic land use changes at the regional-scale and modifications to ecological processes at the global-scale. We also recognize that SD71 properties ranked as "very high" or "high" with respect to relative viability will present the best opportunities for land protection, conservation management or enhancement projects. Some properties ranked as "low" or "medium" may present excellent ecosystem restoration opportunities.

2. METHODS

This conservation assessment was based on the concept of ecological integrity at the ecological community-scale. In respect to ecological communities, the term 'integrity' is sometimes used synonymously with the term 'viability', or the likelihood of persistence of an ecological community over the long-term, including all constituent members of the community. The ecological integrity of SD71 properties was assessed on a case-by-case basis according to standard methodologies and then each property was compared to the others to determine the *relative* ecological integrity of a given property.

The methods used to rank the conservation value of SD71 properties were based on the methods used by NatureServe to rank element occurrences and describe their ecological integrity. There are three principal considerations in this assessment process:

1. Size: the size of the natural area;
2. Condition: the condition of the natural area, and;
3. Landscape Context: essentially the condition of the lands surrounding the natural area.

Each principal consideration was measured for each property, assigned a numeric score and rank, then compared to its peers to develop an overall assessment of the relative conservation value of each property.

2.1. Size

In this analysis we looked at the size of the natural area occurring on the property. In most cases, this is a small proportion of the size of the property, considering that most properties include buildings, playgrounds and sports fields as primary land cover types. Natural area size was measured (in hectares) using the Comox Valley Regional District iMap system and the polygon measurement tool. 2020 air photos were used as the base layer. The properties were sorted based on size of natural area from largest to smallest and histogram of natural area sizes was produced. The properties were then categorized based on the Jenks Natural Breaks algorithm and ranked as Very High, High, Medium and Low. A score from 1 – 4 was attributed to each rank with 1 for Low (small) and 4 for Very High (large).

Consideration was also given as to whether or not a given property was adjacent to an existing protected area, and if so, what the total area protected would become if the SD71 natural area was incorporated into a larger conservation area. However, this circumstance is rare, and including the total area of a natural feature did not affect the rankings or scores so was discarded.

2.2. Condition

The NatureServe methodology relies heavily on the concept of maturity or the developmental stage of the ecological community as a key element of condition. For example, a forest that had been recently disturbed (e.g., by logging) would be considered in low (or poor) condition whereas an old-growth forest would be considered to have a very high condition rating. Site-based assessments and air-photo (2020) interpretation were used to determine the seral stage of the natural area and the score attributed to it. Structural stage 3 (shrub) was given a score of 3, pole-sapling forests 4, young forests 5, and mature forests 6. A score of 0 was attributed to properties with no natural areas remaining. In some cases, the natural areas of a property occur at different structural stages and in these cases the score was averaged according to the relative proportion of each structural stage.

If a property's natural areas included one or more Sensitive Ecosystem Inventory (SEI) polygons it was given a score of 1, if no SEI polygons were present it scored 0. If the understory vegetation was intact, it was given a score of 1. If it was degraded (e.g., by trampling) over the majority of the of the

natural area, it was given a 0. A value of 0.5 was attributed to natural areas where significant portions, but not all, of a natural area included degraded understory vegetation.

The seral stage score was added to the SEI and understory vegetation scores to create a condition score for each property. These were sorted and ranked using the same approach as described above for size.

2.3. Landscape Context

The landscape surrounding each property was visually assessed using 2020 air-photos. A score and a rank was attributed to each property according to the criteria set out in Table 1 below.

Table 1. Landscape Context rating and scoring criteria.

Buffer Rank	Score	Definition
Very High	3	Mostly surrounded by parks, managed forests or other natural areas
High	2	Mostly surrounded by rural/agricultural lands
Medium	1	Surrounded by a mix of suburban, urban and agricultural lands
Low	0	Mostly surrounded by suburban and/or urban lands

2.4. Conservation Value

The relative conservation value for each property was determined by calculating a weighted average of the condition ranks for size, condition, and landscape context where Very High = 4, High = 2.5, Medium = 1 and Low = 0. Properties with no natural cover remaining were then reclassified as having no conservation value (Nil).

3. RESULTS

Two SD71 properties were identified as having Very High conservation value. Five were ranked as High, one Medium, eleven as Low, and four as having no value (Table 2).

Table 2. Conservation Value of SD71 properties

School Name	Conservation Value Ranking
Hubband	Very High
Ecole Puntledge/Lake Trail	Very High
Atlas Rd Property	High
Miracle Beach Elementary	High
Vanier	High
Highland Park Secondary	High
Hornby	High
Airport Elementary	Medium
Isfeld and Valley View	Low
Denman	Low
NIDES	Low
Royston Elementary	Low
Brooklyn Elementary	Low
Sandwick Tech Ed Park	Low
Aspen Park Elementary	Low
Cumberland Elementary	Low
Ecole Robb Rd	Low
Glacier View Secondary	Low
Queneesh Elementary	Low
Arden Elementary	Nil
Union Bay	Nil
Comox Elementary	Nil
Courtenay Elem/Aboriginal Ed	Nil

4. DISCUSSION

Ecole Puntledge Elementary/Lake Trail and Huband Elementary are SD71 properties which include natural areas of sufficient conservation value as to contribute in a meaningful way to the conservation of biodiversity at the regional scale. The natural areas of these properties should be considered as candidates for more formal conservation designations (e.g., City of Courtenay park), or protected in perpetuity through legally robust mechanisms (e.g., conservation covenant). Conservation management of these natural areas should be paramount, although some low-impact recreational use could likely be accommodated and would provide benefits to local residents. Similarly, high-value educational opportunities connected to nature-based studies, conservation and restoration could also be enhanced.

The Highland Park Secondary School, G. P. Vanier Secondary School, Hornby Island Community School and Miracle Beach Elementary each contain natural areas ranked as High conservation value but demonstrate uses that are tied to educational programming or active use by local residents (e.g., greenspace trails). In these cases, a management plan that includes the conservation of natural resources including protection of ecological communities and wildlife habitats while maintaining or enhancing educational opportunities or public use is recommended. More detailed analysis as to the potential for beneficial ownership and management by local government parks agencies should be investigated.

The property on Atlas Rd. is an outlier in that it is undeveloped land covered completely with natural areas categorized as high-value, other than the access roads that bisect it. There are no active community trails or educational uses on the property. If this property is important to the future plans of SD71 as either a potential future school location or as an operations hub, the development of the site should follow City of Courtenay regulations and other best management practices. If the site is surplus to the needs of SD71, redesignation of the land as a community park with an emphasis on nature conservation is encouraged.

Only one property was ranked as "Medium" conservation value (Airport Elementary). In this case, the natural area is best described as a forested area dominated by mature trees, but with an understory (both shrub and herb layers) that has been almost completely eliminated through trampling and compaction of soils. This property presents excellent opportunities for ecosystem restoration, while maintaining low-impact public recreational access by way of connective trails. Without constraining public use and perhaps the use of the natural area by students to the less sensitive portions of the natural area, we hypothesize that the overstory trees will eventually die, necessitating their removal and thus the degradation of the ecological values inherent in mature forest stands. We recommend that a restoration prescription informed by a certified arborist be considered, and where possible, be implemented by students.

With respect to properties ranked as having Low or Negligible conservation value (n = 15), it should be noted that every property has the potential for some improvement in its biological condition whether that be through tree planting along the fence lines, changes to the landscaping that emphasize native plants, "pollinator gardens", or the installation of habitat features such as bird boxes or bat houses. There is tremendous opportunity to improve on the conservation value of these sites through projects tied to enhancing conservation values.

5. RECOMMENDATIONS

1. Consider developing conservation management plans for all properties containing high conservation value natural areas such that conservation objectives, educational opportunities, and local community benefits are balanced.

2. Consider improving the ecological integrity of Medium, Low and negligible conservation value properties by supporting the activities of teachers, administrators or community groups who step forward to lead suitable projects.
3. Continue to leverage the educational opportunities provided by both intact and degraded natural areas on SD71 properties to support nature-based learning opportunities for students.

Yours truly,

Latitude Conservation Solutions Company

Tim Ennis, President

Disclaimer: