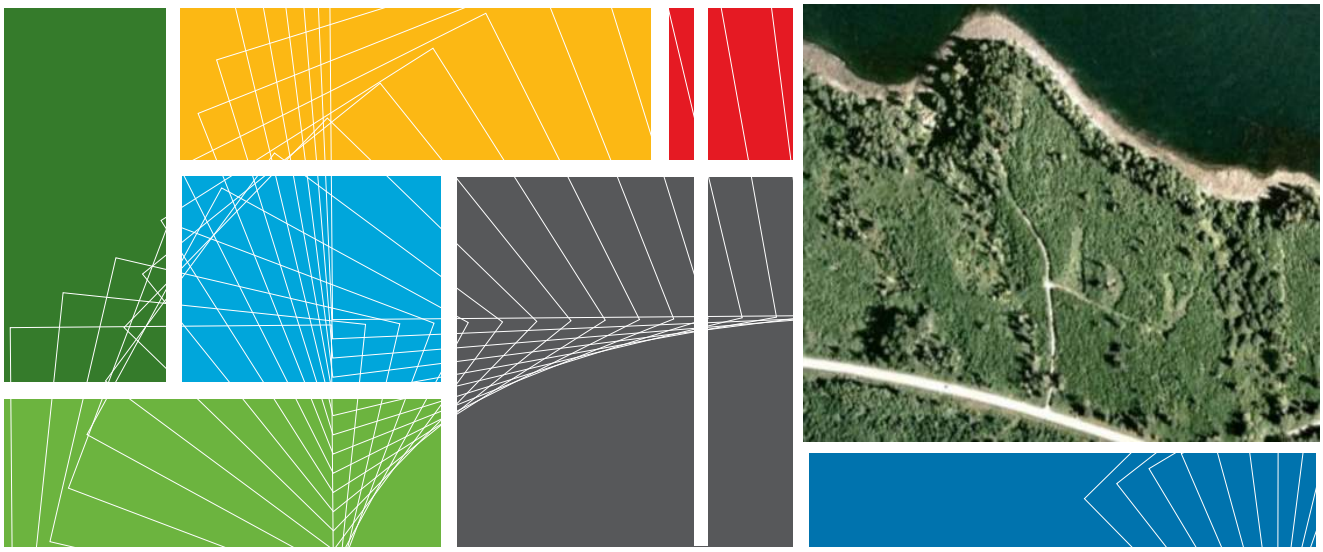

Ripple Rock Estate Development

Riparian Area Protection Regulation

Detailed Assessment Report
9805 Island Highway, Campbell River, BC

May 2022

ISL Engineering and Land Services Ltd. is an award-winning full-service consulting firm dedicated to working with all levels of government and the private sector to deliver planning and design solutions for transportation, water, and land projects.

Riparian Areas Protection Regulation: Assessment Report

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

Date: 2022-05-18

I. Primary QEP Information

First Name	David	Middle Name: E.	
Last Name	Neufeld		
Designation	R.P. Bio.	Company: ISL Engineering and Land Services Ltd.	
Registration #	1564	Email: dneufeld@islengineering.com	
Address	#201, 8506 - 200 Street		
City	Langley	Postal/Zip V2Y 0M1	Phone # 604-371-0091
Prov/state	BC	Country: Canada	

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

First Name	Colden	Middle Name Robert Willem	
Last Name	Van Ommen		
Designation	P.Eng.	Company: Ryzuk Geotechnical	
Registration #	52801	Email: cvanommen@ryzuk.com	
Address	#6-40 Cadillac Ave		
City	Victoria	Postal/Zip V8Z 1T2	Phone # 250-475-3131
Prov/state	BC	Country: Canada	

III. Developer Information

First Name	Niclas	Middle Name	
Last Name	Haglund		
Company	1127921 B.C. Ltd.		
Phone #	250-205-6363	Email: niclas_haglund@hotmail.com	
Address	6805 Island Highway		
City	Campbell River	Postal/Zip: V9H 1R7	
Prov/state	BC	Country: Canada	

IV. Development Information

Development Type	Residential Housing Strata and Mixed-use Strata Development		
Area of Development (ha)	34.72	Riparian Length (m)	985
Lot Area (ha)	34.72	Nature of Development	Redevelopment
Proposed Start Date	May 2022	Proposed End Date	December 2030

V. Location of Proposed Development

Street Address (or nearest town)	6805 Island Highway						
Local Government	City of Campbell River			City Campbell River			
Stream Name	Unnamed Streams, designated in this report as Stream 1, Stream 1A, Stream 3, Stream 4, Stream 4A, Stream 4B.						
Legal Description (PID)	024-937-771			Region 1			
Stream/River Type	Stream			DFO Area 13-3			
Watershed Code	These first order streams do not have Watershed Codes, and they flow directly to the sea						
Latitude	50°	6’	49” N	Longitude	125°	20’	57” W

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

Make duplicates of the complete form fields and paste below each other for additional QEPs

II. Additional QEP Information

First Name	COLDEN	Middle Name	ROBERT WILLEM	
Last Name	VAN OMMEN			
Designation	P.ENG.	Company	RYZUK GEOTECHNICAL	
Registration #	52801	Email	CVANOMMEN@RYZUK.COM	
Address	40 CADILLAC AVE #6			
City	VICTORIA	Postal	V8Z 1T2	Phone # 250-888-1612
Prov/state	BC	Country	CANADA	

PN# 1002996

Feb 16, 2022

Table of Contents for Assessment Report

Page Number

Section 1. Description of Fisheries Resources Values and a Description of the Development proposal

(Provide as a minimum: Species present, type of fish habitat present, description of current riparian vegetation condition, connectivity to downstream habitats, nature of development, specific activities proposed, timelines)

Description of Proposed Development

Enclosed is a detailed Riparian Areas Protection Regulation (RAPR) Assessment report prepared for the redevelopment of a property located at 6805 Island Highway in Campbell River, BC. The proposed project, Ripple Rock Estate Development (RRED) envisions the redevelopment of privately held forest land, containing one residence (a seaside cabin), into a residential and commercial mixed-use community. This community will be serviced by independent water and sanitary sewer systems operated by a strata.

Assessments to support the independent water supply, stormwater supply and sanitary sewer treatment and discharge were completed in the period of 2019-2021. In addition, a Preliminary Environmental Assessment in support of land rezoning was completed in 2020. The RRED land was rezoned from RU-1 to CD-6 in 2021. The RRED requires Subdivision Approval from the City of Campbell River before the redevelopment can proceed to phased construction. Since the property contains streams, the City will only consider issuing the Subdivision Approval after an assessment of the streams following Provincial RAPR data collection and reporting standards and a Detailed Assessment Report has been submitted to and acknowledged by the Province of BC's Ministry of Forests (MoF).

ISL has completed a RAPR Detailed Assessment and prepared this Assessment Report to satisfy Provincial requirements set out in the Riparian Area Protection Act – RAPR. Upon receipt of confirmation of acceptance by the Province, the City of Campbell River may issue the requisite Subdivision Approval allowing the project to proceed.

There are six watercourses meeting the definition of streams pursuant to the RAPR on or about the subject property (Figure RAPR 1). Within two streams (Stream 3 and Stream 4) there are two anthropogenic impoundments that are less than 100 m long and which meet the definition of a 'wetland or pond'.

There is one watercourse that drains the constructed Highway 19 drainage ditch south of the property and which MOTI has diverted onto the subject property. This ditch relief is not a stream pursuant to the RAPR because it does not provide opportunity for fish habitation nor does it provide food and nutrients to downstream fish habitat. This watercourse goes entirely dry in the summer, and has no overland or underground direct connection to a stream that provides fish habitat. Of note this ditch also does not result from channelized upslope streams or springs, it is entirely comprised of diverted road drainage.

Streams 1 and 4 have identifiable barriers to upstream fish migration less than 15 m from tidewater. Both of these small streams lack necessary above-barrier conditions (appropriate substrates, and sufficient perennial discharge) to support a resident fish population. Both above barrier reaches lack pools in which a resident population could rear. However, above-barrier fish sampling to confirm absence was not undertaken for this assessment.

Stream 3 would be technically fish accessible with modification to the anthropogenic culverts and instream rubble. It appears that if these features were removed there would be theoretical fish access from the sea. Removal of the anthropogenic barrier would possibly entail the resultant draining of Pond A.

Existing Conditions

The RRED property has a long history of logging disturbance, Earliest air photographs available show site logging extending back to the 1940s **(PLATE 1**). There was also a significant logging pass undertaken in approximately 2000. In January to April 2022 (after completion of the

Preliminary Environmental Assessment and draft RAPR Detailed Assessment Report for the site), the Owner had a logging contractor log the site again **(PLATE 2).** This logging was done under the auspices of the *Private Managed Forest Land* Act (PMFLA).

ISL reassessed conditions after logging had commenced (February 2022) to understand whether this activity would affect the detailed stream and pond information we had gathered during previous assessments in January 2019 and August 2020. Our re-assessment identified tree clearing, logging road construction, and instream culvert installation as well as new ditch construction. While clearing has been extensive, riparian management areas and reserves were in place and these appear consistent with typical treatments for S4 to S6 classified streams per the *Forest and Range Practices Act (FRPA).* Average stream channel widths were unaffected by the logging activities and as such the data collected in January 2019 and August 2020 remained applicable to determining Zones of Sensitivities (ZOSs).

During reassessment, ISL noted that the logging contractor was beginning to construct ditches towards the stream crossings and improvements related to erosion and sediment control at the crossings was appropriate. ISL advised the Owner that the logging contractor's new ditch construction had the potential to encumber the future site redevelopment because the RAPR would require non-fish bearing ditches that provide food, nutrients, and water supply to downstream fish habitat to have 2 m Streamside Protection and Enhancement Area (SPEAs).

It was recommended that these ditches be constructed in a manner that directed ditch flow to ground for infiltration, as opposed to draining directly to streams **(PLATE 3)**. This would make them consistent with resource road crossing best practice. ISL identified treatments that would be useful to control erosion and sediment control (ESC) deficiencies.

On April 24, 2022, ISL reviewed site status after improvements to the stream crossings and ditches. Photographic records from 2019, 2020 and April 2022 are included in this report as Plates.

Description of Fisheries Resource Values

Per the RAPR, a reach needs to meet the minimum length threshold of 100 m. Using this criterion, the following 'Streams' and 'Reaches' were defined. Notable departures for the 'Stream Reach rule' were identified for ponds located within Stream 3 and Stream 4 and described below. The Plates referenced in the descriptions below can be found in Section 6.

Stream 1 – Reach 1

Reach 1 had an average bankfull width of 1.43 m and an average wetted width of 0.8 m. The streambed consisted of boulders (20%), cobble (30%), gravel (30%) and fines (20%). This reach contained numerous boulders with accumulated sediment wedges. The primary delineation for this reach is its degree of confinement (entrenched) and channel gradient.

The average stream gradient was 13% although there was a short 18 m long section immediately upstream of tide-water that was <5% **(PLATE 4).** Upstream from the ocean 15 m, there is an 18 m long, 15-25% gradient, boulder cascade **(PLATE 5).** This cascade has multiple 0.5 m vertical drops with no appreciable plunge pool. The cascade would be a barrier to upstream fish passage were anadromous fish to attempt to ascend further than 15 m upstream of the ocean.

The 13% gradient reach is too steep and lacks the pools and spawning habitat necessary to support a resident fish population **(PLATE 6).**

The riparian vegetation in this reach was comprised of a canopy of mostly red alder *(Alnus rubra)* and an understory of sword fern *(Polystichum munitum)* and dense salmonberry *(Rubus spectablis).* Logging is evident in 15 -20 m from the high-water mark.

A deactivated logging road was observed during our January 2019 and August 2020 assessments of this stream. This deactivated logging road was reactivated by February 2022. A corrugated steel pipe was used as a crossing structure. Per ISL's recommendations this crossing was disconnected from new roadside ditches and erosion and sediment control measures (seed and 2.5 cm straw) was deployed **(PLATE 7)**.

Stream 1 – Reach 2

This reach was designated at a point where the stream changes from an entrenched morphology to one where it is frequently confined.

Reach 2 has an average bankfull channel width of 1.40 m and has a streambed that consists of boulders (<5%), cobble (20%), gravel (20%) and fines (55%). boulders (30%), cobble (30%), gravel (20%) and fines (20%). The average stream gradient is 6% (range 3-21%).
Riparian vegetation was principally big-leaf maple *(Acer macrophyllum),* red alder (immature), moderate to dense salmonberry and sword fern **(PLATE 8 and PLATE 9).**

Within this reach there is a second stream crossing which flows through a 600mm diameter corrugated steel culvert, approximately 50m in length. ESC Measures were observed **(PLATE 10)**

Stream 1A

Stream 1A had an average bankfull width of 1.07 m and an average wetted width of 1.0 m. The streambed consisted of cobble (10%), gravel (20%) and fines (70%). The average stream gradient was 4%. The source of this scoured stream channel was intermittent seepage that formed west of Race Point Road, in a low-lying depression. The stream is mostly unconfined **(PLATE 11).**

The riparian vegetation of Stream 1A consisted of salmonberry thickets adjacent to big-leaf maple sapling and immature western red cedar *(Thuja plicata).*

One stream crossing was evident across the logging route. The stream flows through 600mm diameter culvert, approximately 40m in length **(PLATE 12).**

Stream 3 – Wetland Pond

Stream 3 discharges to the ocean after flowing through the existing residential property which currently has a driveway and a cabin. There is culvert crossing for the driveway **(PLATE 13),** however this culvert crossing is elevated 0.7 m above the channel bed and has been historically altered to create an artificial impoundment (POND A) on the upstream side of the driveway **(PLATE 14 and PLATE 15).** There is no potential for fish access from the sea at this time due to the culvert arrangement and boulder field downstream of the culvert crossing. The pond is <100 m in length, and as such does not constitute a reach per the RAPR, however, this pond feature is best treated as a wetland pond for RAPR assessment as its features, functions and conditions more closely meet the definition of wetland/pond than 'stream channel'. Secondly, red-legged frog

(Rana aurora) were observed in the riparian area south of this impoundment and this provincially blue-listed species likely uses the pond for breeding and rearing purposes.

Stream 3 – Reach 1

Immediately upstream of the impoundment identified above, the stream channel forms and has an average bankfull channel width of 1.98 m and an average wetted width of 1.76 m **(PLATE 16 and PLATE 17)**. The average stream gradient ranged between 4-15% with the average gradient at 8%. The streambed consisted of cobble (30%), gravel (30%) and fines (40%).

The riparian vegetation includes red alder, broad-leafed maple, vine maple *(Acer circinatum)* salmonberry and sword fern. While there are maturing maple and red alder in around the lowest portions of this reach upstream of the pond 30 m the forest vegetation transitions to a notably younger seral stage, and this corresponds to the logging history evident on the property from air photograph analysis.

There is a logging access route across this reach. The stream flows through 600mm diameter CSP culvert, approximately 52m in length **(PLATE 18).**

Stream 3 – Reach 2

This reach was delineated due to increasing channel steepness which corresponds to terrain elevation changes and side slope elevation increases as the survey proceeded toward Highway 19.

This reach had an average bankfull width of 1.70 m and an average wetted width of 0.7 m. The streambed consisted of cobble (30%), gravel (40%) and fines (30%). The average stream gradient was 15% and ranged between 8-23% in this reach **(PLATE 19).**

This reach had mostly younger stage forest around it consisting of western hemlock *(Tsuga heterophylla),* red alder, vine maple, salmonberry and sword fern.

The stream flows through a 600mm diameter, CSP culvert, approximately 53m in length **(PLATE 20).**

The survey was terminated at the edge of the Highway 19 fill slope and property boundary. Here the highway culvert is substantially elevated above the channel bed, has no plunge pool and there is a 23% gradient, cobble-boulder cascade downstream of it. This culvert would be completely impassable to fish were fish to gain access into Stream 1 from the sea.

Stream 4– Reach 1

Like Stream 1, Stream 4 has a short (15 m), low gradient (4-12%) riffle upstream of the sea which would be technically fish accessible. Immediately upstream of this short section, the stream gradient rises dramatically within a 20 m long, 22-25% gradient, boulder cascade within which are multiple short vertical drops **(PLATE 21).** This cascade is impassable to fish.
Immediately upstream of the cascade the gradient drops to 3% and the stream bed sharply at its confluence with an off-channel pond **(PLATE 22).** Please see Section Stream 4 – Off-Channel Pond for description of this feature.

Upstream of the impounded pond the gradient reduces to 3% and a road crossing culvert (approximately 45 m long, 600 mm diameter CSP) has been installed **(PLATE 23).**

Immediately upstream of the road, Stream 4A flows to the left (west) bank of Stream 4.

Upstream of the stream crossing the stream channel has a bankfull channel width of 1.48 m **(PLATE 24).** The streambed consisted of cobble (10%), gravel (20%) and fines (70%).

Stream 4 becomes increasingly unconfined upstream of this confluence and the channel has a gradient of 3%. The stream consists of multiple, barely scoured braids through dense underbrush (Plate). While this is a very small stream these low gradient muddy braided flats are considered to represent potential floodplain and accordingly the high-water mark was delineated by the surveyor at the point on the landscape where there was sufficient topographic relief that flood waters and braiding could not migrate east or west of the delineated location. The braided conditions also results in an increase in the average channel width relative to its confined condition downstream and where the stream width was only 0.6-0.9 m in width.

Riparian vegetation consisted of western hemlock, big-leafed maple, red alder, salmonberry and sword fern.

Upstream from the confluence with Stream 4A, 91 m Stream 4B enters the left (west) bank of Stream 4.

Stream 4 – Reach 2

Upstream from the confluence with Stream 4B, 65 m the stream channel confines averaging 1.68 m wide and the average channel gradient rises to 8% (range 3-24%). Riparian vegetation is salmonberry with red alder and younger seral stage hemlock and cedar.

An old grown in logging road spur was observed crossing this reach in January 2019 and August 2020. This road was reactivated in the period of December to February 2022. The crossing is an approximately 600 mm diameter CSP. ESC measures have been implemented **(PLATE 25)**
The stream gradient rises increasingly as the survey approached Highway 19. The reach terminates at a stream crossing culvert beneath Highway 19. There is a 20 m long, 24% gradient cascade immediately downstream of this culvert.

Stream 4 – Off-channel Pond

A constructed off-channel pond/wetland was evident at the top of the aforementioned cascade. This pond is a 17 m long x 15 m wide off-channel feature that appears to have been an old water supply. It is now full of sand but is wetted in the winter and observed to be dry in the summer. The off-channel feature is well under 100 m in length, so would not constitute its own reach according to RAPR definitions, however for the purposes of SPEA determination this old partial diversion and impoundment of Stream 4 is treated as a wetland/pond. Secondly, red-legged frogs have been identified on the property and this species could use this pond for breeding and rearing purposes

Stream 4A

Stream 4A had an average bankfull width of 1.14 m and an average wetted width of 0.5 m. The streambed consisted of cobble (20%), gravel (30%) and fines (50%). The average stream gradient was 3% (range: 3-5%). This minor semi-confined tributary extends 40 m from the confluence with Stream 4 **(PLATE 25 and PLATE 26).**

This stream flows through 600mm diameter CSP culvert that is approximately 30m in length and connects to Stream 4.

Stream 4B

Stream 4B had an average bankfull width of 1.09 m and an average wetted width of 0.9 m. The streambed consisted of cobble (20%), gravel (30%) and fines (50%). The average stream gradient was 13% (range: 10-23%). The riparian area had a mixed forest canopy. Salmonberry and Sword Fern were also present in the shrub layer **(PLATE 27 and PLATE 28).**

The stream is crossed by a logging road that utilizes a 38 m long, 600mm diameter, CSP culvert **(PLATE 29).**

There was notable bank erosion in the upper 40 m of the stream channel, and a vertical escarpment of overhanging glacial deposits was evident **(PLATE 30 and PLATE 31).**

Upstream of this escarpment 5 m the stream channel was no longer visible on the surface of the forest floor, upstream, 15 m evidence of rafter debris and twig sorting was evident. A short distance upstream of this point, a stream crossing culvert beneath Highway 19 was evident. There was no discharge from the culvert at the time of our assessment; the low discharge seen in Stream 4B at the time of our assessment appeared to be solely from groundwater, not surface discharge.

Section 2. Results of Riparian Assessment (SPEA width)

Attach or insert the Form 3 or Form 4 assessment form(s). Use enough duplicates of the form to produce a complete riparian area assessment for the proposed development

2. Results of Detailed Riparian Assessment

Refer to Section 3 of Technical Manual

Date: 2022-05-18

Description of Water bodies involved (number, type)	Stream 1
Stream	X
Wetland	
Lake	
Ditch	
Number of reaches	2
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	2.1		4
upstream	1.0		13
	1.7		15
	1.4		
	1.4		22
downstream	1.6		25
	1.1		
	1.2		18
	1.4		
	1.5		13
	1.6		
Total: minus high /low	12.9		13
mean	1.43		13
	R/P	C/P	S/P
Channel Type			S/P

I, David Neufeld, 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 1127921 BC 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			Method employed if other than TR
	LC	SH	TR	
SPVT Type			TR	

Polygon No:				Method employed if other than TR
	LC	SH	TR	
SPVT Type				

Polygon No:				Method employed if other than TR
SPVT Type				

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)	10							
Litter fall and insect drop ZOS (m)	10							
Shade ZOS (m) max	10	South bank	Yes		No	X		
Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)	Not applicable						
Ditch Fish Bearing	Yes		No		If non-fish bearing insert no fish bearing status report			
SPEA maximum	**10**	(For ditch use table3-7)						

Segment No:	2	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	10	South bank	Yes		No	X		
SPEA maximum	**10**	(For ditch use table3-7)						

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Comments

2. Results of Detailed Riparian Assessment

Refer to Section 3 of Technical Manual

Date: 2022-05-18

Description of Water bodies involved (number, type)	Stream 1
Stream	X
Wetland	
Lake	
Ditch	
Number of reaches	2
Reach #	2

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	1.5	6
upstream	1.3	6
	1.6	3
	1.5	
	1.4	8
downstream	1.6	21
	1.4	8
	1.5	
	1.3	
	1.1	
	1.1	8
Total: minus high /low	12.6	6
mean	1.40	6
	R/P	S/P
Channel Type	C/P	C/P

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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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		LC	SH	TR	Method employed if other than TR
Polygon No:	1				
SPVT Type				TR	
Polygon No:					
SPVT Type					
Polygon No:					
SPVT Type					

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)	10							
Litter fall and insect drop ZOS (m)	10							
Shade ZOS (m) max	10	South bank	Yes	X	No			
Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)							
Ditch Fish Bearing	Yes		No		If non-fish bearing insert no fish bearing status report			
SPEA maximum		(For ditch use table3-7)						

Segment No:	2	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	10	South bank	Yes	X	No			
SPEA maximum	**10**	(For ditch use table3-7)						

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Comments

2. Results of Detailed Riparian Assessment

Refer to Section 3 of Technical Manual

Date: 2022-05-18

Description of Water bodies involved (number, type)	Stream 1A
Stream	X
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	1.1		4
upstream	1.6		
	1.0		
	1.2		
	0.9		
downstream	1.4		
	1.0		
	1.0		
	1.1		
	0.9		
	0.8		4
Total: minus high /low	9.6		
mean	1.07		4
	R/P	C/P	S/P
Channel Type	R/P		

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

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)	10							
Litter fall and insect drop ZOS (m)	10							
Shade ZOS (m) max	10	South bank	Yes	X	No			
Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)				Not applicable			
Ditch Fish Bearing	Yes		No		If non-fish bearing insert no fish bearing status report			

SPEA maximum	**10**	(For ditch use table3-7)

Segment No:	2	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	10	South bank	Yes	X	No		

SPEA maximum	**10**	(For ditch use table3-7)

I, David Neufeld, 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 1127921 BC 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.

Comments

2. Results of Detailed Riparian Assessment

Refer to Section 3 of Technical Manual

Date: 2022-05-18

Description of Water bodies involved (number, type)	Stream 3
Stream	
Wetland	X
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		
upstream		
downstream		
Total: minus high /low		
mean		0

	R/P	C/P	S/P
Channel Type	0		

I, David Neufeld, 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 1127921 BC 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

I, David Neufeld, 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 1127921 BC 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.

Polygon No:	1		
	LC	SH	TR
SPVT Type			X

Method employed if other than TR

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)				Not applicable		
Ditch Fish Bearing	Yes		No		If non-fish bearing insert no fish bearing status report		

SPEA maximum	**30**	(For ditch use table3-7)

Segment No:	2	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	0	South bank	Yes		No	X	

I, David Neufeld, 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 1127921 BC 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.

Comments

This anthropogenically constructed impoundment (a pond) is less than 100 m in length, but is classified as a wetland pond for RAPR ZOS and SPEA determination, since the functional characteristic of the fish habitat in the sub-reach are best met by treating the feature as a pond rather than a stream channel.

2. Results of Detailed Riparian Assessment

Refer to Section 3 of Technical Manual

Date: 2022-05-18

Description of Water bodies involved (number, type)	Stream 3
Stream	X
Wetland	
Lake	
Ditch	
Number of reaches	2
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	1.7		6
upstream	1.1		8
	2.1		4
	2.4		
	1.7		15
downstream	2.5		
	2.3		
	2.1		6
	1.9		
	1.9		8
	1.7		
Total: minus high /low	17.8		
mean	1.98		8
	R/P	C/P	S/P
Channel Type			S/P

I, David Neufeld (*name of qualified environmental professional*) , 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 1127921 BC 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

I, David Neufeld, 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 1127921 BC 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.

Polygon No:	1		
	LC	SH	TR
SPVT Type			TR

Method employed if other than TR

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)	10	

Litter fall and insect drop ZOS (m)	10						
Shade ZOS (m) max	10	South bank	Yes		No	X	
Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)				Not applicable		
Ditch Fish Bearing	Yes		No		If non-fish bearing insert no fish bearing status report		
SPEA maximum	**10**	(For ditch use table3-7)					

Segment No:	2	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	10	South bank	Yes		No	X	
SPEA maximum	**10**	(For ditch use table 3-7)					

I, David Neufeld, 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 1127921 BC 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.

Comments

2. Results of Detailed Riparian Assessment

Refer to Section 3 of Technical Manual

Date: 2022-05-18

Description of Water bodies involved (number, type)	Stream 3
Stream	X
Wetland	
Lake	
Ditch	
Number of reaches	2
Reach #	2

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	2.4	15
upstream	1.4	
	2.1	17
	2	15
	1.3	23
downstream	1.9	8
	1.2	
	1.7	
	1.6	15
	1.9	13
	1.4	
Total: minus high /low	15.3	
mean	1.70	15

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

I, David Neufeld; 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 1127921 BC 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

I, David Neufeld , 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 1127921 BC 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.

Polygon No:	1		
	LC	SH	TR
SPVT Type			X

Method employed if other than TR

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)	10
Litter fall and insect drop ZOS (m)	10

Shade ZOS (m) max	10	South bank	Yes		No	X	
Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)				Not applicable		
Ditch Fish Bearing	Yes		No		If non-fish bearing insert no fish bearing status report		
SPEA maximum	**10**	(For ditch use table3-7)					

Segment No:	2	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	10	South bank	Yes		No	X	
SPEA maximum	**10**	(For ditch use table3-7)					

I, David Neufeld , 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 1127921 BC 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.

Comments

2. Results of Detailed Riparian Assessment

Refer to Section 3 of Technical Manual

Date: 2022-05-18

Description of Water bodies involved (number, type)	Stream 4
Stream	X
Wetland	
Lake	
Ditch	
Number of reaches	2
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	1.3	3
upstream	1.2	
	3.0	3
	1.1	
	1.2	3
downstream	0.9	3
	1.3	
	1.3	24
	2.4	22
	2.0	
	1.5	6
Total: minus high /low	13.3	
mean	1.48	3

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

I, David Neufeld, 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 1127921 BC 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

I, David Neufeld, 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 1127921 BC 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.

Polygon No:	1		
	LC	SH	TR
SPVT Type			X

Method employed if other than TR

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)	10
Litter fall and insect drop ZOS (m)	10

Shade ZOS (m) max	10	South bank	Yes	X	No			
Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)				Not applicable			
Ditch Fish Bearing	Yes		No		If non-fish bearing insert no fish bearing status report			
SPEA maximum	**10**	(For ditch use table3-7)						

Segment No:	2	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	10	South bank	Yes	X	No			
SPEA maximum	**10**	(For ditch use table3-7)						

I, David Neufeld, 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 1127921 BC 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.

Comments

2. Results of Detailed Riparian Assessment

Refer to Section 3 of Technical Manual

Date: 2022-05-18

Description of Water bodies involved (number, type)	Stream 4 (POND)
Stream	X
Wetland	
Lake	
Ditch	
Number of reaches	2
Reach #	(POND)

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		0
upstream		
downstream		
Total: minus high /low		
mean		

I, David Neufeld, 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 Niclas Haglund;
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.

	R/P	C/P	S/P
Channel Type			

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

I, David Neufeld, 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 ;
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.

Polygon No:	1		
	LC	SH	TR
SPVT Type			X

Method employed if other than TR

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)				Not applicable			
Ditch Fish Bearing	Yes		No		If non-fish bearing insert no fish bearing status report			
SPEA maximum	**30**	(For ditch use table3-7)						

Segment No:	2	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	15	South bank	Yes	X	No	X		
SPEA maximum	**15**	(For ditch use table3-7)						

I, David Neufeld , 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 1127921 BC 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.

Comments

This anthropogenically constructed impoundment (a pond) is located in and adjacent to Stream 4 - Reach 1. It is less than 100 m in length. While it does not have the length to be a stand-alone reach per RAPR it is classified as a pond wetland for RAPR ZOS and SPEA determination, since the functional characteristic of the riparian habitat in the sub-reach are best met by treating the feature as a pond rather than a stream channel. Red-legged frog (Rana aurora) were also detected onsite and this feature may provide rearing/breeding habitat for that blue-listed species during the spring.

2. Results of Detailed Riparian Assessment

Refer to Section 3 of Technical Manual

Date: 2022-05-18

Description of Water bodies involved (number, type)	Stream 4
Stream	X
Wetland	
Lake	
Ditch	
Number of reaches	2
Reach #	2

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	1.3	8
upstream	3.2	24
	1.4	
	1.1	11
	3.2	
downstream	3.5	6
	1.7	
	0.9	
	1.1	4
	1.2	
	0.6	3
Total: minus high /low	15.1	
mean	1.68	8

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

I, David Neufeld, 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 1127921 BC 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

I, David Neufeld, 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 1127921 BC 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.

Polygon No:	1		
	LC	SH	TR
SPVT Type			X

Method employed if other than TR

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)	10
Litter fall and insect drop ZOS (m)	10

Shade ZOS (m) max	10	South bank	Yes	X	No			
Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)				Not applicable			
Ditch Fish Bearing	Yes		No		If non-fish bearing insert no fish bearing status report			
SPEA maximum	**10**	(For ditch use table 3-7)						

Segment No:	2	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	10	South bank	Yes	X	No			
SPEA maximum	**10**	(For ditch use table 3-7)						

I, David Neufeld, 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 1127921 BC 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.

Comments

2. Results of Detailed Riparian Assessment

Refer to Section 3 of Technical Manual

Date: 2022-05-18

Description of Water bodies involved (number, type)	Stream 4A
Stream	X
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	1.2		
upstream	1.3		5
	1.1		
	1.2		
	0.9		3
downstream	1.3		
	1.1		
	1.2		
	0.9		3
	1.1		
	1.2		
Total: minus high /low	10.3		
mean	1.14		3
	R/P	C/P	S/P
Channel Type	X		

I, David Neufeld, 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 1127921 BC 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

I, David Neufeld, 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 1127921 BC 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.

Polygon No:	1		
	LC	SH	TR
SPVT Type			X

Method employed if other than TR

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)	10
Litter fall and insect drop ZOS (m)	10

Shade ZOS (m) max	10	South bank	Yes	X	No		
Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)				Not applicable		
Ditch Fish Bearing	Yes		No		If non-fish bearing insert no fish bearing status report		
SPEA maximum	**10**	(For ditch use table 3-7)					

Segment No:	2	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	10	South bank	Yes	X	No		
SPEA maximum	**10**	(For ditch use table 3-7)					

I, David Neufeld, 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 1127921 BC 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.

Comments

2. Results of Detailed Riparian Assessment

Refer to Section 3 of Technical Manual

Date: 2022-05-18

Description of Water bodies involved (number, type)	Stream 4B
Stream	X
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	1.0	10
upstream	1.0	10
	1.2	17
	1.5	15
	1.0	
downstream	1.1	
	1.0	
	1.1	
	1	11
	1.0	
	1.2	14
Total: minus high /low	9.8	
mean	1.09	13

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

I, David Neufeld, 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 1127921 BC 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

I, David Neufeld, 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 1127921 BC 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.

Polygon No:	1		
	LC	SH	TR
SPVT Type			X

Method employed if other than TR

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)	10
Litter fall and insect drop ZOS (m)	10

Shade ZOS (m) max	10	South bank	Yes	X	No			
Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)				Not applicable			
Ditch Fish Bearing	Yes		No		If non-fish bearing insert no fish bearing status report			
SPEA maximum	**10**	(For ditch use table 3-7)						

Segment No:	2	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	10	South bank	Yes	X	No			
SPEA maximum	**10**	(For ditch use table 3-7)						

I, David Neufeld, hereby certify that:

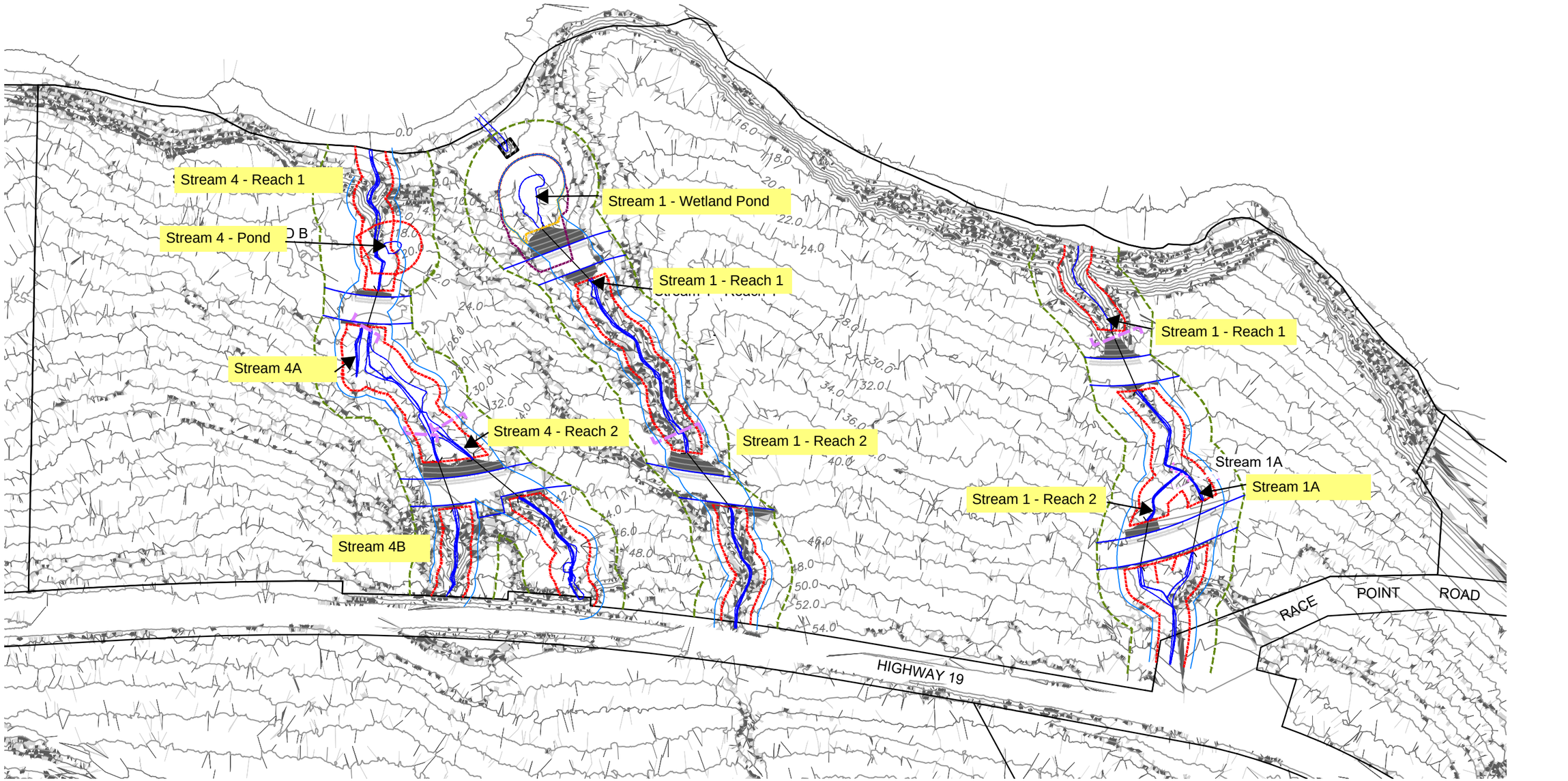
a) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;
b) I am qualified to carry out this part of the assessment of the development proposal made by the developer 1127921 BC Ltd;
c) I have carried out an 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.

Comments

Section 3. Site Plan

Insert jpg file below

MENZIES BAY



Legend:

- EXISTING GROUND CONTOURS
- CULVERTS
- 33.3% TO 40% SLOPE
- 40% TO 50% SLOPE
- STREAM HIGH-WATER MARK
- ZONE OF SENSITIVITY (LARGE WOODY DEBRIS, BANK AND CHANNEL STABILITY, LEAF LITTER, INSECT DROP)
- STREAM CENTERLINE
- 30.0 m RIPARIAN ASSESSMENT AREA (RAA)
- REACH BREAK
- SPEA ON WETLAND/PONDS
- RESTRICTIVE COVENANT BOUNDARY

G:\Projects\27000\27700\27770_Ripple_Rock_Engineering\02_CADD\20_Drafting\RAPR Figures\27770_Ripple Rock_RAPR_Figure.dwg

Ripple Rock Estates
1127921 B.C. Ltd.
Figure RAPR 1
RAPR and SPEA
May 2022

Section 4. Measures to Protect and Maintain the SPEA

This section is required for detailed assessments. Attach text or document files, as need, for each element discussed in Part 4 of the RAPR. It is suggested that documents be converted to PDF *before* inserting into the assessment report. Use your "return" button on your keyboard after each line. You must address and sign off each measure. If a specific measure is not being recommended a justification must be provided.

1. Danger Trees	
I, David Neufeld R.P.Bio., 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 1127921 BC Ltd; c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.	
2. Windthrow	The Site was logged by Owner using a logging contractor/logging road road-builder January to April 2022. This logging was done under the auspices of the *Private Managed Forest Land Act (PMFLA).* The site has a low windthrow risk due to the repeated site disturbance history due to repeated logging passes evident on historic air photographs. The last historic pass was circa 2000 and these disturbances extend back to the 1940s. Repeated logging entries expose trees to less uniform wind circulation patterns and reduce reliance on adjacent stands for wind firmness. The second consideration pertaining to windthrow management, would be it is unclear how windthrow were it to be an issue could be mitigated after a site and Riparian Assessment Area (RAA) has been logged per the PMFLA. There are no treatments recommended for windthrow mitigation.
I, David Neufeld, R.P.Bio., 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 1127921 BC Ltd; c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.	
3. Slope Stability	Most stream reaches have sideslopes within the RAA that are <33.3% gradient. However, Stream 1 Reach 1, Stream 3 - Reach 2, Stream 4 - Reach 1 and Stream 4B have sections of streams with slopes exceeding 40-50%. A geotechnical assessment of steep slopes within the RAA of these reaches was completed to determine risk of slope instability resulting from development which could affect SPEA. The geotechnical assessment (Ryzuk) indicated that the site would not be subject to large scale deeply seated instability, however, it is possible that small scale surficial instability could be experienced within the sloping areas of site. Ryzuk does not consider the development to impact the stability within the RAA provided the recommendations included in the May 7, 2021 Geotechnical Report are followed. All residence foundations must be setback behind a line projected up at 2H:1V (Horizontal:Vertical) from the

	base of any creek slope. Where used, in-ground disposal locations should be situated downslope of any residence, outside of SPEA and away from septic field areas, and at least 15 m back from the crest of any creek slope. Stormwater collection systems must be kept separate from foundation drainage systems. Suitable locations for stormwater disposal on each lot should be reviewed at the time of construction.
I, David Neufeld, 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 1127921 BC Ltd ; c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.	
4. Protection of Trees	Tree boles will be protected by the measures outlined for 'Encroachment', below. A root protection zone extending 3.5 m from the SPEA boundary will be applied to protect roots of existing trees that are adjacent to the 15-30 m SPEA around ponds. This will protect tree roots that cross the SPEA boundary into the development area. Elsewhere, on streams the fencing described below would adequately protect tree roots of trees that are in SPEA.
I, David Neufeld, 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 1127921 BC Ltd ; c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.	
5. Encroachment	There is a Restrictive Covenant (RC) registered on the property which precludes building construction within 15 m of the highwater mark of streams. This requirement exceeds those specified by the RAPR SPEA (10 m) for streams. Exceptions being the SPEA due south of Stream 3 Pond A and Stream 4 Off-channel Pond B. In these latter two locations the SPEA 30 m south of the high-water mark of these ponds. A 6 foot tall fence will be installed along the 15 m RC boundary, except south of the two ponds where the fence will be installed 30.3 m from the highwater mark of the ponds. Signage with specifications and design similar to that in Appendix I will be attached to the fencing at each individual lot, to prevent residents from going into the SPEA and dumping garden refuse into SPEA.
I, David Neufeld , 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 1127921 BC Ltd; c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.	

6. Sediment and Erosion Control	Since a Construction Phasing and Grading Plan has not yet been prepared for the RRED, a responsive erosion and sediment control plan has not yet been prepared for the project. The City of Campbell River has indicated that ESC Plans will need to be prepared for each phase of the development. Phased development will span the period of 2022 to 2030. The existing Restrictive Covenant (RC) establishes a 15 m no build zone, and that RC provides an additional 5 m buffer for protection of SPEA from sediment and erosion. To ensure protection of the SPEA, lot grading and landscaping will be done in such a manner that slopes are graded away from SPEA boundary, no erosion and sediment control facilities will be constructed within SPEA.

I, David Neufeld , 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 1127921 BC Ltd.;
c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.

7. Stormwater Management	No post-construction stormwater will be allowed to discharge to SPEA. The geotechnical report further indicates that there is to be no stormwater disposal at least 15 m back from the crest of any creek slope. This precludes stormwater disposal to SPEA. Stormwater systems and outfalls, where required, would capture and drain stormwater runoff to streams at road crossings or to ocean outside of SPEA. These outfalls would be installed per requirements of the provincial Water Sustainability Regulation. The discharge points to streams would not be in SPEAs. No other stormwater will be allowed to discharge to SPEAs.

I, David Neufeld, 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 1127921 BC Ltd;
c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.

8. Floodplain Concerns (highly mobile channel)	These are very small (<1.5 m), low discharge, first order to perhaps second order streams. These streams do not have floodplains that would affect SPEA. The assessor flagged highwater mark at locations where there was sufficient topographic change that would contain all peak storm discharge (even those discharges that may cause these very small first order streams to exceed their bankfull discharges for short periods). SPEA was measured beyond that HWM. No structures, roads, residences, or commercial buildings would be in a 'floodplain'.

I, David Neufeld , 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 1127921 BC Ltd;
c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.

Section 5. Environmental Monitoring

Attach text or document files explaining the monitoring regimen Use your "return" button on your keyboard after each line. It is suggested that all document be converted to PDF *before* inserting into the PDF version of the assessment report. Include actions required, monitoring schedule, communications plan, and requirement for a post development report.

The City will require the Owner to retain QEP to prepare an Environmental Management Plan (EMP) to provide guidance to the Owner, site foreman, and contractors regarding environmental obligations related to municipal, provincial, and federal environmental legislation that could apply to the site construction activities. This plan would be developed independently for the first phase and then updated for subsequent phases. The plan would cover the entire 8 year development build-out schedule.

To confirm that the Measures set out in this RAPR Detailed Assessment report are followed the following Environmental Monitoring inspections are required:

1) Pre-grubbing, grading site inspection to confirm installation of temporary or permanent fencing and signage along the 15 m Restrictive Covenant boundary to confirm Measures related to Encroachment and Protection of Trees.
2) Twice annual inspections to confirm integrity of SPEA with respect to Encroachment and Protection of Trees.
3) During the servicing work (installation of civil infrastructure) Environmental Monitoring to ensure the integrity of SPEA is maintained with respect to stormwater infrastructure and temporary ditching is managed to avoid creating putative ditches connecting to streams that may be subsequently subject to the RAPR.
4) Periodic monitoring throughout development build-out for the purposes of implementing requisite City requirements pertaining to erosion and sediment control planning, implementation and inspection. At this stage the City has not specified the frequency of Environmental Monitoring they will require for erosion and sediment control. It is anticipated that routine erosion and sediment control inspection would not be less than twice monthly, with additional inspections scheduled within 24 hours of Significant Rain Events (>24mm rain in 24 hours).
5) During any instream works permitted through Water Sustainability Act, Water Sustainability Regulation or Fisheries Act approvals, Notifications or Authorizations.

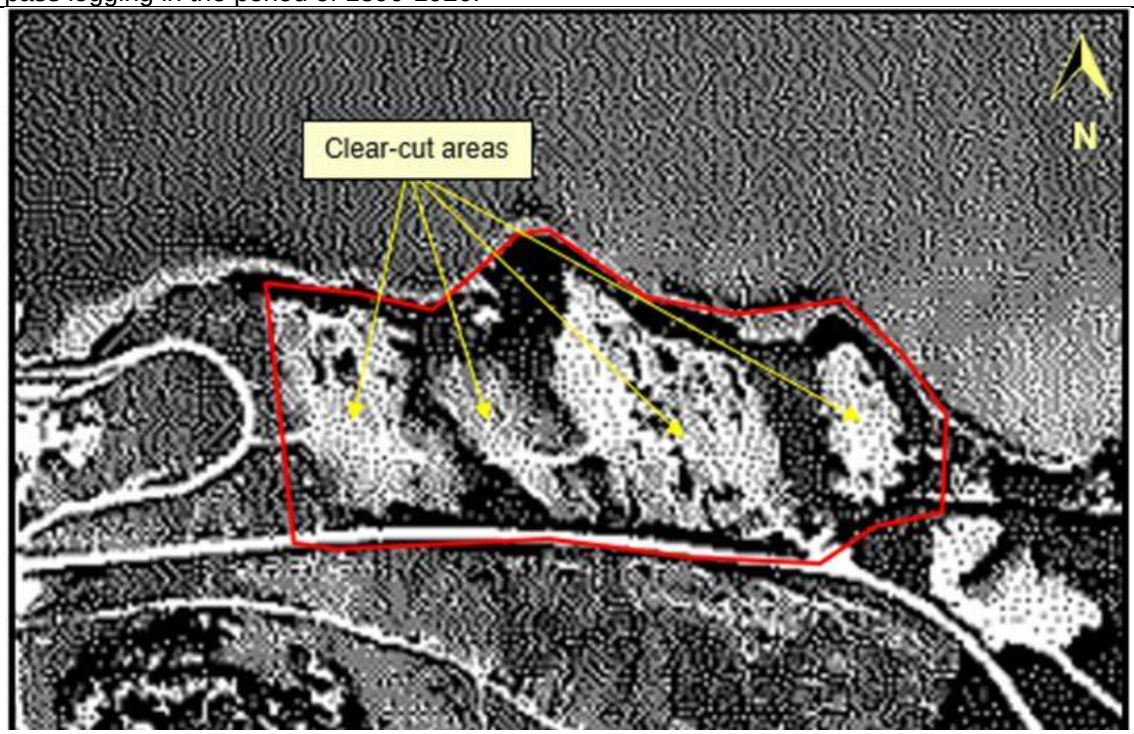
For all of the above-noted Environmental Monitoring requirements the QEP is required to issue both field inspection memoranda to the Person Directly In Charge (PDIC) of the onsite development activities, and summary reports are provided to 1127921 BC Ltd. Lastly, copies of the summary reports are provided to the agencies with jurisdiction.

Site vegetation clearing will not be required since all areas outside of SPEAs have been logged in the period of January – April 2022.

Section 6. Photos

Provide a description of what the photo is depicting, and where it is in relation to the site plan.

Photos

Label	Plate 1. There has been periodic logging of this site evident since the 1940's, with probably first pass logging in the period of 1890-1920.
	
Label	Plate 2. In December 2021, the Owner began logging the site again under the Private Managed Forest Act. (Drone photograph from May 8, 2022)
	

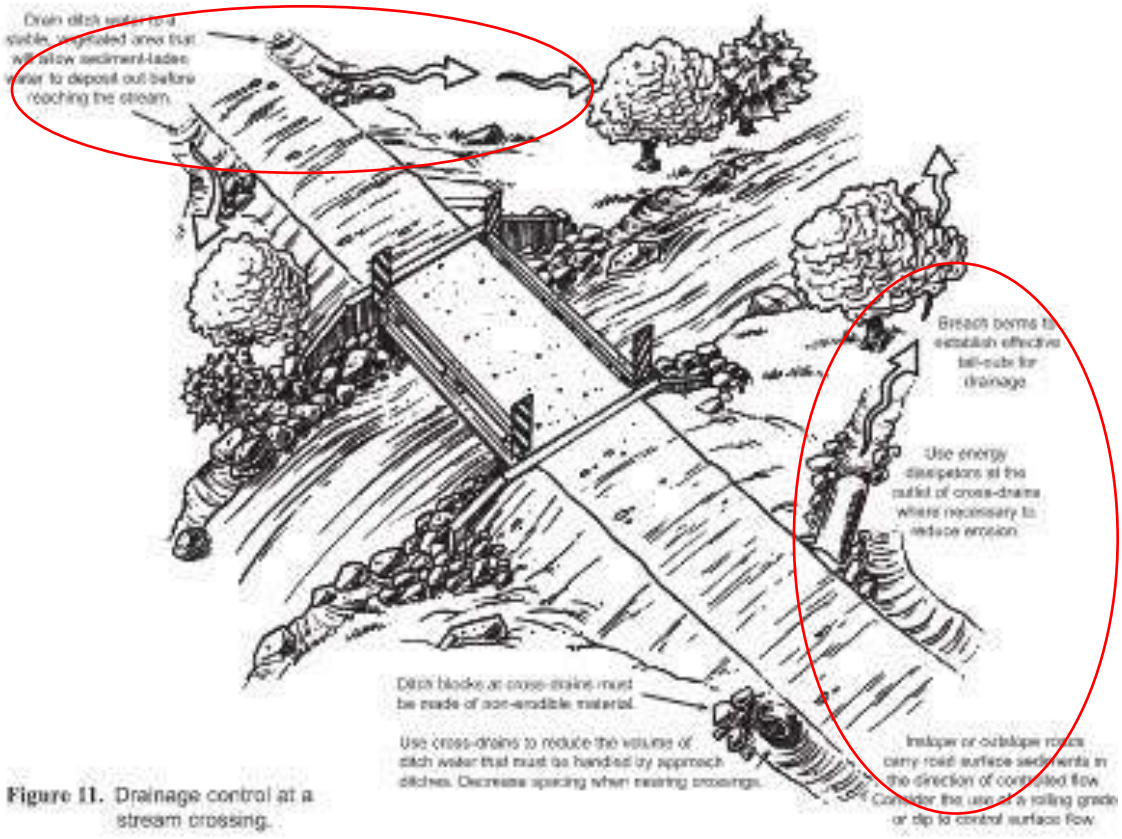
Label	Plate 3. Best management practice for addressing roadside drainage to avoid ditch connectivity to fish habitat (Source Fish Stream Crossing Guidebook)
	

Figure 11. Drainage control at a stream crossing.

Plate 4. Representative photograph of Stream 1 – Reach 1 at tidewater

Plate 5. View from top of 22-25% steep cascade to tidewater in Stream 1 – Reach 1.Plate 2.

Plate 6. Representative photograph in Stream 1 - Reach 1. Note recent logging in background of the photograph (April 2022)

Plate 7. Logging road crossing using a corrugated steel pipe. Note ESC measures (straw and coastal reclamation seed mix) Stream 1 – Reach 1. (April 2022)

Label	Plate 8. Representative photograph within Stream 1 – Reach 2 (January 2019)
	
Label	Plate 9. Representative photograph in Stream 1 – Reach 2 (April 2022).
	

Label	Plate 10. Logging Road Crossing culvert inlet Stream 1 - Reach 2
	

Label	Plate 11. Representative photograph of Stream 1A
	
Label	Plate 12. Representative photograph of Stream 1A Stream Crossing, at new logging road.
	

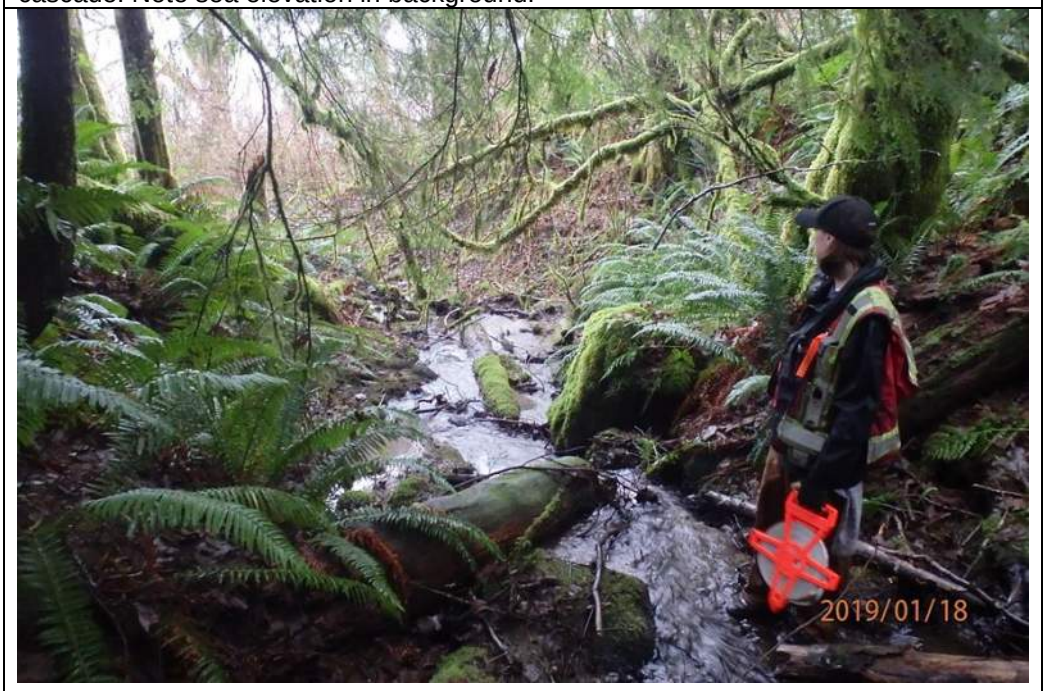
Label	Plate 13. Anthropogenic barriers in Stream 3 – Reach 1
	
Label	Plate 14. Representative photograph of Stream 3 – Pond A
	

Label	Plate 15. Representative photograph showing impounded sub-reach of Stream 1 (Pond A).
	
Label	Plate 16. Representative photograph Stream 1 – Reach 1
	

Label	Plate 17. Riparian condition Stream 1 – Reach 1 (April 2022).
	
Label	Plate 18. Logging access crossing and ESC Measures in Stream 3 - Reach 1.
	

Label	Plate 19. Representative photograph Stream 3 Reach 2 (January 2019).
	
Label	Plate 20. Stream 3 Reach 2 Stream crossing outlet with CSP and ESC placement.
	

Label	Plate 21. Stream 4. Downstream view from top of 20 m long 22-25% boulder, cobble cascade. Note sea elevation in background.



Label	Plate 22. Stream 4 – Pond B

Label	Plate 22. Stream 4 – Reach 1, showing outlet of forest access road. Note CSP culvert and ESC measures.
	
Label	Plate 23. Unconfined sections within Stream 4 – Reach 2
	

Label	Plate 24. Stream 4 Reach 2 Stream Crossing with CSP and ESC Measures
	
Label	Plate 25. Representative photograph Stream 4A
	

Label	Plate 26. Representative photograph within Stream 4A (April 2022)
	
Label	Plate 27. Representative photograph with Stream 4B (January 2019)
	

Label	Plate 28. Representative photograph within Stream 4B (April 2022)
	
Label	Plate 29. Stream 4B crossing, dowmstream view (note ESC Measures) (April 2022)
	

Label	Plate 30. Stream 4B; view of sandy eroding ravine (January 2019)
	
Label	Plate 31. Stream 4B view of same ravine (August 2020)
	

Section 7. Professional Opinion

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

Date 2022-05-18

1. I, David Neufeld

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, 1127921 BC 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) [ ] 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.

[NOTE: "Qualified Environmental Professional" means an individual as described in section 21 of the Riparian Areas Protection Regulation.]