Riparian Areas Protection Regulation: Assessment Report

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

Date	June 11, 2020, Updated May 11, 2021

I. Primary QEP Information

First Name	Rupert				
Last Name	Wong				
Designation	RP Bio		Company:	Current Environmental Ltd.	
Registration #	705		Email:	rwong@currentenv.ca	
Address	558 England Ave				
City	Courtenay	Postal/Zip:	V9N 2N3	Phone #:	250-871-1944
Prov/state	BC	Country:	Canada		

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

First Name			Middle Name:		
Last Name					
Designation			Company:		
Registration #			Email:		
Address					
City		Postal/Zip:		Phone #:	
Prov/state		Country:			

III. Developer Information

First Name	Rachel		Middle Name:		
Last Name	Ricard				
Company	Broadstreet Properties Ltd.				
Phone #	250-850-3212		Email:	Rachel.ricard@seymourproperties.ca	
Address	100 St. Ann's Road				
City	Campbell River	Postal/Zip:	V9W 4C4		
Prov/state	BC	Country:	Canada		

IV. Development Information

Development Type	High Density Multi-Family Residential and ancillary road construction		
Area of Development (ha)	1.54	Riparian Length (m)	170
Lot Area (ha)	3.17	Nature of Development	New development
Proposed Start Date	April 1, 2021	Proposed End Date	April 1, 2023

V. Location of Proposed Development

Street Address (or nearest town)	801 Ryan Road							
Local Government	City of Courtenay			City:	Courtenay			
Stream Name	Stream 1, Stream 2, Len's Pond, Bonner Creek, Ditch 1							
Legal Description (PID)	000-887-951 (development), 030-217-784 (Tunner Drive extension)			Region:	Vancouver Island			
Stream/River Type	Stream, Wetland			DFO Area:	South Coast			
Watershed Code	920-553400							
Latitude	49	41	53.3	Longitude	124	59	07.7	

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

Table of Contents for Assessment Report

Section 1. Description of Fisheries Resources Values and the Development Proposal

Description of Fisheries Resource Values

Two neighbouring properties in the City of Courtenay (CoC) are included in this assessment since development will occur on both. The first property is 801 Ryan Road (PID 000-887-951) which is 2.01 ha in size. The second property is a municipal road-right-of-way (ROW) owned by the CoC (PID 030-217-784), which is 1.17 ha in size. The developer (Broadstreet Properties Ltd) plans to construct three multi-unit high density residential buildings on 801 Ryan Road. A CoC condition of this development is the extension of Tunner Drive from Hunt Road to the southern portion of 801 Ryan Road. Both the building/parking lot development in 801 Ryan Road and the road extension in the neighbouring property are within 30 m of watercourses, therefore RAPR assessments were completed for both properties. These have both been included in this report since the road construction is ancillary to the development.

801 Ryan Road is a cleared and empty lot. A small portion of the lot is paved (the southeastern section), while the remaining portion is unpaved (gravel) and dominated by grasses (Photos 1 and 2). Two paved roadways run west from the paved portion into the Superstore parking lot to the west. There is a narrow grassy and unpaved section of the property that extends east, which is located south of the Mexicana liquor store, Mex Pub, and Washington apartments (Photo 3). A soil berm covered in Himalayan blackberry thickets runs along the entire southern length of the subject property (Photo 4). The neighbouring property to the east is owned by the City of Courtenay as a road ROW and is currently undeveloped. There is a fence line to the north of the lot and walking trails throughout the lot (Photo 5). Thickets of nootka rose and Himalayan blackberry are growing between the walking path and Bonner Creek (Photo 6).

<u>Streams 1 and 2</u>
There are two unnamed streams south of 801 Ryan Road, outside of the property boundary in the neighbouring agricultural fields. Stream 1 is part of CoC's constructed and regularly maintained stormwater system that flows northeast and receives flow from a stormwater retention pond near the southwest corner of the Superstore parking lot, adjacent to the North Island Highway (Photo 7). Stream 2 flows southeast of the subject property, through a culvert that extends south of the subject property (Photo 8). The 30 m Riparian Assessment Area (RAA) of both Streams 1 and 2 extends into the southern portion of 801 Ryan Road, where the Tunner Drive extension will connect with the development parking lots.

Stream 1 was dry during the site visit from CoC's stormwater retention pond until approximately 60 m upstream of Stream 2, where shallow water appeared with trace surface flow. It is a channelized watercourse, with fine silt/mud substrates with stagnant and seasonal hydrology (Photo 9). The channel is homogenous and lacks pools, in-stream large woody debris and spawning gravels, therefore it is poor fish habitat. While no fish were observed at the time of this survey we have observed rearing juveniles in this reach during previous surveys in late winter for CoC. There were several areas with undercut banks. The riparian vegetation is dominated by red alder (*Alnus rubra*), Pacific willow (*Salix lucida*), and red-osier dogwood (*Cornus sericea*) along both banks (Photo 10). Invasive species observed included Himalayan blackberry (*Rubus armeniacus)* and English holly (*Ilex aquifolium*, Photo 10). The stream is overgrown with Himalayan blackberry, with canes across much of the channel (Photo 11). The left bank of Stream 1 was armoured with riprap adjacent to the culvert.

Stream 2 flows southeast through the culvert beneath the subject property. The riparian vegetation observed for Stream 2 is similar to that of Stream 1, with red alder, Pacific willow, and red-osier dogwood as the dominant species. Stream 2 is also overgrown with Himalayan blackberry. This channelized watercourse is straight and homogeneous and is dredged to remove accumulated bedload that is characterized by deep mud and organic substrates (Photos 12 and 13). The gradient of Stream 2 is relatively flat, with stagnant hydrology. Stream 2 flows southwest into Glen Urquhart Creek, which then flows into the Comox Estuary. While no salmonids were observed at the time of this survey we have observed rearing juveniles in this reach during previous surveys in late winter for CoC. Small schools of stickleback were observed in Stream 2 at the time of the site visit. The agricultural fields to the south of the subject property through which Streams 1 and 2 flow are

listed under the Sensitive Ecosystems Inventory as a seasonally flooded agricultural field with riparian areas[1]. The riparian area is partially fragmented by unofficial pedestrian trails that appear to be utilized regularly.

Len's Pond

There is also a constructed wetland called Len's Pond to the east of Stream 2 and south of the project property. Len's Pond was built in the 1990s as a fish habitat compensation for a nearby seasonal wetland that was drained for development (Pers. Comm. D. Bowen, 2020)[2]. It is currently serving as a stormwater detention pond for the area, with a pipe in the northwest corner of the pond that diverts overflow water from the culvert beneath 801 Ryan Road (Photo 14; Figure 1). The pond has steep defined banks and has minimal riparian vegetation (Photo 15). It is surrounded by invasive Himalayan blackberry. The 30 m RAA of Len's Pond extends for approximately 10 m into the subject property.

Bonner Creek

Bonner Creek is a tributary to Glen Urquart Creek, flowing through residential areas before joining with Glen Urquhart Creek southeast of the subject properties. The creek has steep eroded banks, with exposed roots and undercut banks (Photo 16), indicating the flashiness of the urban creek. The substrate is composed of hardpan along the banks (Photo 17) and stream bed, silt, and cobbles/boulders. Small patches of gravels were observed within the reach. Riparian vegetation was predominantly deciduous, with the dominant tree species being red alder and black cottonwood. Horsetail, slough sedge, sword fern, and trailing blackberry are present along the banks, and much of the surveyed reach was covered in overhanging Pacific ninebark (Photos 16 and 17). Invasive species such as Himalayan Blackberry and English holly were present within the riparian area (Photo 17). The creek flows through a 2.2 m diameter corrugated steel culvert beneath a walking path leading to Williams Road (Photo 18). Downstream of Williams Road, Bonner Creek flows beside houses with very limited left bank riparian cover including a Western red cedar, nooka rose, English ivy, and Himalayan Blackberry (Photo 19). The left bank of the creek in this residential area is armoured with riprap and retaining walls (Photo 19). Multiple drainage pipes were observed spilling water into the creek throughout the surveyed reach. Debris such as tires and mattress were observed within the creek (Photo 16). Several pools were noted throughout the surveyed reach, with a moderate amount of large woody debris in the channel.

Ditch 1

A drainage ditch flows into the left bank of Bonner Creek at the upstream end of the culvert beneath the walking path (Photo 20). This ditch follows the fence line to the east (Photo 21), beside residential properties. Due to access issues, the headwaters of the ditch are unknown, however a pipe beneath a property to the east was observed spilling water into the channel (Photo 22), therefore it likely serves as a stormwater overflow channel, contributing flow to Bonner Creek. The area surrounding this pipe was wet with trace flows from the northeast (Photo 23).

Streams 1 and 2 and Bonner Creek are all within the Glen Urquhart watershed. Glen Urquhart Creek originates in northeast Courtenay, and runs for approximately 6 km to its outlet at the Comox Estuary. This creek has documented populations of chum salmon (*Oncorhynchus keta*), Chinook salmon (*Oncorhynchus tshawytscha*), Coho salmon (*Oncorhynchus kisutch*), pink salmon (*Oncorhynchus gorbuscha*), cutthroat trout (*Oncorhynchus clarkii*), and steelhead (*Oncorhynchus mykiss*)[3,4]. A Glen Urquhart watershed Sensitive Habitat Inventory and Mapping (SHIM) survey conducted by Project Watershed in 1999/2000 confirmed fish presence in both Streams 1 and 2, which is consistent with previous surveys completed for CoC prior to stormwater maintenance work. Bonner Creek has confirmed presence of coho and cutthroat trout[5].

[1] Community Mapping Network (2020). Georgia Basin Habitat Atlas. https://cmnmaps.ca/GBHA/. Accessed June 7, 2020.
[2] Personal Communication (Dec 2020) D. Bowen - Project Watershed
[3] BC Ministry of the Environment. Fish Inventories Data Queries: Single Water Body Query. http://a100.gov.bc.ca/pub/fidq/infoSingleWaterbody.do. Accessed May, 2018.
[4] CVRD iMap 3.1. Sensitive Habitat Atlas. http://imap2.comoxvalleyrd.ca/imapviewer/. Accessed May, 2018.
[5] Riddell and Bryden (1996). Courtenay River Water Allocation Plan. Accessed March 2, 2021.

The proposed Tunner Drive extension is within the 30 m RAA of Streams 1 and 2, Bonner Creek, and Len's pond; however, the alignment is outside of the SPEAs. There will be no encroachment of the SPEAs for Streams 1 and 2, Bonner Creek, Len's Pond, or Ditch 1. The proposed multi-unit residential buildings and parking lots are outside of the 30 m RAA of these watercourses.

Description of the Subject Property and Development Proposal

801 Ryan Road is cleared and there are currently no buildings on-site. Proposed development on the subject property includes the construction of three multi-unit high density residential units (total area of approximately 0.49 hectares); Figures 1 and 2. Building A will have 59 units, Building B will have 96 units, and Building C will have 96 units. The remaining portion of the property will be landscaped areas and paved parking for the apartment buildings (Figures 1 and 2). The site has previously been cleared, however there are several black cottonwood (*Populus trichocarpa*) trees on the subject property that are outside of the SPEAs. (Photos 3 and 24). The black cottonwood trees in the southern portion of the lot between the paved and unpaved areas (Photo 24) will be removed as part of development. The black cottonwood tree in the southeastern grassy/gravel portion of the lot (Photo 3) may be retained if feasible, however this will be determined at the time of construction. There is also a row of mature black cottonwood trees between the western part of the subject property and Superstore (Photo 25). All of these mature cottonwood trees are outside of the SPEAs.

The Tunner Drive extension has been proposed as an ancillary part of the high-density residential development. This road will originate at Hunt Road, running southwest for approximately 320 m until it will join up with the parking lots of the 801 Ryan Road development (Figures 3 and 4). The lot that the Tunner Drive extension will begin on is a City of Courtenay road easement and it is currently undeveloped with grassy areas, walking trails, and nootka rose thickets. The lot is covered in invasive Himalayan Blackberry.

No work is being proposed in the Streamside Protection and Enhancement Area (SPEA) for Streams 1 and 2, Bonner Creek, Ditch 1, or Len's Pond. Native species will be reinstated along the Bonner Creek SPEA and invasive species will need to be managed along the length of the road alignment until native species have re-established (approximately 115 m; Appendix A).

Section 2. Results of Riparian Assessment (SPEA width)

Date:	June 2, 2020 (Streams 1 and 2 and Len's pond) March 17, 2021 (Bonner Creek and Ditch 1)

Description of Water bodies involved (number, type)	3 streams, 1 ditch, and 1 wetland

Stream 1:

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

Channel width and slope and Channel Type

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

	Channel Width(m)	Gradient (%)
starting point	~~2.8~~	
upstream	2.9	0.5%
	3.3	
	3.2	
	3.4	
downstream	~~4.4~~	
	4.4	
	3.7	0.5%
	4.0	
	3.8	
	4.1	
Total: minus high /low	32.8	**0.5%**
mean	**3.64 m**	

	R/P	C/P	S/P
Channel Type	X		

I, Rupert Wong, hereby certify that:

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

Site Potential Vegetation Type (SPVT)

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

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Polygon No: 1

	LC	SH	TR
SPVT Type			X

Method employed if other than TR
n/a

Zone of Sensitivity (ZOS) and resultant SPEA

Segment No:	1, left bank	If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons
LWD, Bank and Channel Stability ZOS (m)	10.9	
Litter fall and insect drop ZOS (m)	10.9	
Shade ZOS (m) max	n/a	South bank: Yes [ ] No [X]

Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)				n/a	
Ditch Fish Bearing	Yes	n/a	No	n/a	If non-fish bearing insert no fish bearing status report	n/a

SPEA maximum	**10.9 m**	(For ditch use table 3-7)

Stream 2:

	Channel Width(m)		Gradient (%)
starting point	~~4.7~~		
upstream	3.7		0%
	3.5		
	4.0		
	3.9		
downstream	3.7		
	3.5		0.5%
	~~3.3~~		
	4.0		
	3.8		
	3.7		
Total: minus high /low	33.8		**0.25%**
mean	**3.76 m**		

	R/P	C/P	S/P
Channel Type	X		

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Site Potential Vegetation Type (SPVT)

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

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Polygon No: 1

SPVT Type	LC	SH	TR
			X

Method employed if other than TR
n/a

Zone of Sensitivity (ZOS) and resultant SPEA

Segment No:	1, left bank	If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons

LWD, Bank and Channel Stability ZOS (m)	11.3				
Litter fall and insect drop ZOS (m)	11.3				
Shade ZOS (m) max	n/a	South bank	Yes		No X

Segment No:	2, right bank	If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons					
LWD, Bank and Channel Stability ZOS (m)	11.3						
Litter fall and insect drop ZOS (m)	11.3						
Shade ZOS (m) max	11.3	South bank	Yes	X	No		

Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)				n/a	
Ditch Fish Bearing	Yes	n/a	No	n/a	If non-fish bearing insert no fish bearing status report	n/a

SPEA maximum	**11.3 m**	(For ditch use table 3-7)

Len's Pond:

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

Site Potential Vegetation Type (SPVT)

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

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Polygon No:	1			Method employed if other than TR
	LC	SH	TR	n/a
SPVT Type			X	

Zone of Sensitivity (ZOS) and resultant SPEA

Segment No:	1	If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons
LWD, Bank and Channel Stability ZOS (m)	15	

Litter fall and insect drop ZOS (m)	15						
Shade ZOS (m) max	30	South bank	Yes	X	No		

Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)				n/a	
Ditch Fish Bearing	Yes	n/a	No	n/a	If non-fish bearing insert no fish bearing status report	n/a

SPEA maximum	**15-30 m**	(For ditch use table 3-7)

Bonner Creek:

	Channel Width(m)	Gradient (%)
starting point	2.0	
upstream	2.3	2.5%
	~~2.4~~	
	1.6	
	1.9	
downstream	1.4	
	~~1.3~~	3.0%
	1.5	
	2.0	
	1.6	
	1.4	
Total: minus high /low	15.7	**2.75%**
mean	**1.74 m**	

	R/P	C/P	S/P
Channel Type	X		

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Site Potential Vegetation Type (SPVT)

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

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Polygon No:	1			Method employed if other than TR n/a
	LC	SH	TR	
SPVT Type			X	

Zone of Sensitivity (ZOS) and resultant SPEA

Segment No:	1, right bank	If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons
LWD, Bank and Channel Stability ZOS (m)	10	
Litter fall and insect drop ZOS (m)	10	
Shade ZOS (m) max	n/a	South bank: Yes [ ] No [X]

Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)				n/a	
Ditch Fish Bearing	Yes	n/a	No	n/a	If non-fish bearing insert no fish bearing status report	n/a

SPEA maximum	**10.0 m** (For ditch use table 3-7)

Ditch 1:

	Channel Width(m)	Gradient (%)
starting point	1.0	
upstream	1.1	0.5
	1.2	
	0.8	
	0.7	
downstream	1.3	
	~~0.6~~	1.0
	1.0	
	1.1	
	1.3	
	~~1.4~~	
Total: minus high /low	9.5	**0.75%**
mean	**1.06 m**	

	R/P	C/P	S/P
Channel Type	X		

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Site Potential Vegetation Type (SPVT)

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

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Polygon No:	1		
	LC	SH	TR
SPVT Type			X

Method employed if other than TR
n/a

Zone of Sensitivity (ZOS) and resultant SPEA

Segment No:	1, right bank	If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons
LWD, Bank and Channel Stability ZOS (m)	5	
Litter fall and insect drop ZOS (m)	5	
Shade ZOS (m) max	n/a	South bank: Yes [ ] No [X]

Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)	Channelized, no alluvium, serves as a drainage channel

Ditch Fish Bearing	Yes	n/a	No	n/a	If non-fish bearing insert no fish bearing status report	n/a

Comments

Section 3. Site Plan

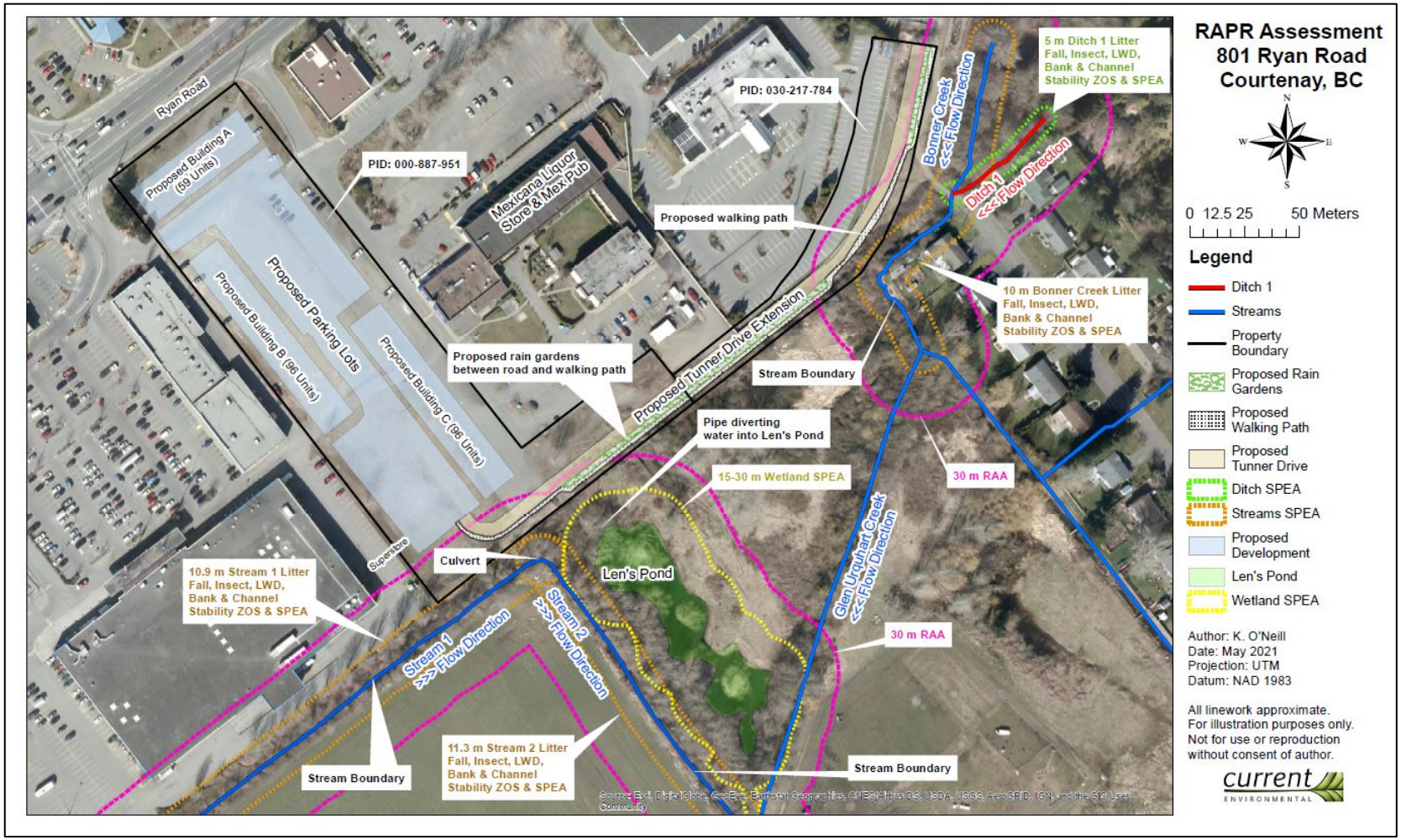

Figure 1. Overview map showing RAA and SPEAs of the streams, ditch and wetland. The locations of the proposed buildings and Tunner Drive Extension are also indicated on the map – all development outside of SPEAs.

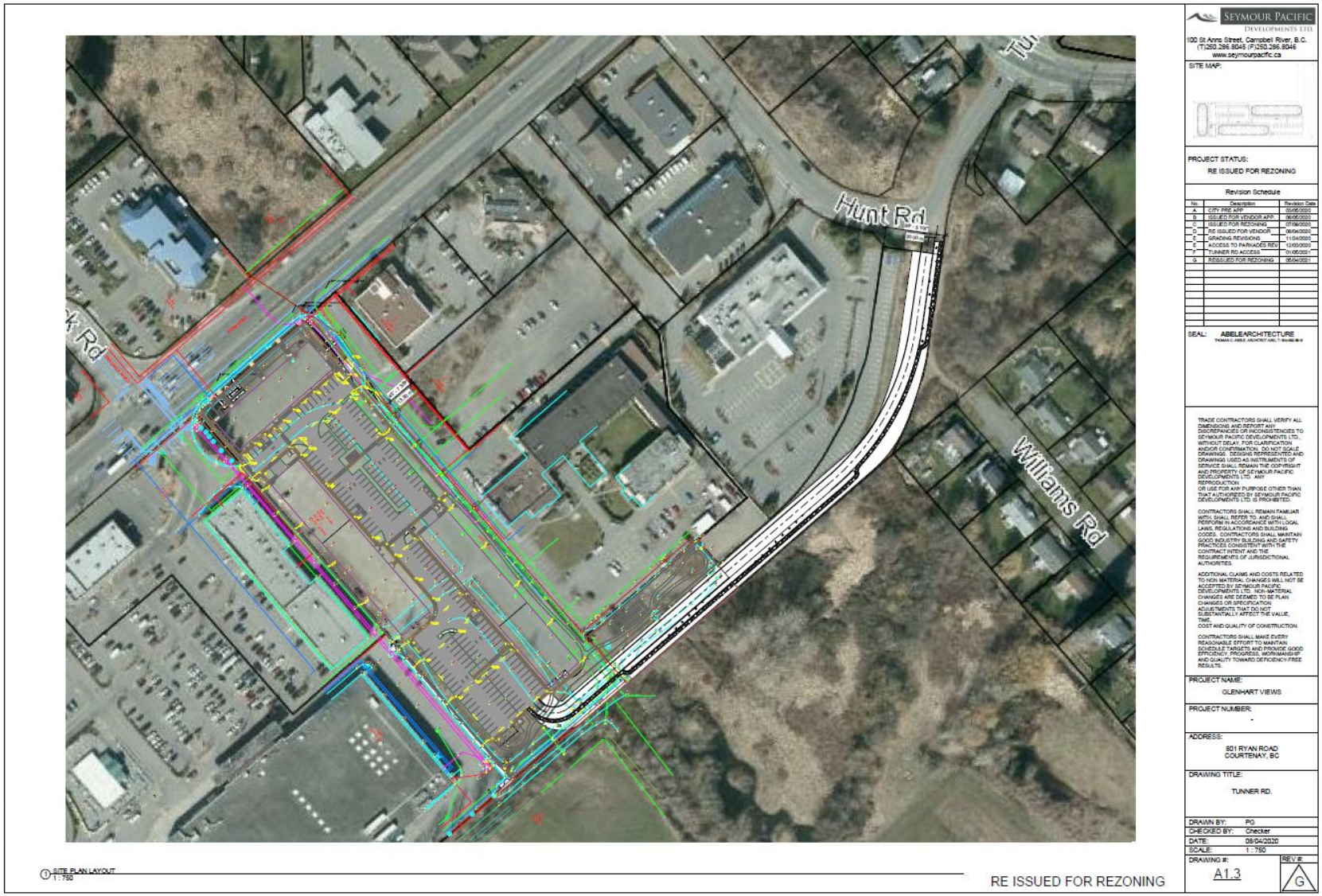

Figure 2. Site plan of proposed development.

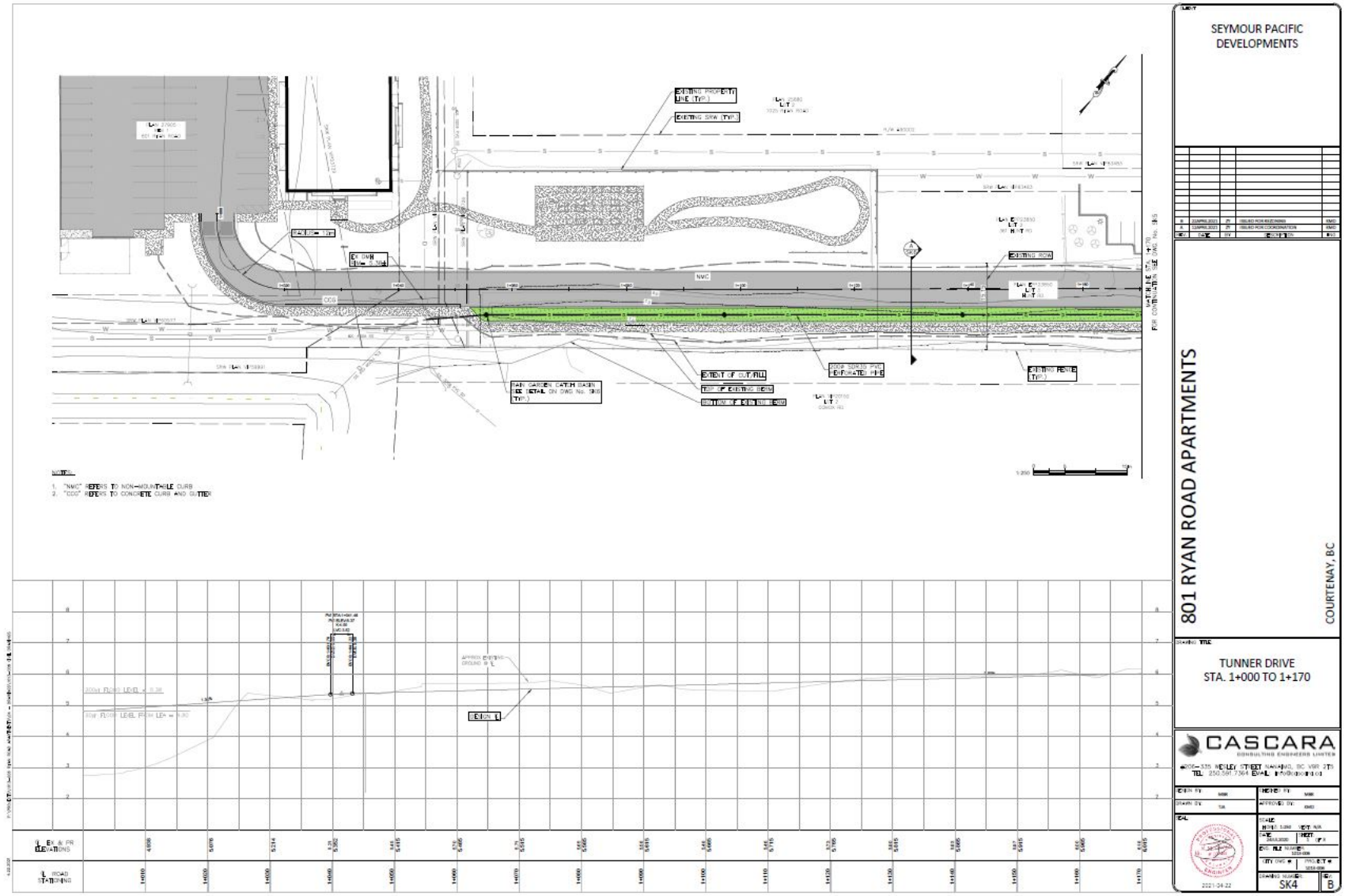

Figure 3. Site plan showing proposed Tunner Drive layout (Sta. 1+000 to 1+170).

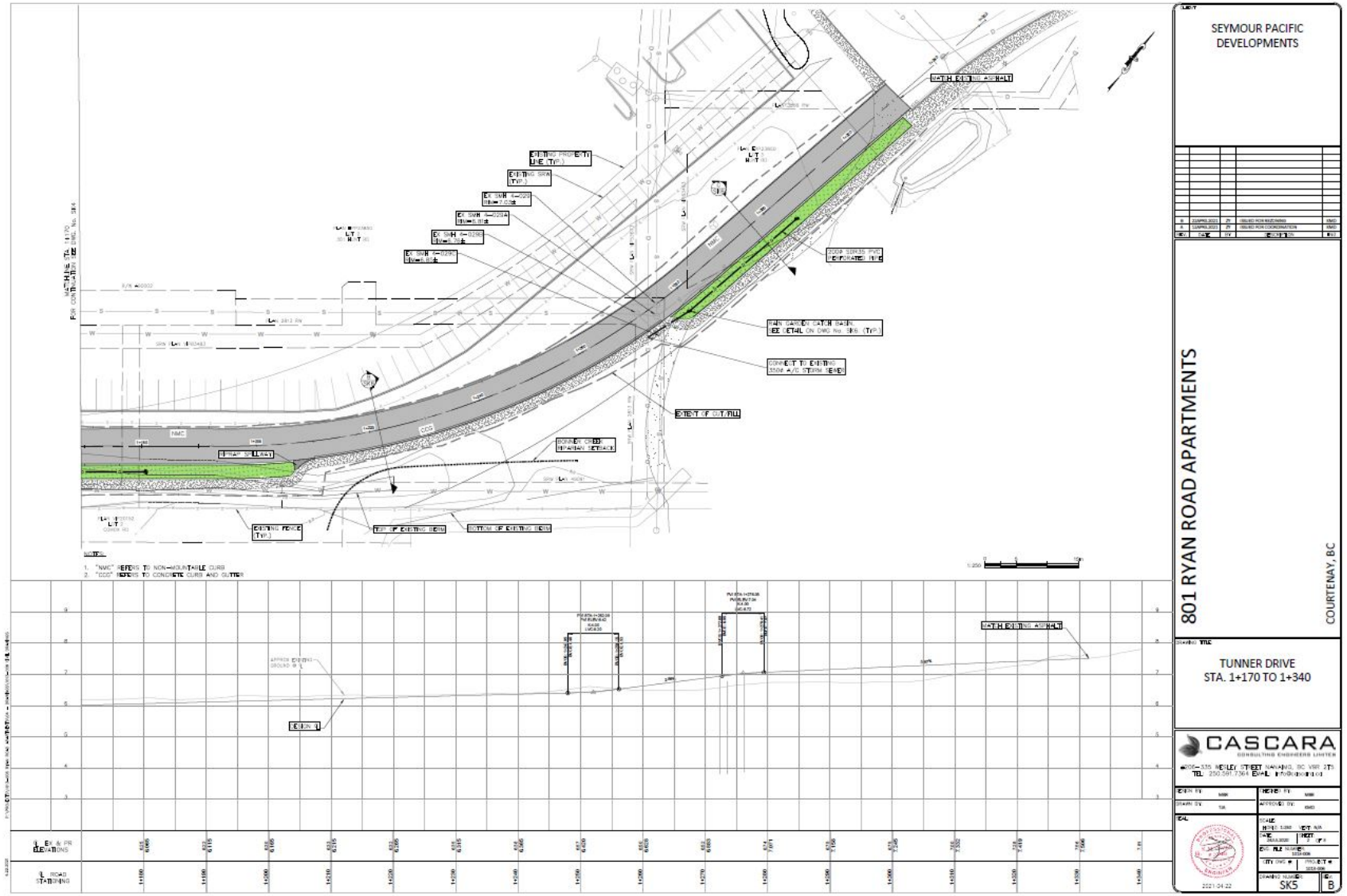

Figure 4. Site plan showing proposed Tunner Drive layout (Sta. 1+170 to 1+340).

Section 4. Measures to Protect and Maintain the SPEA

1. Danger Trees

There are very few mature trees on the site, with the majority of trees (such as red alder and Pacific willow) located along the riparian areas of Streams 1 and 2. These trees are outside of the falling zone for the proposed development and there were no apparent issues with these trees at this time. There are several black cottonwood trees within the cleared portion of 801 Ryan Road, north of the streams and agricultural fields. All of these mature trees are outside of the SPEAs of the streams and wetland. The black cottonwood tree in the southern portion of the lot between the paved and unpaved areas (Photo 24) will be removed as part of development. The black cottonwood trees in the southeastern grassy/gravel portion of the lot (Photo 3) may be retained if feasible, however this will be determined at the time of construction. There are few trees in the City of Courtenay road ROW, with all trees located within the 10 m SPEA of Bonner Creek.

It is important to note that trees cannot be felled in the 10.9 m SPEA for Stream 1, the 11.3 m SPEA for Stream 2, the 10 m SPEA for Bonner Creek, or the 5 m SPEA for Ditch 1 unless they are deemed hazardous by a Certified Arborist qualified to assess danger trees. All non-hazard trees in the SPEAs must be retained and protected to maintain the features functions and conditions of the riparian habitats of the streams, ditches, and wetland.

Disclaimer:

Unless expressed otherwise: (1) information contained in this report covers only those items that were examined and reflects the condition of those items at the time of inspection; and (2) the inspection is limited to visual examination of accessible items without dissection, excavation, probing, or coring. There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the plants or property in question may not arise in the future.

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

2. Windthrow

Several black cottonwood trees in the previously cleared portion of the lot may be removed as part of this proposed development, however the riparian trees along Streams 1 and 2 will not be removed. Trees along the SPEA of Bonner Creek will also be retained during the road construction. As a result, there will not be an increase in wind/weather exposure to the trees in the SPEA and in the RAA, and there are no concerns with regards to windthrow at this time.

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b) I am qualified to carry out this part of the assessment of the development proposal made by the developer Broadstreet Properties Ltd;

c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and
d) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.

3. Slope Stability

The left bank of Stream 1 was armoured with riprap adjacent to the culvert, therefore they may be stability concerns in this location of Stream 1. The left bank of Bonner Creek in the reach adjacent to the residential properties was also armoured with rip rap and retaining walls. As such, it is important that no trees are removed from the 10.9 m SPEA of Stream 1 or the 10 m SPEA of Bonner Creek. There were no slope stability issues noted along Stream 2 or for the remaining Stream 1 reach to the southwest of the culvert.

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4. Protection of Trees

All trees and vegetation within the 10.9 m SPEA for Stream 1, the 11.3 m SPEA for Stream 2, the 15-30 m SPEA for Len's Pond, the 10 m SPEA for Bonner Creek, or the 5 m SPEA for Ditch 1 will need to be retained and protected, unless a tree is deemed hazardous by a certified arborist. Trees provide critical functions in riparian areas by providing shade, nutrient and leaf litter drop, large woody debris recruitment in both the forest floor and inputs to watercourses, and bank stability through their complex root networks. They also help retain soil and provide more favourable growing conditions for other understory shrubs and ground cover plants in the riparian area. Streams 1 and 2 do not appear to be good fish habitat, however fish presence has previously been confirmed in these streams. Bonner Creek may serve as fish habitat due to its proximity to fish-bearing Glen Urquhart Creek, therefore riparian functionality should be maintained.

Several black cottonwood trees that are outside of the SPEAs may be removed from the subject property as part of this development. Specific measures to protect trees in the SPEAs of Streams 1 and 2 and Bonner Creek during development will include:

1) A root protection zone for all trees within the SPEAs that may be impacted by construction must be established prior to project commencement. Temporary fencing will be set up around root protection zones to ensure no encroachment occurs into this area during construction. There can be no paving, trenching, change of ground level, parking, storage of materials, or release of concrete washout or other pollutants into these root protection zones.

2) Machines will not operate or travel within the SPEAs. Heavy equipment will compact the soil around trees and can inhibit root growth and decrease oxygen in the soil that is essential to the growth and function of roots.

3) Tree protection plans will be communicated during the required pre-construction meeting.

4) If any roots are encountered during construction, they should be first avoided if possible, and if they must be cut they should be cut cleanly with a saw as opposed to shattered with machinery.

5) Care should be taken not to break any tree limbs during construction. If any limbs are accidentally broken, they should be cleanly cut with a saw.

6) Should any issues arise with regards to potential changes to the impact on trees during development, it is recommended that an arborist be retained to provide guidance on the least impact approach to development around trees.

7) The developer is to contact the project biologist three days prior to the commencement of construction activity for a pre work meeting/call to discuss all measures and BMP's to protect aquatic resources.

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

5. Encroachment

It important that the 10.9 m SPEA for Stream 1, the 11.3 m SPEA for Stream 2, the 10 m SPEA for Bonner Creek, and the 15-30 m SPEA of Len's Pond be protected from encroachment both during construction and in the long term. During construction, temporary fencing (i.e. snow fencing) will be set up along the SPEAs and around tree protection zones that extend out from the SPEAs as described previously. This will act as a visual barrier to all workers during construction so that no encroachment occurs into the SPEAs. Specifically, encroachment includes all material storage, machinery, vehicles, release of hazardous materials, and even limiting foot traffic where possible. The developer is to contact the project biologist three days prior to the commencement of construction activity for a pre work meeting/call to discuss all measures and BMP's to protect aquatic resources.

In the long term, after construction is complete, it is important to maintain a barrier along the edge of the SPEA to prevent encroachment on a day to day basis.

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6. Sediment and Erosion Control

Sediment laden water that enters watercourses can seriously harm aquatic life. It is important to implement measures to prevent the release of sediment into waterbodies during construction. There is confirmed fish presence in Streams 1 and 2 and Stream 2 and Bonner Creek flow into Glen Urquhart downstream which is fish-bearing, therefore protecting the streams from sediment laden waters is crucial.

Specific measures to control sediment during construction will include:

1) Maintain all vegetation in the 10.9 m SPEA for Stream 1, the 11.3 m SPEA for Stream 2, the 10 m SPEA for Bonner Creek, and the 15-30 m SPEA for Len's Pond;

2) Where there is a potential for silt runoff towards Streams 1 and 2, Bonner Creek, and Len's Pond, control devices will be installed prior to construction activities commencing;

3) Filter fabric dams, rock check dams, and silt fencing will be used as needed on a site-specific basis to control erosion. Filtration should be accomplished using filter fabric keyed into substrates and banks and elevated using stakes or straw bales. Silt fencing is not an acceptable mitigation technique to control erosion in flowing water however it is useful for containing slumping areas and for use as baffles to slow water velocities.

4) Excavation will be stopped during intense rainfall events or whenever surface erosion occurs affecting nearby waterbodies.

5) Soil stockpiles will be placed a minimum of 15 m from any waterbody and in a location where erosion back into the marine environment cannot occur and will not impede any drainage.

6) Soil stockpiles with the potential to erode into waterbodies are to be covered with poly sheeting. Other techniques, such as terracing or surface roughening can greatly reduce surface erosion on steeper slopes.

7) Permanent exposed soil areas and erosion-prone slopes that may potentially erode into waterbodies are to be re-seeded immediately or covered with geotextile.

8) Any clearing will take place immediately prior to excavation and earthworks to minimize the length of time that soils are exposed. Vegetation in adjoining areas will not be disturbed.

9) Site re-vegetation measures are required to stabilize disturbed soils and areas where invasive plants have been removed to reduce erosion.

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c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and
d) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.

7. Stormwater Management

Pursuant to CVRD Bylaw No. 337, an assessment of water quality and quantity impacts including recommendations to "ensure the pre-development or natural hydrologic regime is maintained or restored by the development" is required. Subsequently, future roof drains on the new development and driveway runoff will need to be directed through a proper drainage area that filters the runoff water and promotes infiltration back into the ground before reaching the SPEAs of the streams or wetland south of the property. The property owner should work with the project engineer to design a system for drainage that adheres to these general guidelines of filtering the runoff water and promoting infiltration where possible as opposed to piping the runoff water directly to the streams and/or wetland. Options may include an open vegetated swale or drain rock trench that filters runoff water prior to reaching waterbodies, however this drainage feature may not enter the SPEAs.

Rain gardens have been proposed between the Tunner Drive extension and the walking path to the south (Figure 1) to capture runoff from the road and allow water to infiltrate to ground.

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c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and
d) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation

8. Floodplain Concerns (highly mobile channel)

Streams 1 and 2 and Bonner Creek are incised with defined banks covered in thickets of Himalayan blackberry and the streams are maintained. Consequently, there are no concerns or mitigation measures with regards to floodplain protection for this assessment.

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c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and
d) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.

Section 5. Environmental Monitoring

A QEP must be notified 3 days in advance of any construction on the subject property, with the following items to be discussed prior to construction:

1. Review work plan;
2. Ensure appropriate mitigation measures are/will be in place;
3. Review all Measures to Protect the SPEA stated in this report and ensure appropriate equipment to satisfy the measures are on-site or available;
4. Set up a contact system should a Biologist or Qualified Environmental Professional (QEP) be required on site in the event of sediment/erosion issues or some other type of risk to aquatic habitats that may arise during construction.

Immediately upon completion of the construction work, the proponent is to contact a QEP for a post-construction site inspection. Any deficiencies noted by the QEP are to be addressed by the proponent. A final post-construction report is to be submitted by the QEP to the BC RAPR Notification System.

Section 6. Photos

Photo 1. Subject property looking southeast toward berm and Streams 1 and 2. Photo taken near Ryan Road, on northwestern part of property. Paved section seen on eastern side of property and unpaved section seen on western side of property adjacent to Superstore (June 2020).

Photo 2. Subject property on paved portion looking southeast toward berm and Streams 1 and 2. Unpaved portion of property on western side adjacent to Superstore (June 2020).

Photo 3. Grassy southeast portion of subject property south of Washington apartments. Mature black cottonwood tree observed in left side of photo and berm with Himalayan blackberry thicket observed in right side of photo (June 2020).

Photo 4. Himalayan blackberry thickets along berm adjacent to riparian area of Stream 1 (June 2020).

Photo 5. Municipal property to the east of 801 Ryan Road where the proposed Tunner Drive extension will be constructed. Looking southwest, with nootka rose and Himalayan blackberry in the Bonner Creek riparian area (left side of photo) and grasses and invasive species beside the fence (right side of photo; February 2021).

Photo 6. Riparian vegetation along Bonner Creek overrun with Himalayan blackberry (February 2021).

Photo 7. CoC stormwater retention pond to southwest of subject property, adjacent to North Island Highway (June 2020).

Photo 8. Culvert running south beneath subject property, through which Stream 2 flows southwest. Photo taken from Stream 1, which flows northeast toward culvert (June 2020).

Photo 9. Stream 1 looking northeast toward culvert showing straight and homogeneous channel with muddy substrates (June 2020).

Photo 10. Riparian vegetation (Himalayan blackberry, red alder, and Pacific willow) along right bank of Stream 1, looking northeast. Photo taken from agricultural property to south of subject property (June 2020).

Photo 11. Dry portion of Stream 1 looking southwest toward retention pond, showing Himalayan blackberry covering channel (June 2020).

Photo 12. Stream 2 looking south showing straight and homogeneous channel overgrown with Himalayan blackberry. Red alder observed along banks (June 2020).

Photo 13. Stream 2 looking south showing straight and homogeneous channel overgrown with Himalayan blackberry. Red alder observed along banks (June 2020).

Photo 14. Pipe in the northwest corner of Len's pond that diverts overflow water from the culvert beneath 801 Ryan Road into the pond (February 2021).

Photo 15. Len's pond looking southwest, with steep defined banks and minimal riparian vegetation (February 2021).

Photo 16. Looking downstream in Bonner Creek, showing eroded banks with exposed roots and undercut banks along left bank. Debris observed within channel (February 2021).

Photo 17. Hardpan along banks of Bonner Creek, with exposed tree roots due to erosion. Cobbles and sand/silt within this reach (February 2021).

Photo 18. Bonner Creek flows through a 2.2 diameter CSP culvert beneath walking path to Williams Road, looking downstream (February 2021).

Photo 19. Bonner Creek downstream of 2.2 m diameter culvert. Creek flows beside residential properties and has armoured banks (February 2021).

Photo 20. Drainage ditch (Ditch 1) flowing into Bonner Creek from left bank (February 2021).

Photo 21. Ditch 1 flowing along fence line to the southeast of Bonner Creek (February 2021).

Photo 22. Pipe beneath residential property contributing flow to Ditch 1 (February 2021).

Photo 23. Wet area with trace flows beneath Bonner Creek and Ditch 1 (February 2021).

Photo 24. Small black cottonwood trees between the paved and unpaved portion of the subject property, north of Streams 1 and 2.

Photo 25. Mature black cottonwood trees between western portion of subject property and Superstore.

Section 7. Professional Opinion

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

Date May 11, 2021

1. I/We Rupert Wong, R.P.Bio.

hereby certify that:

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

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

a) [n/a] the site of the proposed development is subject to undue hardship, (**if applicable, indicate N/A otherwise**) and

b) [X] the proposed development will meet the **riparian protection standard** if the development proceeds as proposed in the report and complies with the measures, if any, recommended in the report.

Appendix A – SPEA Enhancements

Planting Plan

The riparian area on the right bank of Bonner Creek is narrow and lacks species diversity. The reach from Hunt Road to the culvert beneath the walking path that leads to Williams Road is primarily composed of Black cottonwood, red alder, horsetail, slough sedge, sword fern, trailing blackberry, and Pacific ninebark. The reach between the culvert and where the creek turns southwest into the agricultural field lacks trees with the exception of a Western red cedar. The riparian zone on the right bank in this area is narrow (2-3 m wide) and is primarily composed of nootka rose. Invasive species are prevalent in the riparian areas of Bonner Creek adjacent to the proposed road alignment, including Himalayan Blackberry, English Ivy, and English holly.

Due to the poor quality of the riparian area along Bonner Creek (low species diversity, narrow strip of vegetation, high prevalence of invasive species), we recommend that the 10 m SPEA of the Creek be enhanced with native species planting and invasive species removal to improve the functionality of the riparian zone.

The proposed Tunner Drive extension follows Bonner Creek for a length of approximately 115 m, resulting in a total SPEA area of 1,150 m^2 that can be planted (Figure 5). The species assemblage for planting should include native species that are suited to the site conditions, with possible species listed in Table 1 below.

Table 1. Potential species to be planted in riparian area of Bonner Creek.

Common Name	**Scientific Name**
Trees	
Douglas fir	*Pseudotsuga menziesii*
Bigleaf maple	*Acer macrophyllum*
Black hawthorn	*Crataegus douglasii*
Western red cedar	*Thuja plicata*
Grand fir	*Abies grandis*
Red alder	*Alnus rubra*
Shrubs	
Western sword fern	*Polystichum munitum*
Salmonberry	*Rubus spectabilis*
Thimbleberry	*Rubus parviflorus*
Snowberry	*Symphoricarpos*
Red flowering currant	*Ribes sanguineum*
Pacific ninebark	*Physocarpus capitatus*
Devil's club	*Oplopanax horridus*

The planting plan including species, numbers of plants and associated costs is provided below (Table 1).

Invasive Species Removal

Invasive Himalayan blackberry, English ivy, and English holly should be removed from the SPEA of Bonner Creek. Removed invasive species should be disposed of at an appropriate landfill and should not be stockpiled on site. The invasive species must be well contained during transport (i.e. covered or inside a sealed container) to help prevent spores or seeds from falling out of the vehicle. The type of load (invasive species) must be communicated to the landfill attendant so it can be disposed of appropriately. Although a quote has not been acquired, the cost for a landscaper to remove invasive species has been generalized in Table 2 below.

Table 1. Estimated Planting and Invasive Species Removal for 801 Ryan Road development/Tunner Drive extension. Sizes and prices from Streamside Native Plants.[1]

Common Name*	Number	Size	Spacing (m)	Cost/Unit	Total Cost (excluding taxes)
Trees	150	1 gal pot	6	$5.95	$892.50
Shrubs	500	1 gal pot	1.5	$5.95	$2,975.00

* Species of trees and shrubs to be determined at a later date based on list in Table 1.

Item	Total cost (not including taxes)
Plant cost	$3,867.50
Labour cost (40 hours @ $20.00/hour)*	$800.00
Equipment Rental for Invasive Species Removal	$1,000.00
Soil Amendments	$200.00
Total planting cost	**$5,867.50**

[1] Streamside Native Plants. (2020). Streamside Native Plants Wholesale Price Guide. Retrieved from < http://www.streamsidenativeplants.com/streamside_inventory.html>

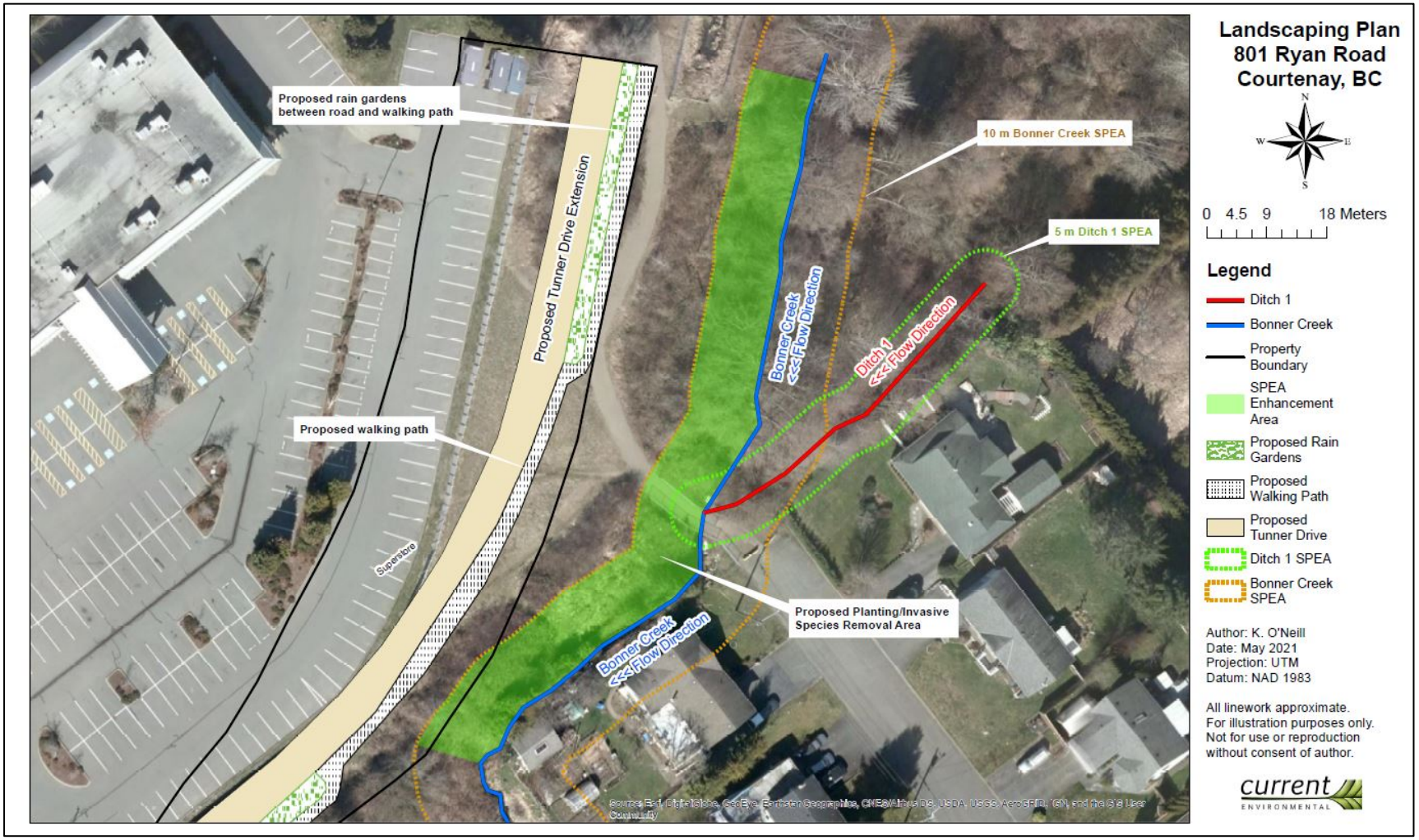

Figure 5. Proposed SPEA enhancement area showing where native species planting and invasive species removal is recommended (green polygon).