- Lot “A” -

Revised Application for Rezoning

City of Courtenay

Appendix B

Environmental Assessment and Protection Plan

- Current Environmental -

Rosebery Investments Ltd.
West Vancouver, BC

ENVIRONMENTAL ASSESSMENT AND PROTECTION PLAN

LOT A COPPERFIELD ROAD

-

CITY OF COURTENAY, BC

September 22, 2017
(Revised October 10, 2019)

Prepared for:

Rosebery Investments Ltd.

Prepared by:

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current ENVIRONMENTAL

HEADINGS

1 INTRODUCTION

Rosebery Investments Ltd. is proposing to rezone and develop an approximate 5.9 Ha property[1] - herein referred to as "Lot A" - located between the western terminus of Copperfield Road and the Comox Logging Road within the City of Courtenay, BC. The proposed lot layout for this development is provided in Figure 1. Due to the existence of several environmentally sensitive areas (ESA) on the subject property, Current Environmental Ltd. (CEL) has been retained to provide an environmental inventory, impact assessment, and impact mitigation plan[2] to facilitate project planning and to assist with securing approval from regulatory agencies. It is anticipated that this Environmental Assessment and Protection Plan (EAPP) report will be referred to Ministry of Forests Land and Natural Resource Operations (MFLNRO) agency staff for comment, and possibly to Fisheries and Oceans Canada (DFO) pending consideration of final designs.

1.1 OBJECTIVES

This document is provided in support of a rezoning application with the City of Courtenay for the subject property. Specifically, the objectives of this assessment are to:

a. Complete an assessment of fish and wildlife habitat and utilization, plant communities, and other Environmentally Sensitive Areas (ESA's) on the subject property.

b. Determine appropriate setbacks from identified fish habitat using the detailed *Riparian Areas Regulation* (RAR) assessment methodology and City of Courtenay Arden Local Area Plan (LAP).

c. Support interdisciplinary project planning and design.

d. Outline recommendations for enhancement and compensation measures as part of a conceptual site development plan that will help avoid or minimize potential impacts and optimize ecological function on the site after development.

1.2 PROPOSED DEVELOPMENT

The proposed rezoning and development plan by Rosebery Investments Ltd. includes the creation of 35 units (15 townhomes; 2 duplexes; 18 single family) within the 5.82 ha property while maintaining and preserving key environmentally sensitive habitats (Figure 1). Preserved areas included within the site plan include four seasonal wetlands, Piercy Creek mainstem and Tributary 11, all with associated setbacks prescribed according to the City's Arden Local Area Plan (LAP) and the *Riparian Areas Regulation* (RAR) of the BC *Fisheries Protection Act*. Site access will be provided by extending Copperfield Road along the existing road right-of-way (ROW) to Ministry of Transport and Infrastructure standards. The access road will upgrade an existing culvert crossing of Tributary 11 (Photo 6) by replacing the closed-bottom culvert with an arched design that will include re-instating natural stream bed substrates and profile. A 0.08 ha (0.02 ha on property & 0.06 ha on ROW) wetland located near the northern property corner ("Wetland 4") will be modified to allow site access (Figure 1; Table 1).

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1 Lot Rem A, PL 2607, DL 138, Comox Dist.

2 Silvester, D. & Fleenor, W. (2019). DRAFT: Construction Environmental Management Plan. Prepared by Current Environmental Ltd. for Rosebery Investments Ltd. Revised Oct. 8, 2019. pp. 23.

Aquatic areas (wetland and stream channels) on the property comprise a total of 0.61 Ha (10.5 % of the site; Table 1 ID# 2) and LAP setbacks (not including aquatic areas) 2.36 ha or 40.5 % (ID# 8), resulting in a gross developable area of 2.85 ha or 49.0 % (ID# 3) of the total property. The developable area, however, has further been reduced to 2.59 ha (44.5 %; ID# 7) by extending protection to 0.26 ha (4.5 %; ID# 6) of otherwise developable land that will be set aside for addition to protected areas. The result of extending protection to otherwise developable area is a net protected area of 2.62 ha (45.0 %).

Table 1. Areas of proposed protection and property development.

ID	TOTAL AREAS	AREA (HA)	% OF TOTAL
1	Lot	5.82	100
2	**Aquatic (wetland + stream)**	**0.61**	**10.5**
3	Developable (outside all existing LAP setbacks)	2.85	49.0
4	Wetland 4 modified for access (from property)	+ 0.02	0.3
5	Wetland riparian modified	+ 0.32	5.5
6	Developable added to protected	- 0.26	4.5
7	**Net developable**	**2.59**	**44.5**
8	Gross Protected (Terrestrial LAP, not including aquatic areas)	2.36	40.5
9	**Net protected (LAP + added developable)**	**2.62**	**45.0**

As such, a combined total of aquatic areas (wetland and stream) and protected (LAP and added developable) areas results in 55.5 % of the total lot being set aside as protected areas recommended for dedication as parkland. Furthermore, developable land added to protected areas are recommended to partially offset areas of proposed encroachment into protected riparian areas (i.e. 0.32 ha LAP Wetland 4 riparian to be modified; detailed in Section 8).

2 BACKGROUND

The following documents have been produced in support of the re-zoning application package with the City of Courtenay and have been used to assist in setting the scope of this assessment:

- Current Environmental Ltd. (Revised Oct. 2019). Construction Environmental Management Plan (CEMP)
- Skyline Tree Services. (Jan. 24, 2017). Arborist's Tree Inventory and Assessment.
- Current Environmental Ltd. (Revised Oct. 2019). Detailed *Riparian Areas Regulation* Assessment
- McElhanney Consulting Services Ltd. (July 4, 2017). Proposed Rezoning and Subdivision Layout Option 2. (Figure 1)

Pursuant to the City of Courtenay's OCP[4], the BC Ministry of Environment's *Develop with Care*[22] methodology was used during 2017 ground-level reconnaissance. The following ecosystem elements were considered during all previous assessments and form the basis of this impact assessment:

a) Presence and locations of watercourses and wetlands;

b) Legislated setbacks from watercourses and wetlands;

c) Presence of other terrestrial and aquatic ESA's;

d) The occurrence of rare or endangered species.

3 STUDY AREA

The subject property comprises a total area of 5.9 ha located between the southwestern terminus of Copperfield Road and the southeast to northwest alignment of Comox Logging Road in the City of Courtenay approximately centered at UTM coordinates 10N 354561.7 m E 5503603.7 m N (Figure 1). The subject property is surrounded by rural residential properties to the northeast along Copperfield Road, a relatively dense new subdivision and development beyond the Piercy mainstem to the south and east, and undeveloped rural lots in the Comox Valley Regional district to the north and west.

The site resides in the Coastal western hemlock (very dry maritime eastern variant) CWHxm1 biogeoclimatic zone. This zone is restricted to elevations between sea level and 700 m in areas subject to the rainshadow of Vancouver Island and the Olympic Range, and is characterized by warm, dry summers; and mild, wet winters.[3]

In general, the subject property, which slopes gently from northwest to southeast at an approximate grade of 2 %, has undergone historical modifications that are largely limited to forestry and land clearing. Overall, the study area

3 Ministry of Forests and Range. (2009). CWHxm1 - Moist Maritime Coastal Douglas fir Subzone. Biogeoclimatic Ecosystems Classification Program. Research Branch. Retrieved from <http://www.for.gov.bc.ca/rco/research/eco/bec_web/docs/CWHxm1.htm>.

can be characterized into two distinct regions with regard to Environmentally Sensitive Areas (ESA's) (see below): both of these areas are discussed in detail in Section 6.3 and illustrated in Figure 3.

1. Young 3rd Growth Forested Area (4.4 ha): The property has begun to re-generate a 3rd growth forest through natural succession (planting does not appear to have occurred) in the most recently cleared areas (20-30 years old), primarily in the central area on the northwestern half of the property. These young, sapling forests show relatively low species richness and limited signs of wildlife usage.

2. Older 2nd Growth Forested and Riparian Areas (1.4 ha): Older 2nd growth (60-100 years old) forest stands remain adjacent to and within riparian areas of Piercy Creek and its wetlands, and along the property boundaries; especially in the northeastern corner and southeastern half of the subject property. These areas contain the highest concentration of wildlife trees, recumbent LWD, and signs of wildlife usage.

4 REGULATORY REQUIREMENTS

The primary regulatory jurisdictions over environmentally related aspects of the Project include the City of Courtenay, Department of Fisheries and Oceans (DFO), and the BC Ministry of Forest Lands and Natural Resource Operations (MFLNRO) agencies.

The protection of ESAs and the mitigation of environmental impacts are to be of primary importance during construction of the Project. Pertinent regulations that will govern construction activities in proximity to ESAs include:

1. City of Courtenay OCP ESA DPA[4] & Arden LAP[5]
2. Federal *Fisheries Act*
3. Federal *Species at Risk Act* (SARA)
4. Federal *Migratory Bird Convention Act*
5. BC *Wildlife Act*
6. BC *Fisheries Protection Act*
7. BC *Water Sustainability Act*

If implemented correctly, Best Management Practices (BMPs) and mitigation measures outlined in this document (Section 8) and the project CEMP[2] will ensure the protection of ESAs and compliance with the abovementioned regulations.

4 City of Courtenay. (2016). Official Community Plan. Appendix "A" to Bylaw No. 2387. Section 8 - Environmental Development Permit Area. Accessed from <http://www.courtenay.ca/assets/Departments/Development~Services/Bylaw_2387_OCP.pdf.pdf>
5 http://www.courtenay.ca/assets/Departments/Development~Services/LAP_Arden%20Corridor.pdf

4.1 CITY OF COURTENAY OCP ESA DPA (INC. *RIPARIAN AREAS REGULATION*), ARDEN LAP, & TREE MANAGEMENT BYLAW

City of Courtenay environmental legislation that applies to the subject property during the current re-zoning application process includes Environmental Development Permit Area (OCP Bylaw No. 2387) and more specifically the Arden Corridor Environmental Development Permit (AC-EDP) detailed in the Arden Local Area Plan (LAP). During later sub-division and development processes, additional legislation will apply such as the City *Tree Protection and Management Bylaw* No. 2850.

According to the City's OCP (Section 4.10.4) Environmentally Sensitive Areas (ESA) that reside on the subject property include watercourses, wetlands, and riparian and wildlife habitats. The City has identified a number of tools for the protection of these areas that include:

- Development permits
- Tree Protection and Management Bylaw
- Acquisition/dedication of applicable lands
- Conservation covenants
- Joint ownership/management
- Increased buffer areas or leave strips
- Amenity provisions through zoning

Of these tools the Environmental Development Permit Area (EDPA) requirement has been applied to the forthcoming re-zoning and subdivision phases. The EDPA recognizes that assessments of watercourses and wetlands are co-enabled under the *Riparian Areas Regulation* (RAR) of the BC *Fisheries Protection Act* (see below) and accepts the RAR as a minimum standard for stream and riparian protection[6]. This EAPP meets the EDPA requirement for an impact assessment and Detailed Assessment under *Develop with Care 2012 Bio-Inventory Terms of Reference* prepared by a R.P.Bio.

The Arden Local Area Plan (LAP) builds on the RAR's minimum standard by applying a blanket 30 m setback on all watercourses and wetlands. The LAP does, however, allow for trail systems to be within the 30 m LAP setback providing that it remains outside the RAR setbacks for watercourses and wetlands. Additional discussion of the RAR as it applies to the subject property is provided in Section 6.2.

The City of Courtenay *Tree Protection and Management Bylaw* (No. 2850)[7] regulates the removal, retention, and replacement of trees associated with development. The development work proposed in this EAPP will require consideration and application of the regulation during all design, planning, and implementation phases. As referenced in Section 2, an Arborist's Tree Inventory and Assessment was created by Skyline Tree Services on Jan. 24, 2017 and was appended to both 2017 and 2019 RAR submissions[6].

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6 A detailed RAR assessment was created by CEL on Feb. 22, 2017 and submitted to RARNS under Assessment #4459. An updated version (Oct. 2019) of the assessment revised with the most recent lot layout and development plan.

7 http://www.courtenay.ca/assets/City~Hall/Bylaws/Land~Use/2850_Tree_Protection_Bylaw.pdf

4.2 FEDERAL FISHERIES ACT

An updated version of the Federal *Fisheries Act* came was introduced on June 21, 2019 with additional provisions coming into force on Aug. 28, 2019.

The Federal *Fisheries Act*[8] is intended to ensure works are carried out in a manner that avoids resulting in the harmful alteration, disruption, or destruction of fish habitat and prevent pollution of water frequented by fish as described in the following notable sections:

1. No person shall carry on any work, undertaking or activity that results in the harmful alteration, disruption or destruction of fish habitat. (Section 35);
2. A prohibition against depositing or permitting the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water (Section 36(3));
3. Provisions for flow and passage (Section 20 and 21);
4. A framework for regulatory decision-making (Section 6 and 6.1).

These provisions are intended to reduce threats to habitat (degradation or loss), flow alteration, aquatic invasive species, overexploitation of fish, and pollution of many kinds that may adversely affect water quality and fish health.

When conducting a project near water it is the responsibility of the person or proponent conducting the work to ensure they avoid causing a "*harmful alteration, disruption or destruction* [HADD] *of fish habitat"* in compliance with the *Fisheries Act*. The DFO document entitled "*Measures to Protect Fish and Fish Habitat*"[9] applies to all project types and replaces all previous DFO "*Operational Statements*". "Standards, codes of practice, and guidelines for projects near water"[10] are intended to assist compliance with fish and fish habitat protection provisions of the *Fisheries Act* by incorporating measures to avoid causing the death of fish and HADD of fish habitat.

Measures to Protect Fish and Fish Habitat under the Fisheries Act

Projects may either be submitted for review to DFO agency staff ("Request for Review" process) or "Self-Assessed" by a Qualified Environmental Professional (QEP). Successful self-assessment occurs when "measures to protect fish and fish habitat" can be effectively implemented and no formal project review by DFO is required. The final design and development schedule will determine whether the Project will require a Request for Review under the assertions provided in Table 2 (next page).

8 Fisheries Act. Last Amended April 5, 2015. Accessed from <http://laws-lois.justice.gc.ca/eng/acts/f-14/>.
9 Measures to Protect Fish and Fish Habitat. <http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures-eng.html>.
10 DFO Projects Near Water. <http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html>

Table 2. *Measures to Protect Fish and Fish Habitat* detailing project activities and design criteria that trigger DFO project review.

#	*Measures to Protect Fish and Fish Habitat*	Relevant Project Component	DFO Review Required
1	Prevent the death of fish and plan work in water with respect to timing windows to protect fish.	All work will be planned to avoid the death of fish. All work in-stream, including Copperfield culvert crossing upgrade will be scheduled within the regional timing window of least risk.	NO
2	Maintain riparian vegetation. Maintaining an undisturbed vegetated buffer zone between areas of on-land activity and the high-water mark of any water body	Approximately Riparian vegetation near the northern property corner will be modified to allow access to the property via Copperfield Road ROW. The proposed riparian encroachment areas are discussed in Section 8.3. Impacts to riparian vegetation will also fall under the jurisdiction of MFLNRO (see BC *Water Sustainability Act* section below)	YES
3	Avoid conducting any work, or undertaking, or activity in water, placing fill or other temporary or permanent structures below high-water mark.	A clear span or arched culvert crossing design will be required for vehicle access over Tributary 11 in the Copperfield ROW. This work is below highwater mark and will expand the footprint of the existing crossing structure.	YES
4	Maintain fish passage by avoiding changing flows or water levels or obstructing/interfering with the movement or migration of fish.	Any work below highwater mark will be timed during the fisheries work window and mitigation measures will be in place to avoid obstructing fish passage.	NO
5	Ensure proper sediment control by avoiding introducing sediment in the water and developing and implementing an erosion and sediment control plan.	A sediment and erosion control plan is included within the project Construction Environmental Monitoring Plan (CEMP)	NO
6	Prevent entry of deleterious substances in water by avoiding and planning for emergency spill response procedures.	Avoidance and mitigation measures for Fuels and Hazardous Materials are included within the project Construction Environmental Monitoring Plan (CEMP)	NO

4.3 SPECIES AT RISK ACT

The *Species at Risk Act* (SARA) is a federal law with three main goals:

1. Prevent endangered or threatened species from becoming extinct or extirpated;
2. Help in the recovery of endangered, threatened and extirpated species; and
3. Manage species of special concern to help prevent them from becoming endangered or threatened.

For those species listed as extirpated, endangered or threatened under the Species at Risk Act (SARA), it is illegal to:

1. Kill, harm, harass, capture or take an individual;
2. Possess, collect, buy, sell or trade an individual or any part of an individual; and
3. Damage or destroy the residence of one or more individuals.

4.4 MIGRATORY BIRD CONVENTION ACT (MBCA)

The *Migratory Bird Convention Act* (MBCA) protects individuals and populations of migrating birds, including their eggs and nests. Among a number of prohibitions, this act requires there be no disturbance to the nests or eggs of migratory birds without a permit from the Minister, and there be no addition of substances "in waters or an area frequented by migratory birds or in a place from which it may enter such waters or such an area — that is harmful to migratory birds."[11]

4.5 BC WILDLIFE ACT

Section 34 of the provincial *Wildlife Act*[12] specifies that:

> A person commits an offence if the person, except as provided by regulation, possesses, takes, injures, molests or destroys
>
> (a) a bird or its egg,
>
> (b) the nest of an eagle, peregrine falcon, gyrfalcon, osprey, heron or burrowing owl, or
>
> (c) the nest of a bird not referred to in paragraph (b) when the nest is occupied by a bird or its egg.

Raptor nests covered under the *Act* are protected year-round whether they are active or not, while breeding birds' nests are only protected while inhabited by a bird or its egg.

In order to ensure the protection of nesting birds and their eggs pursuant to the BC *Wildlife Act* no works with the potential to disrupt trees/vegetation should be undertaken during the passerine bird nesting window from Mar. 1 - Aug. 31[13] without being preceded by a bird nesting survey completed by a Qualified Environmental Professional (QEP).

4.6 BC WATER SUSTAINABILITY ACT

Section 11 of the Provincial *Water Sustainability Act* (*WSA*) requires an Approval be granted by the Ministry of Forests Lands and Natural Resource Operations (MFLNRO) for "changes in and about a stream" defined as[14]:

> (a) any modification to the nature of the stream including the land, vegetation, natural environment or flow of water within the stream, or
>
> (b) any activity or construction within the stream channel that has or may have an impact on a stream or a stream channel.

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11 Migratory Bird Convention Act. <https://www.ec.gc.ca/Nature/default.asp?lang=En&n=7CEBB77D-1>&<http://laws-lois.justice.gc.ca/eng/acts/M-7.01/>
12 BC Wildlife Act. Accessed from: <http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/00_96488_01#section34>.
13 Develop with Care. (2014). Section 4 - Environmentally Valuable Resources. Table 4.2: Breeding season least risk window. pg. 4-26. Accessed from < http://www.env.gov.bc.ca/wld/documents/bmp/devwithcare/DWC-Section-4.pdf>.
14 http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-licensing-rights/working-around-water

Notifications are relevant to low-risk changes, such as culvert upgrades, that will have a minimal impact on the environment and third parties; while larger, more complex works, such as encroaching into a wetland and its riparian area to provide access to the subject property via development of the Copperfield Road Right-of-Way (ROW) will require an Approval.

Development of Copperfield Road along the northern property boundary will take place within the ROW and as a result the City may be required to provide a letter of agency to the developer and/or their consultants for the submission of an approval application package on their behalf.

Best Management Practices (BMPs) outlined in the *Users' Guide to Working in and Around Water*[15] should be implemented as the Project aims to meet and/or exceed provincial and federal requirements for habitat protection. Based on preliminary designs and locations of Project components near water, triggers for "changes in and about a stream" as described in the *Water Sustainability Act* include encroaching on wetlands and their associated riparian vegetation (i.e. Streamside Protection and Enhancement Area [SPEA]) such as with proposed access through the City's ROW in the northeast corner of the property (Figures 1 & 2). Should these anticipated impacts be reduced or additional impacts be defined as designs are formalized the level of *WSA* applicability will be subject to change.

5 SCOPE OF ASSESSMENT/METHODS

This EAPP has been completed based on the following methods and resources:

1. "Office-based"/background, review of existing technical reports specific to environmentally related resources in the project area;
2. Field verification, assessment, and mapping of proposed project areas and inventoried Environmentally Sensitive Areas (ESA's);
3. Assessment of potential environmental impacts associated with proposed project works;
4. Recommendations to avoid, minimize, restore and offset environmental impacts.

5.1 BACKGROUND INFORMATION REVIEW

The following resources were consulted prior to field work to help identify known ESA's and to direct field assessment activities:

1. Office-based resources to determine fish presence and habitat suitability of identified watercourses included information researched on the Provincial Ministry of Environment (MoE) *Fisheries Information Database Query* (FIDQ) database, and the MoE BC *Habitat Wizard*[16] online resources.
2. MoE BC Conservation Data Center (CDC) *Species and Ecosystem Explorer*[17];
3. SARA and COSEWIC (Committee on the Status on Endangered Wildlife in Canada) online database[18];

15 BC Ministry of Environment. May, 2008.
16 http://www.env.gov.bc.ca/habwiz/
17 http://www.env.gov.bc.ca/atrisk/toolintro.html
18 http://www.sararegistry.gc.ca/default.asp?lang=En&n=24F7211B-1;http://www.cosewic.gc.ca/eng/sct1/index_e.cfm

4. BC Geographic Warehouse iMapBC 2.0 online mapping application[19];
5. Sensitive Ecosystem Inventory (SEI) mapping of East Vancouver Island[20];
6. Wildlife Tree Stewardship Atlas (WiTS)[21];
7. Geo-referenced orthophotos of the study area.

5.2 FIELD METHODOLOGY

A series of reconnaissance-level field surveys were completed Jan. 12, May 18, and Aug. 30, 2017 to sample the seasonal character and wildlife usage patterns of the subject lot. In general, broad, initial observations around the entire project area were conducted to help highlight areas of special concern that may warrant closer investigation including aquatic and terrestrial habitats and species. No species at risk were identified on the subject lot during ground-level reconnaissance.

Aquatic Habitats & Species

Criteria for determining and describing aquatic ESAs and proposing restoration areas from identified features were based primarily on measures in BC MOE *Develop with Care: Environmental Guidelines for Urban and Rural Land Development in British Columbia*[22], the Resources Inventory Committee of British Columbia *Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures* Version 1.1[23], the City of Courtenay *Official Community Plan*4, BC *Fisheries Protection Act - Riparian Areas Regulation Assessment Methodology*[24], and from the project biologist's previous experience in dealing with local government, Federal, and Provincial agency staff.

Terrestrial Habitats & Species

Survey methods for terrestrial elements or ESA's included those outlined in *Environmental Objectives, Best Management Practices and Requirements for Land Developments*[25], *Environmental Best Management Practices for Urban and Rural Land Development in British Columbia*[26], and the *Field Manual for Describing Terrestrial Ecosystems*[27].

19 http://www.data.gov.bc.ca/dbc/geographic/view_and_analyze/imapbc/index.page
20 http://www.shim.bc.ca/atlases/sei/seimain.html
21 http://www.wildlifetree.ca/atlas.html
22 http://www.env.gov.bc.ca/wld/documents/bmp/devwithcare/
23 Resource Information Standards Committee. (1999). Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures. Retrieved from <http://www.ilmb.gov.bc.ca/risc/pubs/aquatic/sitecard/sitecard.pdf>.
24 http://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/fish-fish-habitat/riparian-areas-regulations/rar_assessment_methods.pdf
25 BC Ministry of Environment Lands and Parks, 2001
26 BC Ministry of Environment, Draft 2005
27 BC Ministry of Environment Lands and Parks and BC Ministry of Forests - Research Branch, 1998

Species at Risk

An office-based assessment of Species at Risk occurrences on the subject property was completed using the *CDC Mapped Known Locations of Species and Ecological Communities at Risk*[28], *BC Species and Ecosystems Explorer*[29], and the *Federal Species at Risk Public Registry*[30].

The on-site assessment of Species at Risk was completed concurrent with the other inventory efforts mentioned above and was based primarily on methods outlined in *Environmental Best Management Practices for Urban and Rural Land Development*[31].

6 RESULTS

Identified ESA's on the subject property include aquatic habitats and species (Section 6.1) that include a series of seasonal wetlands connected by surface water flow to confirmed fish bearing waters and the channels of Piercy mainstem and Tributary 11; riparian areas that include maturing riparian forest areas adjacent to wetlands and watercourses (Section 6.2); terrestrial habitats and species (Section 6.3); and species at risk (Section 6.4). These ESA areas are discussed in detail below and illustrated spatially in Figures 2 & 3.

6.1 AQUATIC HABITATS AND SPECIES

Five wetlands have been identified on site that are connected by seasonal surface water flows to the downstream fish bearing waters of Piercy Creek and/or Tributary 11 (Figure 2). Wetlands and watercourses are subject to protection under the BC *Riparian Areas Regulation* and City of Courtenay OCP.

Wetlands

All five wetland ecosystems identified on the subject property share common characteristics that include connection by seasonal surface flows to downstream fish bearing waters of Piercy Creek (Photo 1). Limitations to salmonid productivity on the property includes a total barrier to adult salmonid migration at the Arden Road/Piercy Creek crossing approximately 300 m downstream of the site and seasonal drying that reduces juvenile salmon rearing potential during summer months (Photo 2).

All of the wetlands are classified as forested swamps that contain a variety of native species including a canopy dominated by red alder (*Alnus rubra*), with some Douglas fir (*Pseudotsuga menziesii*), western red cedar (*Thuja plicata*), and bitter cherry (*Prunus emarginata*) on the fringes. Slough sedge (*Carex obnupta*) dominates the wetland bottoms while fringe understory species include salmonberry (*Rubus spectabilis*), red-osier dogwood (*Cornus stolonifera*), and cascara (*Rhamnus purshiana*).

Although, not currently providing direct salmonid utilization, the subject wetlands do supply storage and slow release of overland flows that enhance food production for downstream fish and hydrological and water quality

28 http://maps.gov.bc.ca/ess/sv/cdc/
29 http://a100.gov.bc.ca/pub/eswp/
30 http://www.sararegistry.gc.ca/species/default_e.cfm
31 BC Ministry of Water, Land and Air Protection. Draft 2004. Section 6. Special Wildlife and Species at Risk. Accessed from <http://www.for.gov.bc.ca/hfd/library/documents/bib96812.pdf>.

buffering functions that help maintain the overall health and productivity of Piercy Creek. As well, ongoing protection and enhancement of the subject wetlands will help support increased future habitat values once fish access is restored at the Arden Road crossing.

The subject wetlands and associated riparian areas contain the highest abundance of wildlife trees on the property that provide excellent habitat for a variety of bird species, bats, and smaller mammals (Photo 3). The seasonally wetted areas provide important foraging and hydration habitat for amphibians and other wildlife. However, the wetlands dry during summer months and are not suspected to sustain wetted habitat long enough to provide breeding habitat for most amphibian species. Wandering Salamander (*Aneides vagrans*), a Provincially blue-listed species of special concern (Section 6), is known to inhabit the area; while a Pacific chorus frog (*Pseudacris regilla*) was observed in the northeastern corner of the property near Wetland 3 (similar wetland habitats throughout the property are expected to support amphibian productivity) on Aug. 30, 2017 (see cover photo); this indicates utilization of these areas for amphibian rearing and foraging and underscores the importance of protection of similar habitats for amphibian species.

Piercy Mainstem

The Piercy Creek mainstem flows from southeast to northeast along the southern property boundary for approximately 600 m (Figure 2). At its confluence with Trib 11, just off the property to the east, the mainstem continues to flow east to eventually join Millard Creek before discharging into the Courtenay River estuary.

Riparian habitat of this stream is well vegetated throughout the majority of the property (Section 6.2). Some areas of the stream banks are eroded, but overall riparian vegetation provides good stream and bank stability. Substrates in the Piercy Creek mainstem vary from gravel and cobble to areas transitioning into cobble boulder mixes. Substrates were larger in diameter close to a pedestrian crossing (Photo 5) where the stream bed had a higher gradient. The pedestrian crossing will eventually connect a trail built from the neighbouring development off Swanson Street to the south to a network of trails to be constructed on the subject property that will traverse the mainstem SPEA at this location. Sections of the Piercy Creek mainstem channel appear to have been historically straightened and can be characterized as having nearly uniform glide habitat with low complexity, a low frequency of large woody debris (LWD), and varying fine to coarse substrates with little to no shelter by way of cutbanks.

While wetted, this channel would provide marginal habitat for rearing juvenile salmonid species that could be significantly enhanced by increasing riffle/pool and LWD frequency and exploring options to enhance year-round flows. A series of deep, constructed pools exist upstream of the subject property near Marsden Road that help extend the wetted season in the upper watershed.

Tributary 11

An approximate 30 m length of Tributary 11 is located in the northernmost corner of the subject property where it passes through a 1.5 m x 1.0 m ovoid CSP culvert under a pedestrian access point within the Copperfield Road ROW and flows downstream to its confluence with the Piercy Creek mainstem (Photo 6). Riparian vegetation along the tributary is characterized by a mixed young forest of similar composition to that of the mainstem channel. Additional species include big leaf maple (*Acer macrophyllum*), dull Oregon-grape (*Mahonia nervosa*), salmonberry, and some invasive English holly (*Ilex aquifolium*). Substrates within this reach of Trib 11 were

composed of larger cobble to boulder (10 cm +) near the culvert, and gravels (10 cm -) moving downstream from the culvert to lower gradient sections. This tributary dries seasonally although it is connected upstream to a series of large wetlands on the neighbouring property to the north.

Fish

Piercy Creek is a known fish bearing watercourse that supports chinook, coho, chum, and pink salmon, as well as steelhead and cutthroat trout[32]. The stream is monitored by the Millard Piercy Watershed Stewards (MPWS). However, as noted above, limiting factors to fish productivity in the watercourses and wetlands of the subject property exist that include an anadromous barrier to upstream adult salmonid migration at the Arden Road crossing, approximately 325 m downstream of the subject property, and limitations to resident fish populations by way of seasonal drying that results from upstream agricultural water use, a limited upstream headwaters and catchment area, and lack of spring fed water sources to supply year-round flows.

Should the access barrier at Arden Road be repaired at a future time and adult salmon migration return to the subject property there are suitable spawning areas and wet season refuge and rearing opportunities in the area. Restoration opportunities exist on site that could assist in extending the on-site hydrological period by installing a series of riffle/pool complexes that would increase pool frequency and depths and hold water through a longer period. Enhanced shelter in pools could be made by installing large woody debris structures. Improved access notwithstanding, lack of dry-season flows will likely remain a limiting factor to fish productivity on the property.

6.2 RIPARIAN AREAS

Riparian vegetation along the mainstem channel varies between wetland species and younger and older mixed terrestrial forest species that include western red cedar (*Thuja plicata*), red alder (*Alnus rubra*), Douglas fir (*Pseudotsuga menziesii*), Sitka spruce (*Picea sitchensis*), and some mature black cottonwood (*Populus balsamifera trichocarpa*) (Photo 7; Figures 2-3). Shrub and herb species observed along the mainstems length consisted primarily of swordfern (*Polystichum munitum*), red-osier dogwood (*Cornus stolonifera*), Pacific ninebark (*Physocarpus capitatus*), and Nootka rose (*Rosa nutkana*).

Riparian areas surrounding the subject property's wetlands include red alder, big leaf maple (Acer macrophysslum), bitter cherry (*Prunus emarginata*), and cascara (*Rhamnus purshiana*) deciduous species; with coniferous Douglas fir and western red cedar in direr areas. Riparian understory species are dominated by oceanspray (*Holodiscus discolor*) with sub-dominant salmonberry (*Rubus spectabilis*), red-osier dogwood, salal (*Gaultheria shallon*), and dull-Oregon grape (*Mahonia nervosa*).

Riparian areas protection is regulated under the BC *Riparian Areas Regulation* and City of Courtenay OCP (Section 4.1 and the following sub-section).

[32] Fleenor, W and Wong, R., (2006). Overview Environmental Inventory - West Courtenay Development Planning. City of Courtenay. 35pp.

Riparian Areas Regulation Summary

The *Riparian Area Regulation* (RAR) methodology determines the extent of a Streamside Protection and Enhancement Area (SPEA) around watercourses as a means to avoid the harmful alteration, disruption, or destruction of fish and fish habitat. No activity is to occur within these buffered areas including:

1. removal, alteration, disruption or destruction of vegetation;
2. disturbance of soils;
3. construction or erection of buildings and structures;
4. creation of nonstructural impervious or semi-impervious surfaces;
5. flood protection works;
6. construction of roads, trails, docks, wharves and bridges;
7. provision and maintenance of sewer and water services;
8. development of drainage systems;
9. development of utility corridors.

6.2.1.1 Prescribed SPEA's

The prescribed SPEA's for the waterbodies affecting the subject property are summarized as follows as shown in the detailed RAR assessment report[6]:

1. Wetland: SPEA[33] = 15-30 m (30 m to south exposure);
2. Piercy Mainstem: SPEA = 10 m;
3. Tributary 11: SPEA = 10 m.

During the Jan. 12, 2017 RAR site survey, the high-water mark of the wetland was delineated by CEL staff and MCSL surveying staff used those markers to pickup watercourse information to inform constraints in lot layout design (Figures 1 & 2).

6.3 TERRESTRIAL HABITATS AND SPECIES

As introduced in Section 3, the property can be divided into two distinct vegetation classes based on stand age: young 3rd growth forest (20-30 years old); and older 2nd growth forest stands (60-100 years old) (Figure 3).

The younger 3rd growth forest has begun to re-generate through natural succession (planting does not appear to have occurred) in the most recently cleared areas: primarily in the central and western portions of the property (Photo 8). The younger forest is characterized as having low ecological significance as it contains a dense, recovering mixed deciduous/coniferous forest stand. Because of the early seral stage of this area little understory vegetation has been able to grow under the dense canopy of saplings and little wildlife usage was evident.

Currently, the dense growth of saplings in this zone is dominated by red alder and big leaf maple deciduous species, and conifer trees are conspicuously absent. Where conifers do exist, they are young, often isolated

33 SPEA = Streamside Protection and Enhancement Area. Measured from highwater mark on all banks.

Douglas fir, grand fir, or western red cedar. The relatively dense shrub vegetation throughout the property provides good habitat for small passerine birds.

Note that the majority of larger valued conifers and wildlife trees, as well as general terrestrial wildlife use, are located within the riparian setbacks of the watercourses and Wetlands 1-5.

Wildlife trees provide perch and nest sites for a wide variety of avian species. A number of excavated cavities were observed in standing dead wildlife trees scattered throughout the riparian areas and older 2nd growth stands on the property (Photo 3). The sizes and shapes of the cavities vary greatly and have been created by a number of primary cavity excavator species such as Pileated and Downy Woodpeckers, Northern Flickers, and Chestnut-backed Chickadees. Cavities such as these may support nesting habitat for a number of secondary cavity user species. In live trees, cavity excavation often suggests a decaying tree that may become a hazard in the future.

In older 2nd growth and riparian stands a number of fallen wildlife trees were also observed that are now acting as recumbent LWD. Recumbent LWD is conspicuously absent from the younger 3rd growth areas. Recumbent LWD functions to provide habitat for amphibian and insect species, moderates moisture and temperature, returns nutrients to the forest floor, and acts as a growing medium and energy source for successional vegetation.

During field reconnaissance efforts on Aug. 30, 2017, several deer bedding, migration, and foraging zones were identified in and around the older 2nd growth forests near Wetland 3 in the northeast corner of the property.

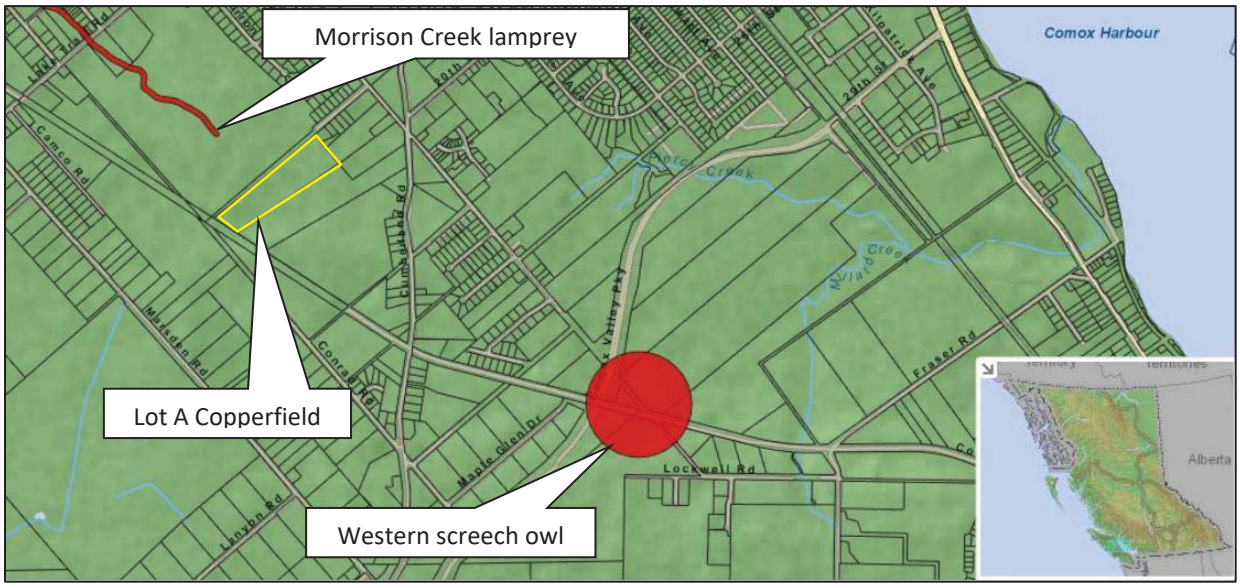
6.4 SPECIES AT RISK

Vegetation and Wildlife

The Conservation Data Center (CDC) maintains an active database of species and ecological communities at risk for each Forest District in British Columbia. Detailed records are maintained for species and ecological communities that are of special concern (blue list) or at risk of extirpation and extinction (red list). According to the CDC online mapping resource[34] (Inset 1) the closest known occurrence of a Species at Risk (SAR) is the red-listed Morrison Creek Lamprey (*Lampetra richardsoni var. marifuga*), an endemic species in the Morrison Creek watershed: it is not known to reside in the Millard/Piercy watershed.

Provincially blue-listed species of special concern Wandering Salamander (*Aneides vagrans*) and Red-legged frogs (*Rana aurora*) are is known to inhabit the area, although they have not been directly observed on the subject property to date. Wetland habitats, and contiguous riparian forest stands that currently exist on the property likely support habitat requirements of these species. Because a significant portion of these habitats will be protected on the property within the 30 m Arden LAP setbacks, and within wetlands themselves, risk to these species from development are relatively low. However, since modification of wetland and riparian habit is required in the northern property corner to facilitate access to the property, measures will be taken to avoid impacting these species, and any other amphibians, according to details in the project CEMP.

34 http://www.env.gov.bc.ca/atrisk/ims.htm



Inset 1. Known mapped occurrences of species at risk near the Project according the BC Provincial Conservation Data Centre (CDC) database.

Ecological Communities

The listed or "ranked" ecological community within Wetlands 1-4 is considered to meet criteria as "rare or endangered" based on the functional quality of the area and decreased significance of seral stage development for wetland areas (e.g., Castelle, 1994). The listed wetland ecological community found on the site is the *red alder/slough sedge (black cottonwood) (Alnus rubra / Carex obnupta [Populus balsamifera ssp. trichocarpa])* (Red listed) in Wetlands 1-4 (Figure 2). Wetland 5 does not support the same species assemblage as Wetlands 1-4 and does not meet the criteria of a rare ecological community.

With the exception of Wetland 4 that will be modified to provide site access, these communities are protected within City of Courtenay LAP 30 m setbacks and the 15-30 m setback (SPEA) where no trails are allowed and measures to avoid encroachment have been defined as per the RAR methodology.

Although these communities are noteworthy, they do not receive specific legislated protections. Additional ecological communities that are currently ranked by the BC Conservation Data Centre (CDC) as threatened or endangered were not found on the subject property during the site survey. Forested areas within the site are either too young or disturbed to be considered threatened or endangered.

7 SITE DEVELOPMENT PLAN

The proposed development layout for the subject property is presented in Figure 1. As discussed above, the proposed plan features a layout design of 35 units that avoids unnecessary encroachment into stream and wetland setback areas. According to the layout plan, and as a result of dedicated road allowances, the main access road

into the site will require passing through a wetland/riparian area and its setback within the City's ROW (Figure 1 & 2).

The proposed development includes the dedication of approximately 3.2 ha of setbacks and greenways that comprise roughly 55 % of the total area of the site for environmental protection. In addition to prescribed setback areas, the proposed development will include the dedication of 0.26 ha of otherwise developable area to partially offset 0.34 ha of proposed encroachment into wetland and riparian setbacks (Table 1).

Recommended avoidance, minimization, restoration, and offset measures for ESA encroachments are provided in Section 8 below.

8 POTENTIAL IMPACTS AND MITIGATION FROM THE PROPOSED DEVELOPMENT

The information presented in this section has been generated through an analysis of potential impacts associated with the proposed lot layout, prescribed ESA setbacks, and the professional judgment of the author. Arden LAP environmental protection objectives have been used to guide proposed avoidance, minimization, and restoration of environmental impacts on site. The potential impacts associated with the development are discussed below, followed by a summary of proposed mitigation and offsetting measures intended to augment development prescriptions presented in CEL's Construction Environmental Management Plan (CEMP)[2].

8.1 POTENTIAL IMPACTS

The potential impacts associated with the proposed development are presented here. The mitigation of impacts is presented in the subsequent section.

Long-term Residential Encroachment into Setback Areas

Over time, residential encroachment into ESA's can result in lost habitat, tree removal, placement of fill, and the spread of invasive species.

Impacts to Hydrological Regime

Increases in the total impervious surfaces and drainage density (ditches, piping, linear networks) associated with residential developments can seriously impact the hydrological response of local areas. This can result in increased peak flows to downstream watercourses resulting in channel degradation such as increased erosion and aggradation, decreases in habitat complexity, channel widening, and flooding of property. As well, the decreased retention capabilities of soils and seasonally flooded areas can seriously impact the availability of wetted habitat during periods of drought.

Construction-Related Impacts

Land clearing and other construction-related activities can cause serious degradation of habitat through the release of sediment to downstream habitats, the introduction and spread of invasive species, destruction of trees, and the unnecessary encroachment into prescribed setback areas. Construction-related impacts to fish habitat can be managed through the effective implementation of the project CEMP executed under the supervision of an experienced and qualified environmental monitor.

Loss of Wildlife Habitat and Species at Risk

Currently, the forested portions of the site provide habitat for a variety of wildlife species. The loss of these areas will result in a net loss of terrestrial wildlife habitat. The setback areas that will remain protected help mitigate losses of quality wildlife habitat and will improve in function as vegetation matures over time.

8.2 MITIGATION MEASURES

Impact Mitigation Hierarchy

Setback areas can be impacted both during development construction (e.g. tree cutting, machinery access and placement of fill in setbacks), and through the gradual encroachment into setbacks by property owners. Protecting setback areas from future encroachment, yard waste disposal, and foot traffic will be accomplished using exclusion fencing (below) and the implementation of the CEMP.

According to BC Ministry of Environment *Procedures for Mitigating Impacts on Environmental Values*[35] a mitigation hierarchy for potential impacts during development should be followed. The components of the mitigation hierarchy are as follows:

a. Avoid
b. Minimize
c. Restore on-site
d. Offset

For example, primary importance should be given to avoid making any impacts on wetted areas and riparian ESAs in and around the Project footprint.

a. **Avoiding** impacts to riparian areas by aligning proposed lot boundaries outside of setback areas.
b. If impacts are unavoidable, such as in the case of establishing access via the City's Copperfield Road ROW onto the site, **minimizing** impacts must be considered where all efforts to avoid encroaching into wetland/riparian areas be made in the design and construction processes.
c. Once options to minimize impact have been exhausted **restoring on-site** by replanting the edges of disturbed riparian areas and the proposed trail system should be implemented. Compensation strategies for on-site restoration of riparian impacts will include replacement according to the City of Courtenay *Tree Protection and Management Bylaw*[7] and/or shrubs replaced at a 2:1 ratio.
d. If the restoration strategies are unable to result in an area of no-net-loss, or better, within the project footprint additional measures may need to be considered where **offsets** could be applied to other habitats along Piercy Creek that would benefit from restoration strategies (Section 8.3-8.8).

35 MOE (2014). Procedures for Mitigating Impacts on Environmental Values (Environmental Mitigation Procedures). Working Document. Pp. 70.

8.3 MANAGEMENT OF AQUATIC/RIPARIAN HABITATS

Wetland and Riparian Area Conservation

The site development plan includes 100 % retention of Wetlands 1-3 & 5 and their associated riparian habitat through the implementation of a 30 m LAP setback. Due to their direct association with aquatic habitat, the creation of adequate setbacks is one of the most effective methods to ensure the longterm integrity of stream function (Chilibeck, 1993; Anon, 2004). The proposed setbacks will help ensure adequate shade, water quality maintenance, LWD recruitment, and water retention/infiltration to sustain fish habitat values remain intact over the longterm. These values will improve as the riparian communities mature. This wide buffer also provides important habitats and a continuous migration corridor for terrestrial and semi-aquatic species.

Wetland 4 and its riparian area will be impacted by development of the City ROW off the end of Copperfield Road and the access road into the site. The loss of wetland and riparian areas will require approval from the City of Courtenay, DFO via request for review (Section 4.2), and by MFLNRO under Section 11 of the *Water Sustainability Act* (Section 4.6).

Protected vs. Encroachment Areas

LAP setbacks the proposed development layout will include 3.2 ha (55 % of the total area) of the site set aside for environmental protection. Note that the total LAP protected area will exceed RAR-mandated setback areas (2.1 ha) by 1.1 ha (or an increase of 19 % more than RAR protected areas). In addition to prescribed LAP setback areas the proposed development will include the dedication of 0.26 ha of protected area to partially offset 0.34 ha of encroachment into wetland and riparian setbacks.

On-site Restoration of Riparian and Aquatic Habitats

Property access is only possible from the northern property corner off the end of Copperfield Road that will require modifying 0.34 ha of wetland and riparian forest habitats. Application of the mitigation hierarchy from the BC Ministry of Environment's *Procedures for Mitigating Impacts on Environmental Values* (Section 8.2) avoidance and minimization components have been applied to the extent where the proposed access road will minimize impacts to the riparian habitat of Wetland 5, while impacts to Wetland 4 are unavoidable (Figures 1 & 2). Further application of the hierarchy shows that on-site restoration opportunities exist that are intended to attempt to balance those areas of lost habitat.

As shown in Table 1 & Figure 2, 0.26 ha of otherwise developable land (beyond but adjacent to 30 m LAP setbacks), much of which is situated in areas of more mature vegetation (Figure 3), are suggested to partially offset the modification of 0.32 ha of riparian forest habitats in and around Wetland 4. In addition, approximately 0.03 ha (108 m length x 3 m width) of existing pedestrian walking trail within the LAP setback area north of Wetland 2 will be decommissioned and restored using an assemblage of native vegetation species.

In order to compensate for the remaining balance of impacted riparian and wetland habitat resulting from establishing site access requirements, it is recommended that a series of Newbury style riffles be installed at suitable locations within the Piercy Creek mainstem to create spawning and pool habitats that appear to be lacking within the mainstem reach on the property. Each riffle/pool complex will have a ballasted large woody debris

feature installed within the pool to enhance rearing and shelter from predation. The specific locations of each riffle/pool/LWD complex will depend on stream access and input from City on their habitat offset requirements.

8.4 AVOIDING AND MINIMIZING RESIDENTIAL ENCROACHMENT

Long-term residential encroachment into ESA's can be avoided and/or minimized by installing fencing and placing coarse woody debris that accommodates wildlife passage along the perimeter of Park Dedication areas adjacent to proposed development lots. Application of the City's prescribed tree retention requirements[7] along the southern perimeters of lots adjacent to LAP setback areas will assist in the reduction of LAP encroachment impacts described in Section 8.3 while permitting these lots to proceed with subdivision/development according to the proposed lot orientation.

8.5 MINIMIZING LOSS OF WILDLIFE HABITAT AND SPECIES AT RISK

Development will be focused in the largely disturbed (i.e. recovering 3rd growth forest) central portion of the site to minimize the loss of wildlife habitat (Figures 1-3). As mentioned, the majority of meaningful wildlife habitat lies along the southwest and northeast corners of the site, including within wetlands, watercourses, and their riparian areas. Although not directly observed on-site it is likely that blue listed red-legged frogs and wandering salamanders may be found on the subject property; while the red-listed red alder/slough sedge ecological community lies entirely within the wetland areas and will be preserved, with the exception of development of the City's ROW that is proposed through the area containing Wetland 4.

8.6 MINIMIZING IMPACTS TO HYDROLOGICAL REGIME

Rapid urban development within the watershed is putting increasing pressure on hydrologically related ecosystem functions that are resulting in aquatic habitat degradation in lower reaches of Piercy Creek (Ellefson, 2003). Examples of this degradation include loss of channel complexity, erosion, and flooding resulting from increased peak flows, and degraded water quality.

The Arden LAP policy for surface run-off is to minimize the volume/velocity of flows "into watercourses and encourage rain-water infiltration by limiting the amount of impervious cover and maintaining trees and other vegetation."

Stormwater management aimed at maintaining existing hydrological function of the property must be a design objective for this proposed development.

Stormwater management in the LAP requires adherence to the following hierarchy[5]:

> *a. Firstly, every attempt shall be made to introduce source controls, and must be demonstrated by an engineering study that such an attempt has been made;*
>
> *b. Introducing upstream detention facilities is a second preferred option;*
>
> *c. Enclosing stormwater in a piped, underground system should be considered only as a last resort.*

The stormwater management BMP's described in the following sub-sections will be incorporated in all levels of the project engineering design.

Rainwater Volume Management

It is recommended that development rainwater runoff will be detained by the use of on-site facilities that will include a decentralized system designed to mimic natural flow patterns through maximizing infiltration to the ground in as many separate locations and as on-site soils will permit. The proposed development layout includes a decentralized system that will include two raingardens and a rainwater detention pond (Figure 1), the latter of which will discharge to the sensitive riparian/LAP setback area adjacent to the confluence of Tributary 11 and mainstem Piercy Creek (Figure 1). These rainwater management features are intended to be unobtrusive, constructed wetland-type features outside of the LAP setback that will help support rainwater infiltration and reduce impacts from peak flow discharges to the natural environment. There is to be no increase in peak discharges within watercourses as a result of this development.

Criteria for rainwater detention ponds include the following criteria from the LAP[5]:

> *a. Aim for a decentralized stormwater pond system of many ponds located suitably to service localized needs;*
>
> *b. More and smaller ponds is preferred over few larger ponds, including on individual sites where such an approach is appropriate;*
>
> *c. Ponds shall be designed to be 'natural' and aesthetic and should ensure that there is adequate topsoil and planting with a variety of native aquatic and riparian species under the guidance of a landscape architect and/or Registered Professional Biologist proficient in wetland landscaping practices.*

Integrating the components of rainwater engineering with the environmentally sensitive areas near Piercy Creek will require an understanding of the topography downstream of the features as well as existing ecological functions that will require site-specific knowledge from the project landscape architect and project biologist.

Treat Road and Parking Runoff

All road surface runoff will be treated using a combination of vegetated, ephemeral bioswales and rain gardens placed strategically in greenspace areas located outside the setback area. Oil/water separators alone are insufficient to remove contaminants from road surface/driveway stormwater flows.

8.7 TREE PROTECTION

All trees deemed to be safe within ESA's and designated setback areas will be protected in perpetuity. These will continue to increase in functional value as protected areas mature over the longterm. During the sub-division phase additional tree management criteria will be identified through implementation of City of Courtenay *Tree Protection and Management Bylaw No. 2850* (2016)[7].

The application of the City's prescribed tree retention requirements along the perimeter of lots adjacent to park dedication/LAP setback areas, as discussed above in Section 8.4, will result in reduced encroachment and enhanced tree protection within protected areas.

Additional tree protection and riparian area encroachment avoidance measures have been prescribed in CEL's 2019 *Riparian Areas Regulation* assessment report[6].

8.8 OTHER MITIGATION AND COMPENSATION STRATEGIES

Lighting

The placement of lighting structures will be avoided adjacent to riparian and sensitive habitat areas. Where human safety is a concern, lighting will be installed that is of low power and located close to the ground surface and directed away from sensitive habitats.

Human Exclusion Fencing

Exclusion fencing (height to be determined in consultation with City) will be constructed along all setback areas to minimize human intrusion into sensitive areas. The fencing should not be considered just an "exclusion" barrier but should also provide a "psychological" delineation of sensitive areas for foot traffic and local residents. Fencing should be constructed to allow clearance above, below, or between for passage of wildlife.

Riparian Habitat Enhancement

Any coarse woody debris, salvaged from cleared areas, will be opportunistically placed, as directed by a QEP, into setback and wetland areas to provide habitat, moisture regulation, and autochthonous nutrient and energy sources for wildlife - particularly amphibians. Downed logs and bark, especially large diameter pieces will not be removed from protected areas.

Terrestrial Habitat Enhancement and Off-set Strategies

Younger 3rd growth stands, specifically the "Developable Area Added to Protected" shown in Figure 2, are recommended as partial offsets for encroachment into the riparian area of Wetland 4 required for site access (Table 1) and can be enhanced through a combination of planting a suitable assemblage of native coniferous trees, installing recumbent woody debris, planting "snag" habitat trees, and decommissioning/ replanting sections of the existing pedestrian trail that traverses the LAP north of Wetland 2 (Figure 3). Planting young 3rd growth stands with coniferous species will assist in the succession process towards a mixed stand with higher wildlife values, similar to the older 2nd growth forest visible elsewhere on the property.

A well-used existing pedestrian trail approximately 550 m in length traverses the property connecting Copperfield Road in the east with Comox Logging Road in the west (Figure 3). Approximately 350 m of this trail runs through the Younger 3rd Growth forest type, while the remaining 200 m traverses the LAP waterbody setbacks (150 m of which also falls within calculated *RAR* SPEAs).

In consideration of pedestrian trail routing guidelines in the Arden LAP, and in light of recent development of the neighbouring property to the south that includes trail development which already parallels Piercy Creek: it is recommended that subject property trail development focus on minimizing impacts from new trail construction and attempt to utilize the existing trail system as much as practicable. Additional rationale for utilizing parts of the existing trail is that its well-used character indicates that users show an affinity to accessing Comox Logging Road through the subject property. Should the connection to Comox Logging Road be maintained it will effectively create a "loop" trail in connection with the neighbouring property to the south.

As mentioned, parts of the existing trail currently traverse sections of *RAR* mandated SPEAs, and as noted in the Arden LAP: encroachment into SPEAs is prohibited. Those portions of the trail will be realigned outside the SPEA but within the LAP setback, if suitably near to property boundaries, so as to discourage encroachment into ESAs - as noted in the Arden LAP (Item 11 of Environmental Protection Policies). Once lot boundaries have been established on a final site plan the proposed trail alignment should be ground-truthed and flagged by a QEP and adjustments be made to follow the least environmentally intrusive path (tree, vegetation, habitat avoidance, etc).

Those areas of trail within SPEA's that are to be deactivated will be decommissioned by installing a combination of recumbent LWD and planting native vegetation. A planting plan, including proposed species lists and numbers, will be required prior to the start of trail decommissioning work.

In-stream Habitat Enhancement

Instream enhancement opportunities exist in mainstem Piercy Creek and near the proposed City ROW road crossing of Tributary 11 where a series of riffle/pools and large woody debris installations could be installed to offset proposed impacts to Wetland 4 in the northwestern corner of the lot. These enhancements will have additional value once the barrier to adult salmonid upstream migration via the Arden Road crossing is repaired, although seasonal mainstem and tributary drying will remain a limitation to juvenile salmonid rearing and survival. The installation of riffles dramatically increases the stream's resilience to drying by impounding flows and releasing them slowly over time. This has worked very well on lower reaches of Piercy Creek (e.g. downstream of Cherry Grove Park).

Replacement of the 1.5 m x 1.0 m ovoid CSP culvert within the City's Copperfield Road ROW with a suitably sized, fish friendly clear-span or arched culvert with native bed material is recommended. The proposed City ROW crossing, and any other culvert crossings proposed for the project must meet fish passage criteria detailed in:

Chilibeck, B. (1992). Land Development Guidelines for the Protection of Aquatic Habitat. Ministry of Environment, Lands, and Parks. Integrated Management Branch. p. 73 - 77.

Ministry of Transportation and Highways. (2000). Culverts and Fish Passage. Fact Sheet. Environmental Management Section. Pp. 1-6.

Parker, M. (2000). Fish Passage – Culvert Inspection Procedures. Watershed Restoration Technical Circular No. 11. Ministry of Environment Lands and Parks. Pp. 1-52.

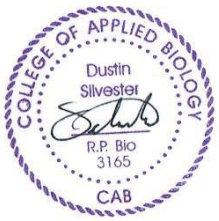
9 CONCLUSIONS AND SUMMARY OF RECOMENDATIONS

1) A combined total of 3.2 ha (55 % of the total property) of protected areas (including LAP setbacks and aquatic areas) is recommended for dedication as parkland. Of the 3.2 ha of protected lands, 0.29 ha is derived from otherwise developable area added to protected area (0.26 ha) and decommissioning of existing trail within setbacks (0.03 ha) that will be restored to a natural condition. These areas of additional protection and restoration are intended to partially offset 0.34 ha of encroachment into wetland and riparian setbacks near Wetland 4 (Figure 2).
   a) The protected areas are focused primarily on the longterm preservation of aquatic habitats and their riparian areas.
   b) Protected areas include approximately 1.1 Ha of lands that are additional to RAR-mandated setbacks.
2) Fish habitat protected under the City of Courtenay OCP and BC *Riparian Areas Regulation* include the wetted and forested riparian areas within 30 m of highwater mark of four seasonal wetlands, Piercy Creek mainstem, and Tributary 11.
3) The conversion of a portion of the property to residential lots will result in a net loss of terrestrial wildlife habitat. However, it is important to note that the higher value ecological elements of the site (mature forest, Wetlands 1-3 & 5, and riparian areas will be protected for the longterm through the implementation of setback areas and BMP's. These areas will improve over time as forest communities mature.
   a) It is anticipated that additional enhancement and long-term protection of "Protected Areas" described in Section 8 (i.e. planting in protected areas, restoration of trails, recumbent LWD and standing wildlife snag placements, instream fish habitat enhancement) will provide increased habitat function as protected areas continue to mature.
4) Section 11 Approval under the Provincial *Water Sustainability Act* for complex works, such as altering wetlands to provide access to the subject property via development of the City's ROW will be required with the City as applicant or providing agency to the developer's consultant.
5) DFO request for review will be pusued according to measures to avoid causing harm (Table 2). The project CEMP will be submitted alongside the RFR form to provide background on timing of environmentally sensitive components of the project and proposed construction mitigation measures.
6) Rainwater features (decentralized source controls, detention/infiltration facilities, constructed wetlands, etc.) will provide water quality treatment and will also help maintain natural hydrologic processes on the site. Arden LAP criteria[4] for rainwater detention will be adhered to.
7) Correspondence with the Millard Piercy Watershed Stewards (MPWS) will be maintained throughout the planning and design process.
8) In order to ensure the protection of nesting birds and their eggs pursuant to the BC *Wildlife Act*, no works with the potential to disrupt trees/vegetation should be undertaken during the passerine bird nesting window from Mar. 1 - Aug. 31 without being preceded by a bird nesting survey completed by a Qualified Environmental Professional (QEP).
9) The management of all potential construction-related impacts to environmental resources will be accomplished through the implementation of the Construction Environmental Management Plan (CEMP).
   a) Best Management Practices (BMPs) outlined in the project CEMP and *Users' Guide to Working in and Around Water* will be implemented as the Project aims to meet and/or exceed provincial and federal requirements for habitat protection.

10 CLOSURE

We trust that this report will satisfy the requirements for a biophysical assessment of environmentally sensitive areas pursuant to the City of Courtenay OCP. If there are any questions or comments please contact the undersigned.

Current Environmental Ltd.



Dusty Silvester, R.P.Bio.

11 DISCLAIMER

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12 FIGURES

(next page)

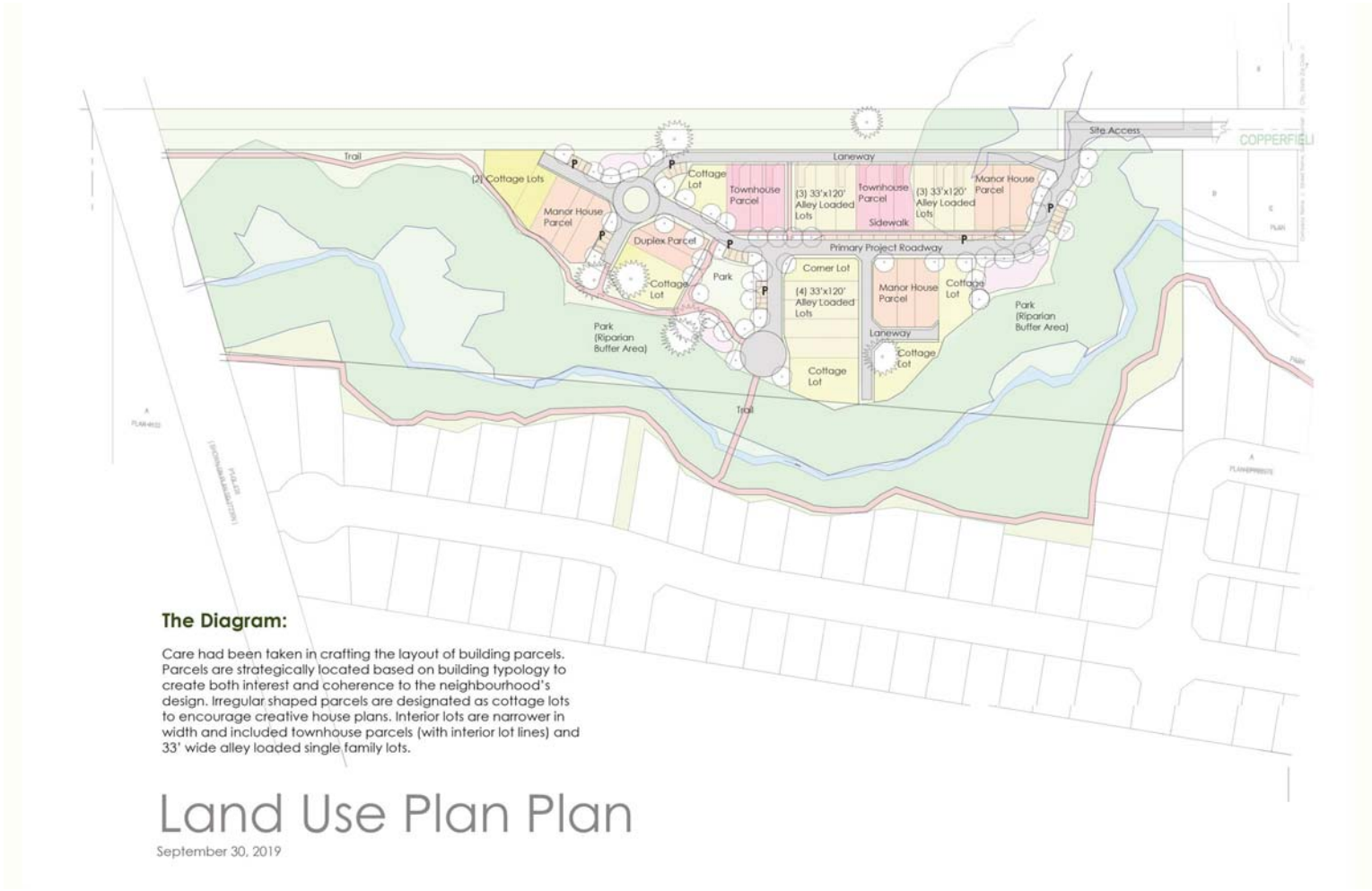

Figure 1. Proposed lot layout for re-zoning and sub-division of Lot A Copperfield Road. (Adapted from AWT Architecture and Planning)

Figure 2. Site plan showing Environmentally Sensitive Areas (ESA) on the subject lot including wetland, riparian, and setback areas.

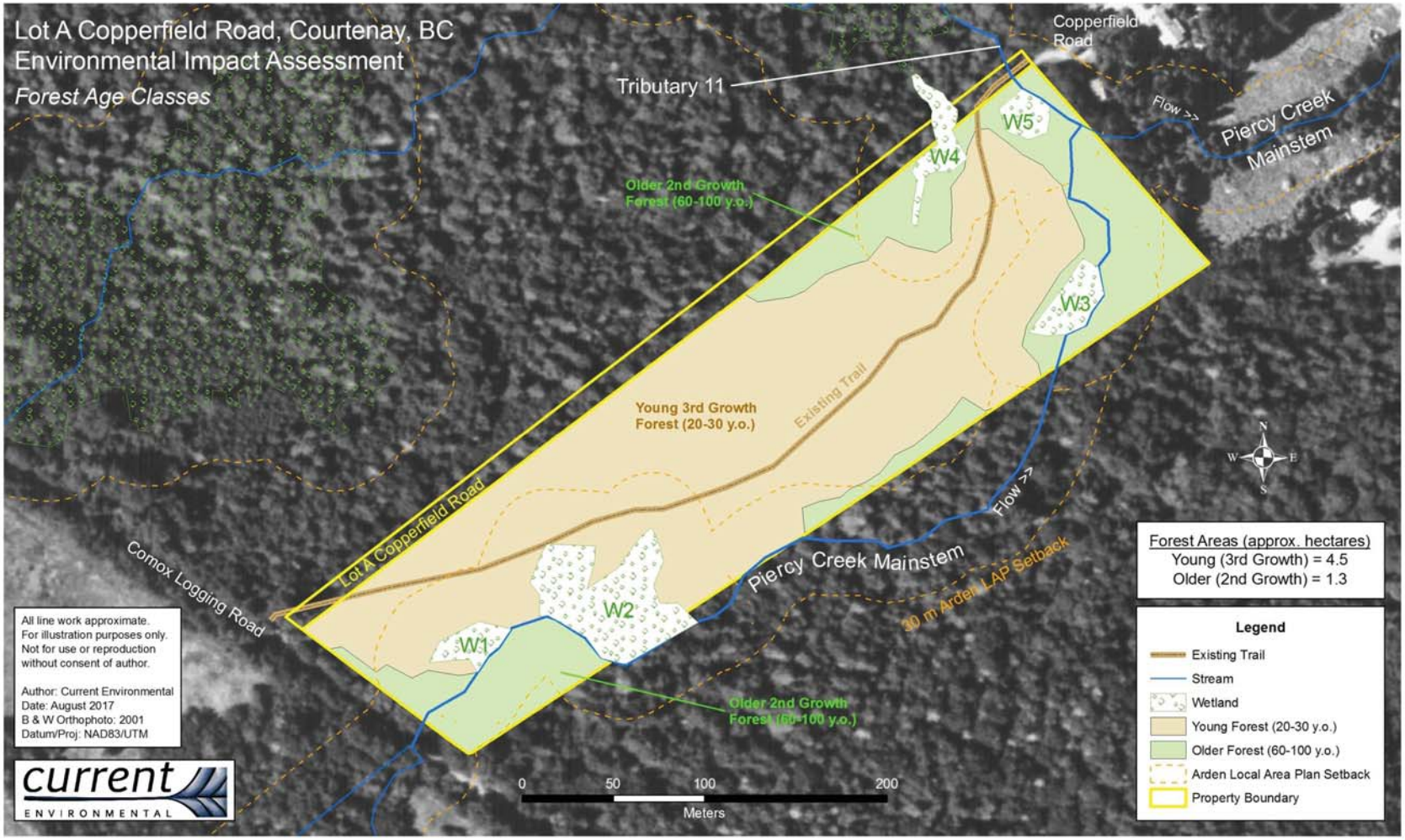

Figure 3. Site plan showing vegetation age classes on the subject property that are linked with habitat quality.

13 PHOTOS

Photo 1 (left). Forested swamp wetland type that characterizes the dominant wetland types found on the subject property (May 15, 2017).

Photo 2 (below). Downstream view of Piercy Creek mainstem adjacent to a section of Wetland 3 during a period when the mainstem dries. (Aug. 30, 2017).

Photo 3. Example of a wildlife tree with recent signs of cavity excavation located within proposed Encroachment Area "J" in the maturing 2nd growth forest stand in riparian area of Wetland 4. (Aug. 30, 2017).

Photo 4. View upstream of the Piercy mainstem taken from near the existing pedestrian trail culvert crossing along the southern property boundary showing the mainstem during a period of flow. (May 15, 2017).

Photo 5. View upstream of the existing pedestrian trail culvert crossing across Piercy Creek mainstem located near the southern property boundary. (Aug. 30, 2017).

Photo 6. View upstream of the existing Tributary 11 crossing that will be upgraded during Copperfield Road ROW development. (Aug. 30, 2017).

Photo 7. Maturing 2nd growth forest that characterizes 1.4 ha of the forested areas near the subject property boundaries and riparian areas in the northern and southeast corners of the lot.

(May 15, 2017).

Photo 8. Recovering 3rd growth stand of deciduous saplings that characterize 4.5 ha of the subject lot. Photo taken from near "Undevelopable Area 2" in the southwest corner of the property.