

# Ecology and Wildlife Summary

## RiverWood Development

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Amendment  
RGS 1C 17  
A. Mullaly



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## **Executive Summary**

FishFor Contracting Ltd. was retained by 3L Developments Inc. to provide assistance in the ecology and wildlife component of their RiverWood development. This included locating, mapping and describing all waterways on the property for the development of the subdivision layout, as well as having input from a wildlife biologist to develop a conservation plan to meet the objectives of their Sustainability Matrix.

The project has been divided into sections based on sustainability issues of the RiverWood Sustainability Matrix. The sections include:

- Ecology – Conservation
- Ecology – Restoration
- Ecology – Natural Wetlands and Surface Water

The section on conservation will describe the conservation of local flora and fauna and how the development will protect imperiled species and ecological communities and ecologically sensitive areas.

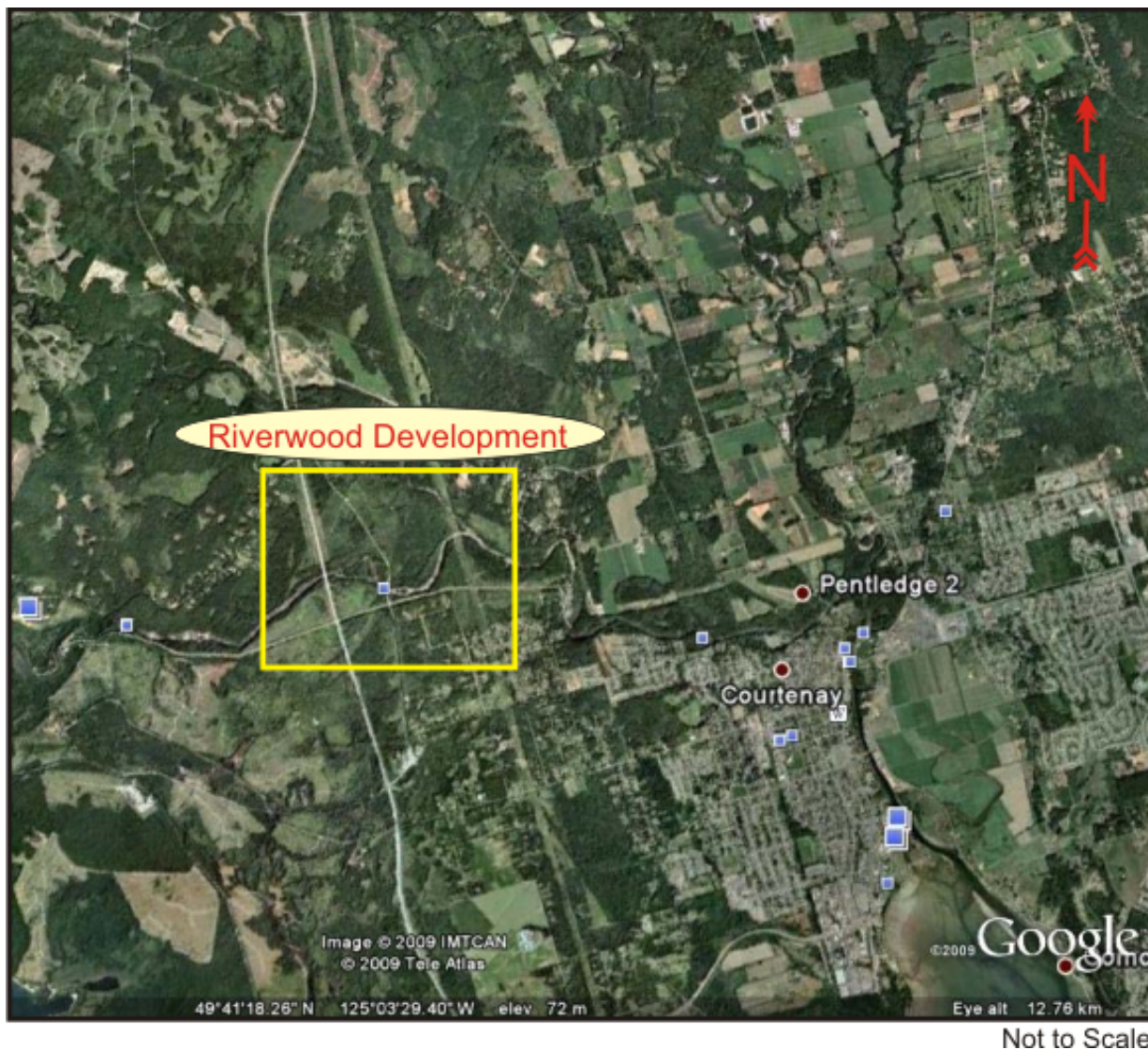
The section on Restoration will describe how the development will provide habitat and promote biodiversity.

The section on Natural Wetlands and Surface Water will describe the twenty two waterways that were located and identified in the assessment and what protection is needed to meet the requirements under the Riparian Areas Regulation (RAR). One of the identified waterways will have some impact from the development and the onsite with Fisheries and Oceans Canada has been described. The resulting map and photographs of the waterways have been included.

This report has been completed as part of the rezoning process. Some of the issues surrounding the ecology and wildlife portion of the development will require further assessments at an appropriate time of year.

## Location

The RiverWood development is located on approximately 395 acres (160 hectares) within the Comox Regional District adjacent to the Puntledge and Browns Rivers. Duncan Bay Main bisects the property.



**Figure 1. Area map showing location of proposed RiverWood development**



## Methodology

### ***Ecology – Conservation***

No specific field inventories were conducted in the development area.

A query was conducted for animals and plants using BC Species and Ecosystems Explorer. The query was refined to Red and Blue listed species that occur within the Comox Valley Regional District. Species were evaluated on their global ranking. Species that were critically imperiled (G1) or imperiled (G2) were reviewed to determine the potential for occurrence within the development area. The possibility of occurrence was based on habitat requirements found in the literature and distribution. These were compared to general habitats found in the development area and a general possibility of occurrence was stated. If the habitat types did not occur in the development area (based on biogeoclimatic information or specific habitat types) the probability was Nil. If the range of the species occurred in the development area but specific habitat features were absent the possibility of occurrence was considered Unlikely. If the basic habitat information indicated that the species could occur, the possibility of occurrence was Potential. If habitat information on species was not available, no probability was assigned.

A plant community list was developed using BC Species and Ecosystems Explorer. The query was refined to Red and Blue listed species that occur within the Comox Valley Regional District. Species were evaluated on their global ranking. Plant communities that were critically imperiled (G1) or imperiled (G2) were reviewed to determine the potential for occurrence within the development area. The level of stratification was based on the biogeoclimatic sub-zone/variant in which the plant community occurs. If the plant community did not occur in the CWH xm1 it was determined that the possibility of occurrence was nil. If the plant community occurred in the CWH xm1 the site series were reviewed to determine the possibility of occurrence in the development area. The probabilities in this case were subjectively stated as Unlikely (low probability) and Potential (moderate to high probability)

### ***Ecology – Restoration***

The development area was assessed against the need for restoration outlined in the RiverWood Sustainability Matrix. The aim for the sustainability issue is to *Provide habitat and promote biodiversity*. The Proposed Measure in the Matrix was *to restore 10% of the development footprint to native habitat*.

Prior to commencing a field visit of the proposed development area, a review of existing inventory information was conducted. This review included locating specific features in the Comox Valley Regional District Habitat Atlas as well as reviewing the distribution of forest cover and relative age of the forest using Google Earth. A field review was conducted at an overview level to look at the relative values in the development footprint in relation to area designated as reserve.

## ***Ecology – Natural Wetlands and Surface Water***

Prior to commencing field work all safety precautions were taken based on our in-house Occupational Health and Safety Program. The assessments were carried out to the standards outlined in the Resource Inventory Standards Committee (RISC) guidelines and methodologies for quality assurance and control. The RISC is a provincial initiative to ensure that all data collection, storage, analysis interpretation and reporting relating to natural and cultural resources are undertaken using standardized compatible systems. Both government and industry recognize and utilize RISC standards in the implementation of projects relating to ecosystem assessments and mapping. In addition, the following reference material was utilized to determine and apply appropriate field sampling techniques:

*Riparian Areas Regulation: Implementation Guidebook*, January 2006, Ministry of Water Land and Air Protection (Ministry of Environment).

*Riparian Areas Regulation: Assessment Methodology*, January 2006, Ministry of Water Land and Air Protection (Ministry of Environment), Department of Fisheries and Oceans Canada.

*Reconnaissance (1:20000) Fish and Fish Habitat Inventory Manual*, March 1999, Resource Inventory Committee (RIC)

*Fish Stream Identification Guidebook*, August 1998, Forest Practices Code of BC

Using working level 1:10,000 scale maps from the Ministry of Environment Habitat Wizard showing TRIM streams, the field crews located and assessed all waterways on the property. The waterways were located using a Trimble GeoXT Mapping Grade GPS Receiver operating to RIC standards for an accuracy of 5m. Streams were mapped as line features and GPS points of significance were taken at various locations along each watercourse to note features such as barriers to fish passage, beaver dams etc.

Stream widths, gradients, substrates and morphology were noted. Habitat quality observations were made.

Although the RAR methodology and data analysis was not completed at this time, the required information was collected to determine the appropriate setback if the detailed assessment is done.

Field equipment that was used in this study included:

- Standard personal equipment for forestry related stream work (compasses, clinometers, hip chains, radios, field safety gear, etc...)
- Laser Rangefinders
- Trimble GeoXT Mapping Grade GPS Receiver and external antenna with data dictionaries
- Olympus 8.5 mega pixel digital cameras

Collected GPS data was corrected to the local base station provider to increase accuracy and precision. GPS data was manually corrected by an experienced GIS analyst using the field notes as reference. Communication between field crews and GIS analysts ensures the map data accurately represents observed field conditions.

## Results and Observations

### *Ecology – Conservation*

The aim of this sustainability issue is to address the conservation of local flora and fauna and protect imperiled species and ecological communities. Although this might seem like a difficult task in a development such as RiverWood, the fact that 50% of the development will stay in its present state makes the conservation of local flora and fauna more attainable. The 50% of the development that will be retained consists of most of the older forest on the property and areas associated with water bodies that were identified during the riparian area assessment.

With regards to imperiled species and ecological communities, an initial query of potential species and ecological communities was conducted using BC Species and Ecosystem Explorer. BC Species and Ecosystem Explorer is supported by NatureServe, an internationally accredited system for ranking species at risk.

### **Local Flora and Fauna**

A course filter approach was used to evaluate the developments impact on local flora and fauna. When looking at the risk to these species the property is evaluated on forest age and generally ecological significance. Forests associate with riparian habitats and older forests generally sustain the highest levels of biological diversity. For example the Clayoquot Scientific Panel indicates that 72% of forest dwelling species use riparian habitats for all or a portion of their life cycle<sup>1</sup>. Reserves have been designed around all water bodies on the property and are described further in the natural wetland and surface water section of this report.

Older forests generally have a greater structural diversity with important attributes such as snags and coarse woody debris. A significant portion of the oldest forests on the property will be retained. At this time, these forests have limited structural diversity. These older forests are found along the two major water bodies on the property and should contribute significantly to biodiversity.

Reference was made to the Comox Valley Regional District Habitats Atlas to determine impacts of the development on documented sensitive habitats.<sup>2</sup> Habitats identified by the Habitat Atlas were associated with riparian areas and wetlands. The proposed reserve design associated with the development will augment the areas identified in the Habitat Atlas.

### **Imperiled Species – Animals and Plants**

Imperiled Species is not a common phrase used in British Columbia or Canada when looking at species at risk. The term as defined by NatureServe, means Extirpated, Endangered or Threatened. A query was conducted using BC Species and Ecosystem Explorer of Red or Blue Listed species found in the Comox Valley Regional District. The list was further refined to include both Critically Imperiled (G1) and Imperiled (G2) species. These species are listed in Table 1.

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<sup>1</sup> 1995, Clayoquot Sound Scientific Panel. Report 5, Sustainable Ecosystem Management in Clayoquot Sound: Planning and Practices, pg 27

<sup>2</sup> Comox Valley Regional District Habitat Atlas. <http://www.imap.rdc.bc.ca>. Accessed, December 17, 2009.

**Table 1 Comox Regional District – List of Imperilled Species - Plants and Animals**

Scientific Name	English Name	COSEWIC Status	Global Ranking	Possibility of occurrence
<i>Marmota vancouverensis</i>	Vancouver Island Marmot	Endangered	G1	<b>Nil</b> Ranges of species does not overlap development area
<i>Trematodon boasii</i>		Not Ranked	G1	<b>Nil</b> Found in Mountain Hemlock Zone <sup>3</sup>
<i>Copablepharon fuscum</i>	Sand-verbena Moth	Endangered	G1G2	<b>Nil</b> Closely associated with yellow sand verbena (vascular plant). This plant is not found in development area
<i>Deroceras hesperium</i>	Evening Field Slug	Data Deficient	G2	<b>Unknown</b> Very little is known about this species. NatureServe Explorer indicates that it could be extirpated in BC <sup>4</sup>
<i>Limnathes macounii</i>	Macouns's meadow-foam	Threaten	G2	<b>Nil</b> This species is generally associated with Garry oak ecosystems <sup>5</sup>
<i>Andreaea schofieldiana</i>		Not Ranked	G2G3	<b>Nil</b> Occurs in montane to subalpine ecosystems <sup>6</sup>
<i>Myotis keenii</i>	Keen's Myotis	Data Deficient	G2G3	<b>Highly Unlikely</b> There are no karst features noted on the property. Limestone caves are used as hibernacula for this species. <sup>7</sup>
<i>Pristiloma johnsoni</i>	Broadwhorl Tightcoil	Not Ranked	G2G3	<b>Potential</b> These species could occur within the property area.

Source: BC Species and Ecosystem Explorer – Comox Valley Regional District Search, December 16, 2009

Each imperilled species found in the query were evaluated for possibility of occurrence in the area of the property. In cases like the Vancouver Island Marmot, the process of elimination was simple as the property does not overlap the range of the species. In other cases an evaluation of habitat features such as karst (limestone caves) was used to assign the possibility of occurrence.

A summary of the species, general distribution and habitat description of the species has been included. In the case of the evening field slug, very little information could be found. This is also reflected in the COSEWIC status in Table 1. Although much of the information on the species comes from multiple references only the source reference has been cited.

<sup>3</sup> Ryan M.W. Bryophytes of British Columbia: rare species and priorities for inventory. Res. Br., B.C. Min .For., and Wildl.Br., B.C. Min. Environ., Lands and Parks. Victoria, B.C. Work. Pap. 12/1996. Pg.13.

<sup>4</sup> NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: December 16, 2009 ).

<sup>5</sup> COSEWIC, 2004. Assessement and Update Status Report on the Macoun's Meadowfoam *Limnathes macounii* in Canada. Executive Summary pg iv.

<sup>6</sup> Christy, J.A. & D.H. Wagner. 1996. Guide for the identification of rare, threatened or sensitive bryophytes in the range of the northern spotted owl, western Washington, western Oregon, and northwestern California. USDI Bureau of Land Management. 200 pp.

<sup>7</sup> B.C. Ministry of Environment. 2004. Identified Wildlife Management Strategy. Accounts and Measures for Managing Identified Wildlife: Keen's Long-eared Myotis, *Myotis keenii*. B. C. Ministry of Environment, Victoria, BC.

### **Vancouver Island Marmot**

This marmot is endemic to Vancouver Island and has declined by more than 50% in the past ten years. Less than 30 mature animals remain in the wild, where they are confined to four mountains. Most colonies occur on south-west slopes between 1000 and 1400 m in elevation. Marmots require grasses and forbs for forage, suitable soils for digging burrows, and a microclimate that permits summer foraging, thermoregulation and successful hibernation. Habitat scarcity is the primary reason for marmot rarity, but recent declines are due to high losses of both adults and juveniles to predators and to unsuccessful hibernation. Other threats include the impacts of climate change on vegetation and reduced dispersal success through logged habitats. Intensive recovery efforts, including captive breeding are ongoing.<sup>8</sup>

### **Trematodon boasii**

**Basic Description:** Mosses erect, tiny, 2-4 mm tall. Leaves 2-4 mm long, green or yellow-green, glossy, imbricate and flexuose but not much contorted when dry, consisting of a short, sheathing blade tapering to a long awl-shaped and flexuose apex. Setae yellow, 1-4 mm long, flexuose. Capsules usually numerous, reddish-brown, 0.5-1 mm long, 0.5 mm wide, with a yellowish neck of about the same length tapering to the seta. Peristome well developed. Lid of capsule has a distinct beak (Christy & Wagner 1996).

**Habitat Comments:** Forming loose mats on moist bare soil, often with organic content, along edges of trails, streams and ponds in the subalpine zone (Christy 1996).<sup>9</sup>

### **Sand-verbena Moth**

**Habitat Comments:** Beaches, dunes, and sand spits with dense vigorous patches of sand verbena (*Abronia latifolia*), but not sandy meadows or nearly bare sand with sparse or non-flowering sand verbena plants only.

**Food Comments:** The larvae are monophagous on yellow sand verbena *Abronia latifolia*. Adults take nectar from its flowers.

**Phenology Comments:** Adults occur from mid or late May though June, about 45-55 days per year. Eggs hatch in about two weeks. Larvae overwinter in one or more late instars and pupate in late April or May.<sup>10</sup>

### **Evening Field Slug**

Potentially extirpated in Washington State and British Columbia.<sup>11</sup> Limited information available on distribution or habitat requirements in British Columbia.

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<sup>8</sup> Species at Risk & Local Government: A Primer for British Columbia. <http://www.speciesatrisk.bc.ca> Accessed December 16, 2009.

<sup>9</sup> NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: December 17, 2009 ).

<sup>10</sup> NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: December 17, 2009 ).

<sup>11</sup> NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: December 17, 2009 )



### **Macoun's meadow-foam**

**Distribution:** Macoun's meadow-foam is known only from southern Vancouver Island and several other islands close to Vancouver Island. It has not been found on the mainland of British Columbia nor in Washington State.

**Habitat:** Plants occur in seasonally wet depressions or along intermittent seeps in low elevation and usually close to the ocean. The majority of the sites are in open areas of Garry oak ecosystems.<sup>12</sup>

### **Keen's Myotis**

**Terrestrial Habitat(s):** Bare rock/talus/scree, Cliff, Forest - Conifer, Woodland – Conifer

**Special Habitat Factors:** Standing snag/hollow tree

**Habitat Comments:** The distributional range suggests an association with coastal forest habitat (van Zyll de Jong 1985; Nagorsen and Brigham, unpubl. manuscript). Apparently this bat is associated with mature forests (Balcombe, 1988 COSEWIC report), but it is not restricted to old growth (COSEWIC 2003). Across the range it has been found roosting in southwest-facing rock crevices, among geothermally heated rocks, in tree cavities, in bark crevices, and in buildings (D. Burles, pers. comm.; Firman et al. 1993; Nagorsen and Brigham 1993; Parker and Cook 1996; Mather et al. 2000). Tree cavities and loose bark are important natural roost sites and may be limiting in some parts of the range (British Columbia Ministry of Water, Land and Air Protection 2004). In British Columbia, one maternity colony (on Hot Springs Island in the Queen Charlotte Islands) is situated within geothermally heated rocks associated with hot spring activity (British Columbia Ministry of Water, Land and Air Protection 2004). The only other known maternity colony in British Columbia was suspected to be in a tree located in a low elevation, southwest-facing cliff at Knoll Hill near Tahsis, Vancouver Island (COSEWIC 2003). Known maternity roosts and summer feeding areas in British Columbia are at elevations below 240 meters; known hibernation sites occur above 400 meters in caves over 100 meters long (British Columbia Ministry of Water, Land and Air Protection 2004). These bats have been observed foraging over hot spring pools and clearings above scrubby salal (*Gaultheria shallon*).<sup>13</sup>

### **Andreaea schofieldiana**

**Basic Description:** Erect mosses, rarely over 1 cm tall, dark reddish-brown to blackish. Leaves lanceolate, 2-2.5 mm long, imbricate when dry, sometimes falcate at tip of shoot, broad enough at back to show a portion of the blade on each side of the well-defined costa. Leaf margins entire, or finely crenate toward tips because of projecting cells. Capsules opening by four vertical valves, the urn shrinking vertically when dry, to resemble a Japanese urn (Christy & Wagner 1996).

**Habitat Comments:** Forming mats on dry and exposed to moist, shaded igneous rocks, montane to subalpine. Associated species include *Saxifraga*, *Sedum*, *Selaginella*, *Gymnomitrium*, *Cladonia* and crustose lichens (Christy 1996).<sup>14</sup>

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<sup>12</sup> COSEWIC, 2004. Assessment and Update Status Report on the Macoun's Meadowfoam *Limnanthus macounii* in Canada. Executive Summary pg iv.

<sup>13</sup> NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: December 17, 2009 ).

<sup>14</sup> NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: December 17, 2009 ).

### **Broadwhorl Tightcoil**

This tiny (to 2.8 mm), flattened, translucent to waxy-white snail is found from the mid-coast of British Columbia (including Vancouver Island) south to Oregon. It is considered rare within this range and is typically found in the leaf litter of deciduous, mixed or coniferous forests below 1300 m elevation. The major threats are habitat loss and fragmentation to forest harvest, urbanization, and agricultural development.<sup>15</sup>

The only potentially Critically Imperiled or Imperiled species that could occur on the property is the Broadwhorl Tightcoil.

### **Imperiled Species – Ecological Communities (Plant Communities)**

A query was conducted using BC Species and Ecosystem Explorer of Red or Blue Listed plant communities found in the Comox Valley Regional District. The list was further refined to include both Critically Imperiled (G1) and Imperiled (G2) plant communities. The Comox Valley Regional District covers a broad range of ecosystems. The possibility of occurrence of many of the plant communities is nil as the biogeoclimatic units in which they occur are not found within the area of the development. In other cases, the biogeoclimatic units may occur in the area of the property but the possibility of occurrence could be easily determined that based on known location. For example, Henderson's checker-mallow Tidal Marsh is associated with tidal marshes. The development is located well above sea level.

**Table 2 Comox Regional District – List of Imperiled Species - Plant Communities**

Scientific Name	English Name	Biogeoclimatic Units	Global Ranking	Possibility of occurrence
<i>Festuca idahoensis</i> ssp. <i>roemerii</i> - <i>Koeleria macrantha</i>	Roemer's fescue - junegrass	CDFmm/00 CWHxm1/00	G1	<b>Nil</b> Plant Community does not occur in development area
<i>Sidalcea hendersonii</i> Tidal Marsh	Henderson's checker-mallow Tidal Marsh	CWHxm1/00	G1	<b>Nil</b> Plant Community does not occur in development area
<i>Carex macrocephala</i> Herbaceous Vegetation	large-headed sedge Herbaceous Vegetation	CDFmm/00 CWHvh1/00 CWHwh1	G1G2	<b>Nil</b> Biogeoclimatic sub-zone/variant does not occur in development area
<i>Picea sitchensis</i> / <i>Maianthemum dilatatum</i> Very Wet Hypermaritime 1	Sitka spruce / false lily-of-the-valley Very Wet Hypermaritime 1	CWHvh1/08	G1G2	<b>Nil</b> Biogeoclimatic sub-zone/variant does not occur in development area
<i>Picea sitchensis</i> / <i>Rubus spectabilis</i> Dry	Sitka spruce / salmonberry Dry	CWHdm/08 CWHds1/08	G1G2	<b>Nil</b> Biogeoclimatic sub-zone variant does not occur in development area
<i>Populus tremuloides</i> / <i>Malus fusca</i> / <i>Carex obnupta</i>	trembling aspen / Pacific crab apple / slough sedge	CDFmm/00 CWHxm1	G1G3	<b>Nil</b> Plant Community does not occur in development area

<sup>15</sup> Species at Risk & Local Government: A Primer for British Columbia. <http://www.speciesatrisk.bc.ca> Accessed December 16, 2009.

Scientific Name	English Name	Biogeoclimatic Units	Global Ranking	Possibility of occurrence
<i>Thuja plicata</i> - <i>Picea sitchensis</i> / <i>Oplopanax horridus</i> Very Wet Hypermaritime 1	western redcedar - Sitka spruce / devil's club Very Wet Hypermaritime 1	CWHvh1/07	G1G3	<b>Nil</b> Biogeoclimatic sub-zone variant does not occur in development area
<i>Abies amabilis</i> - <i>Thuja plicata</i> / <i>Tiarella trifoliata</i> Moist Maritime 1	amabilis fir - western redcedar / three-leaved foamflower Moist Maritime 1	CWHmm1/05	G2	<b>Nil</b> Biogeoclimatic sub-zone/variant does not occur in development area
<i>Arbutus menziesii</i> / <i>Arctostaphylos columbiana</i>	arbutus / hairy manzanita	CDFmm/00 CWHxm1/00	G2	<b>Nil</b> Plant Community does not occur in development area
<i>Carex lasiocarpa</i> - <i>Rhynchospora alba</i>	slender sedge - white beak-rush	CDFmm/Wf53 CWHmm1/Wf53 CWHmm2/Wf53 CWHxm1/Wf53 CWHxm2/Wf53	G2	<b>Nil</b> Plant Community does not occur in development area
<i>Carex sitchensis</i> / <i>Sphagnum</i> spp.	Sitka sedge / peat-mosses	CWHvh2/Wf51 CWHvm1/Wf51 CWHvm2/Wf51 CWHwh1/Wf51 CWHwm/Wf51 CWHws2/Wf51 ICHvc/Wf51 ICHwc/Wf51 MHmm1/Wf51	G2	<b>Nil</b> Biogeoclimatic sub-zone variant does not occur in development area
<i>Deschampsia cespitosa</i> - <i>Sidalcea hendersonii</i>	tufted hairgrass - Henderson's checker-mallow	CWHxm1/00	G2	<b>Nil</b> Plant Community does not occur in development area
<i>Salix sitchensis</i> - <i>Salix lucida</i> ssp. <i>lasiandra</i> / <i>Lysichiton americanus</i>	Sitka willow - Pacific willow / skunk cabbage	CDFmm/Ws51 CWH/Ws51 ICH/Ws51	G2	<b>Nil</b> Plant Community does not occur in development area
<i>Pseudotsuga menziesii</i> - <i>Pinus contorta</i> / <i>Holodiscus discolor</i> / <i>Cladina</i> spp.	Douglas-fir - lodgepole pine / oceanspray / reindeer lichens	CWHdm/02	G2G3	<b>Nil</b> Biogeoclimatic sub-zone variant does not occur in development area
<i>Thuja plicata</i> / <i>Polystichum munitum</i> Dry Maritime	western redcedar / sword fern Dry Maritime	CWHdm/05	G2G3	<b>Nil</b> Biogeoclimatic sub-zone variant does not occur in development area
<i>Thuja plicata</i> - <i>Pseudotsuga menziesii</i> / <i>Acer circinatum</i>	western redcedar - Douglas-fir / vine maple	CWHds1/05 CWHds2/05	G2G3	<b>Nil</b> Biogeoclimatic sub-zone variant does not occur in development area
<i>Tsuga heterophylla</i> - <i>Abies amabilis</i> / <i>Hylocomium splendens</i>	western hemlock - amabilis fir / step moss	CWHms1/01 CWHms2/01	G2G4	<b>Nil</b> Biogeoclimatic sub-zone variant does not occur in development area

Scientific Name	English Name	Biogeoclimatic Units	Global Ranking	Possibility of occurrence
<i>Tsuga heterophylla</i> - <i>Pseudotsuga menziesii</i> / <i>Rhytidiadelphus</i> <i>triquetrus</i> Dry Submaritime 1	western hemlock - Douglas-fir / electrified cat's-tail moss Dry Submaritime 1	CWHds1/01	G2G3	<b>Nil</b> Biogeoclimatic sub-zone variant does not occur in development area
<i>Tsuga heterophylla</i> - <i>Thuja plicata</i> / <i>Blechnum</i> <i>spicant</i>	western hemlock - western redcedar / deer fern	CWHdm/06 CWHxm1/06 CWHxm2/06	G2G3	<b>Potential</b> Plant community could exist within development area
<i>Pseudotsuga menziesii</i> - <i>Pinus contorta</i> / <i>Holodiscus discolor</i> / <i>Cladina</i> spp.	Douglas-fir - lodgepole pine / oceanspray / reindeer lichens	CWHdm/02	G2G4	<b>Nil</b> Biogeoclimatic sub-zone variant does not occur in development area
<i>Pseudotsuga menziesii</i> / <i>Polystichum munitum</i>	Douglas-fir / sword fern	CWHdm/04 CWHxm1/04 CWHxm2/04	G2G4	<b>Highly Unlikely</b> Limited possibility that plant community could exist in development area
<i>Thuja plicata</i> / <i>Oplopanax horridus</i>	western redcedar / devil's club	CWHds1/07 CWHds2/07	G2G4	<b>Nil</b> Biogeoclimatic sub-zone variant does not occur in development area
<i>Tsuga heterophylla</i> - <i>Abies amabilis</i> / <i>Blechnum spicant</i> Moist Maritime	western hemlock - amabilis fir / deer fern Moist Maritime	CWHmm1/06 CWHmm2/06	G2G4	<b>Nil</b> Biogeoclimatic sub-zone variant does not occur in development area

Source: BC Species and Ecosystem Explorer – Comox Valley Regional District Search, December 16, 2009

As indicated in Table 2, there are two plant communities that could be present within the development area. It is recommended that a qualified professional conduct and overview assessment to determine the occurrence, amount and distribution of these plant communities.

### ***Ecology – Restoration***

The aim of this sustainability issue is to provide habitat and biodiversity. The proposed measure is to restore 10% of the development footprint to pre-development habitat. The present design addresses this measure through retention of approximately 50% of the development in reserve. The reserve design utilizes riparian areas, wetlands and older forests. These areas presently exhibit the area of higher biodiversity on the property. Over time, the reserve network should increase in structural diversity and provide habitat for a wide range of species.

## ***Ecology – Natural Wetlands and Surface Water***

The aim of this sustainability issue is to identify and protect surface water bodies (watersheds, wetlands and riparian areas). Protection of waterways and their associated riparian areas is a requirement under the Riparian Areas Regulation (RAR). Rather than design the development, apply for rezoning and finally complete a RAR assessment at the time that a development permit was required, 3L Developments Inc. had a vision of using the water bodies as positive features on the property. Prior to the design of the RiverWood development, FishFor Contracting Ltd was retained to locate, map and note uses of the waterways on the property. The maps would be used by the architect to design the layout of RiverWood around these features, ensuring that the riparian areas are protected and determine appropriate areas of additional setbacks to be dedicated as park/open spaces.

On March 30, April 1, 3-8, 14 and June 30, 2009 waterways were located and traversed to be mapped accurately for the development of the property. The property was walked along slopes that would drain to the known water bodies (Puntledge, Browns and Forbidden Plateau Creek) to locate watercourses. Waterways were identified and preliminary assessments on habitat quality were noted. Required setbacks under the Riparian Areas Regulation (RAR) have been listed although the detailed assessments and the completion of a RAR Assessment Report to meet the criteria needed under the RAR have not been completed to date.

Conclusions are based upon an inspection of the waterways mentioned in this report and on the conditions observed March 30, April 1, 3-8, 14 and June 30, 2009. Conclusions and recommendations in this report have been made in a manner consistent with the level of care and skill normally applied by environmental professionals practicing under similar conditions to those encountered at the time of the assessment. Geological and/or morphological changes can occur in waterways. Any change in conditions from those observed on the above date has the potential to invalidate the conclusions in this report. This report has been prepared for use and distribution by 3L Developments Inc.

Although a detailed assessment under the RAR has not been completed at this stage of the development, the waterways on the property were located and mapped. Fish use and habitat quality were noted. Amphibian use was also noted. Stream widths and gradient were measured to determine the appropriate setback that would be required under the RAR.

The results are shown in Table 3. The resulting map showing the location of the identified waterways is included in Appendix 1. Representative photos were taken of each waterway and are included in Appendix 2.



**Table 3 RiverWood Property Natural Wetlands and Surface Water Identification**

Waterway ID	Width	Setback Required under RAR detailed assessment	Comments	Photo #
Puntledge River	+15m	30m	The Puntledge River has steep sideslopes that will need assessing by a qualified professional to determine if the setback is sufficient in providing slope stability.	
Browns River	+10m	30m	The Browns River has steep sideslopes that will need assessing by a qualified professional to determine if the setback is sufficient in providing slope stability.	
1	n/a	n/a	This small drainage dissipates and does not connect to fish bearing water.	1
2	±1m	10m	This small stream flows directly into Waterway 3 (Forbidden Plateau Creek) a known fish bearing stream. The stream offers rearing and limited spawning habitat for resident fish.	2
3 Forbidden Plateau Creek	±4m	10-15m	This is a known fish bearing stream. It offers excellent spawning and rearing habitat for resident fish. The beaver ponds offer habitat for amphibians, Red Legged frog egg masses were noted.	3
4	n/a	15m, 30m due south	This wet site has evidence of old beaver activity. Fish access would be extremely limited due to poor habitat attributes (shallow, no pools).	4, 5
5	n/a	n/a	There is a small seepage that does not provide fish access or habitat.	
6	±1m	10m	This shallow (<5cm deep) drainage is 15m long. It provides marginal fish access and habitat (shallow, no pools). There is no spawning habitat.	6
7	±2m	10m	This shallow waterway offers limited fish access during high flows for ~20m. There is no spawning habitat.	7
9 stream	±1m	10m	The stream drops 4m into the Browns River. Above barrier sampling did not locate resident fish.	8
9 wetland	n/a	15m, 30m due south	This wetland has evidence of recent beaver activity. It offers quality amphibian habitat and numerous egg masses were noted. There is no fish access into the wetland.	9
10	<1m	n/a	Dissipates and does not connect to fish bearing water.	
11	±1m	n/a	This waterway dissipates upslope of the Puntledge River and does not connect to fish bearing water.	10, 11

Waterway ID	Width	Setback Required under RAR detailed assessment	Comments	Photo #
12	±1m	n/a	This short waterway dissipates upslope of the Puntledge River and does not connect.	12
13	±1.5m	10m on stream 15m, 30m due south on wetland	This stream connects directly to the Puntledge River. There is fish access for 42m to an increase in gradient to +40% including a +3m high vertical drop. The seasonal stream was dry in the lower reaches and intermittent upslope. There is no suitable resident fish habitat upslope (no spawning substrates). The wetland does provide limited amphibian habitat. The wetland is dominated by hummocks with low lying areas vegetated in sedges, grasses and fern.	13, 14
14	±1m	10m	This seasonal stream had minimal water at the time of the assessment. It connects directly to the Puntledge River and offers limited fish access to the base of the topographic bench. There is no suitable habitat (shallow, seasonally dry) for resident fish habitation upslope.	15
16	±1m	n/a	This small waterway does not connect directly to fish bearing water and therefore does not trigger the RAR. It has a muck bottom with sedges along the perimeter. The upper reaches have been modified into a drainage area for the surrounding property.	16
17	n/a	n/a	This waterway is a small isolated wet area. It does not connect to fish bearing water.	17
18	n/a	n/a	This waterway is a small isolated wet area. It does not connect directly to fish bearing water.	18, 19
19	n/a	n/a	This waterway is a small isolated wet area. It does not connect to fish bearing water.	
20	±1.5m	10m	This stream connects directly to the Puntledge River and offers both spawning and rearing habitat for fish. Coho fry were observed. The upper reaches are unconfined but there is sufficient depth of water for fish use.	20, 21
21	n/a	n/a	This waterway is a small isolated wet area. It does not connect to fish bearing water.	22, 23
22	±1m	n/a	This small waterway sources from Highway 19 ditchline. It does not connect to fish bearing water.	24

### **Wetland 13**

This wetland (at the headwaters of Stream 13) that was identified during the initial assessment was determined to pose a problem with the proposed development layout. As the RAR process does not allow for encroachment into waterways or their riparian areas, consultation with Fisheries and Oceans Canada was initiated.

On June 22, 2009 an onsite meeting was held between Kabel Atwall of 3L Developments Inc, Cindy Hannah of FishFor Contracting Ltd and Doug Swift of Fisheries and Oceans Canada to discuss the marginal wetland. The proposed development requires filling in portions of the marginal wetland to accommodate the layout. As a result of the onsite a subsequent assessment was recommended to locate and map the area of the wetland that exhibits the best wetland characteristics to ensure that this portion of the wetland is protected during the development. The marginal areas of the wetland are dominated by hummocks vegetated in terrestrial plants, including both coniferous and deciduous species. Low lying areas are dominated by sedges, grasses and ferns. The ground is wet, but a surface water connection throughout the wetland is difficult to determine.

The wetland was re-assessed on June 30 (and a visual assessment was done in December 2009 to ensure that the area located in June is correct) to locate and map areas of the wetland that exhibit defined wetland characteristics (vegetation type and direct connectivity to the outlet stream). The development will not encroach on this area of the wetland. As the development is in the preliminary stages, specific details of both the amount of wetland that will be lost and how the loss will be compensated has not been determined. An agreement in theory has been accepted by Mr. Swift and his comments will be utilized to develop the plan that will be used when completing the "Request for Review under the Habitat Provisions of the Fisheries Act Form" when the development reaches that phase. This plan will ensure that there is "no net loss" of fish habitat. Although the wetland itself is non-fish bearing, it does provide a water source to fish bearing water and thus under the *Fisheries Act* could be considered fish habitat.

## Discussion

3L Developments Inc. RiverWood Development within the Comox Valley Regional District is being designed to be a Sustainable Development. In their Sustainability Guidelines and Matrix, the objectives are divided into three main areas of sustainability; environmental, social and economic. FishFor Contracting Ltd was retained to provide assistance with the Ecology and Wildlife section of the Environmental Sustainability area.

Within the RiverWood Sustainability Matrix several Issues are described within the Ecology and Wildlife Section. Three of these issues are described in this report. They include:

- Ecology – Conservation
- Ecology – Restoration
- Ecology – Natural Wetlands and Surface Water

### ***Ecology – Conservation***

The aim of this sustainability issue is to:

*“Conserve local flora and fauna and protect imperiled species and ecological communities”*

The fact that 50% of the development will stay in its present state makes the conservation of local flora and fauna more attainable. The 50% of the development that will be retained consists of most of the older forest on the property and areas associated with water bodies that were identified during the riparian area assessment. Riparian areas are critical to both aquatic species as well as other forest dwelling creatures. By having these areas set aside as park will meet the aim of conserving local flora and fauna.

The only potentially Critically Imperiled or Imperiled species that could occur on the property is the Broadwhorl Tightcoil, a very small slug that lives in the leaf litter of forests below 1300m elevation. It is recommended to discuss the potential for the slug to occur on the property with a biologist familiar with this invertebrate prior to any field assessments being conducted.

There are two plant communities that could be present within the development area. There is some potential to have the western hemlock - western redcedar / deer fern plant community occurring on the property. There is a less likelihood of having the douglas-fir / sword fern plant community occurring on the property. It is recommended that a qualified professional conduct an overview assessment to determine the occurrence, amount and distribution of these plant communities. Assessment for occurrence of plants is generally conducted in late spring/early summer for accurate identification.

## ***Ecology – Restoration***

The aim of this sustainability issue is to:

*“Provide habitat and promote biodiversity”*

The proposed measure is to restore 10% of the development footprint to pre-development habitat. The present design addresses this measure through retention of approximately 50% of the development in reserve. The reserve design utilizes riparian areas, wetlands and older forests. These areas presently exhibit the area of higher biodiversity on the property. Over time, the reserve network should increase in structural diversity and provide habitat for a wide range of species.

## ***Ecology – Natural Wetlands and Surface Water***

The aim of this sustainability issue is to:

*“Identify and protect surface water bodies (watersheds, wetlands and riparian areas)”*

This was achieved by locating and mapping all watercourses on the property prior to designing the layout of the development. This ensured that the development could be designed in such a way to both protect the aquatic features on the property and highlight these habitats as park areas that the residents in the community can enjoy. The development is within a development permit area of the Comox Valley Regional District, thus requiring the property to have a Riparian Areas Regulation Assessment done on the property during the subdivision. As the project is at the re-zoning stage, a complete RAR assessment has not been completed, but sufficient data was collected to determine the required setbacks that a detailed assessment would determine, to ensure that the design of the development accounted for the required riparian areas to maintain the form and function of each of the waterways on the property.

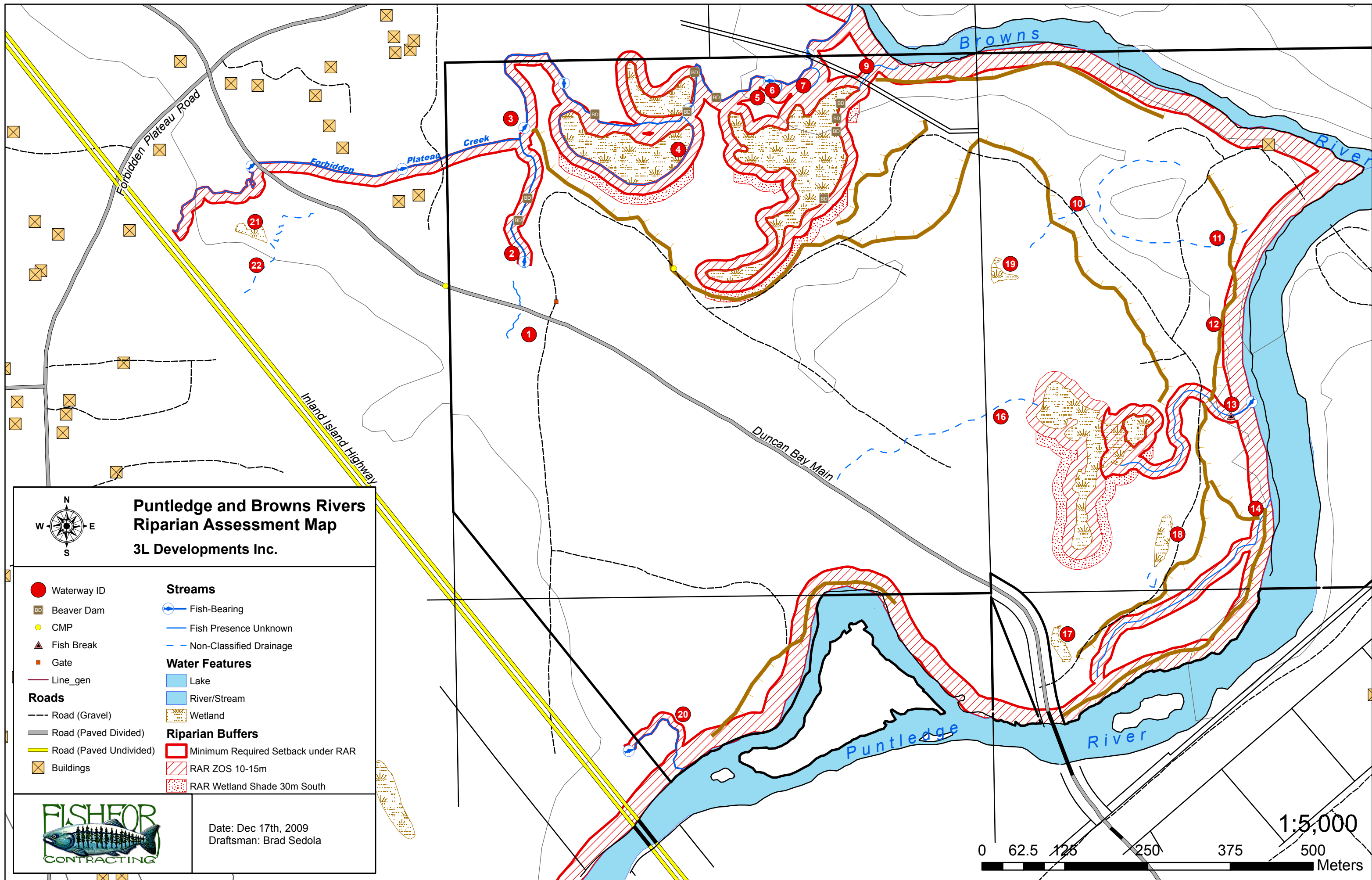
One waterway was determined to pose a problem for the design, and consultation with Fisheries and Oceans Canada commenced immediately to ensure that the vision of the project could be completed without negatively impacting the waterway. Recommendations from Fisheries and Oceans Canada will be utilized when designing the final layout of that phase of the project.



## **Appendices**

Map of located waterways and associated setbacks

Photo documentation of the located waterways





## Photo Documentation

Photo 1, Waterway 1:

This drainage dissipates and does not connect to fish bearing water. It does not require a setback under the RAR.



Photo 2, Waterway 2:

This small stream offers potential rearing and spawning habitat for fish.



Photo 3, Waterway 3:

Forbidden Plateau Creek is known to be fish bearing. It offers both spawning and rearing habitat for fish.





Photo 4, Waterway 4:  
This wet area offers very limited fish access and limited rearing habitat.



Photo 5, Waterway 4:  
There is evidence of old beaver activity.



Photo 6, Waterway 6:  
This seepage is 15m long. It offers marginal fish access and limited rearing habitat.





Photo 7, Waterway 7:  
This waterway offers limited fish access and limited rearing habitat for ~20m during high water levels.



Photo 8, Waterway 9:  
The stream drops 4m into the Browns River. No resident fish were sampled upstream.



Photo 9, Waterway 9:  
There is ongoing beaver activity upstream. The wetland offers excellent habitat for amphibians.





Photo 10, Waterway 11:  
The waterway dissipates upslope of the Puntledge River and does not connect to fish bearing water.



Photo 11, Waterway 11:  
Typical morphology upslope of the trail, predominantly muck/fines substrate with skunk cabbage growing throughout.



Photo 12, Waterway 12:  
The waterway dissipates upslope of the Puntledge River. There is no connection to fish bearing water.





Photo 13, Waterway 13:  
This +3m high vertical drop with the +40% gradient slope is a barrier to upstream fish access. There is no resident fish habitat upstream.



Photo 14, Waterway 13:  
The wetland does not provide suitable habitat for resident fish habitation, but does offer habitat for amphibians. The water is generally shallow.



Photo 15, Waterway 14:  
Upslope of the barrier to fish, the waterway does not offer suitable habitat for resident fish habitation.





Photo 16, Waterway 16:

This waterway does not connect directly to fish bearing water. It is shallow with a muck substrate and sedges growing along the perimeter.



Photo 17, Waterway 17:

This is a small isolated wet area. It does not connect to fish bearing water.



Photo 18, Waterway 18:

There is no connection to fish bearing water.





Photo 19, Waterway 18:  
There is a small isolated wet area upslope of the trail.



Photo 20, Waterway 20:  
This stream offers both spawning and rearing habitat for fish. Coho fry were observed.



Photo 21, Waterway 20:  
The upper reaches are unconfined, but there is sufficient depth of water for fish access.





Photo 22, Waterway 21:  
This waterway does not connect to  
fish bearing water.



Photo 23, Waterway 21:  
The waterway is an isolated wet  
area.



Photo 24, Waterway 22:  
This waterway that sources from the  
Highway 19 ditchline does not  
connect to fish bearing water.

