CITY OF COLWOOD



3300 Wishart Road | Colwood | BC V9C 1R1 | 250 294-8153 planning@colwood.ca | www.colwood.ca

File: DP-20-032A

DEVELOPMENT PERMIT DP-20-032A

THIS PERMIT, issued September 4, 2022 is

ISSUED BY: CITY OF COLWOOD, a municipality incorporated under the Local Government Act,

3300 Wishart Road, Victoria, BC, V9C 1R1

(the "City")

PURSUANT TO: Section 490 of the Local Government Act , RSBC 2015, Chapter 1

ISSUED TO: BC Alta Development Ltd. 47 Elmont Drive SW

Calgary, AB T3H 4X8 (the "Permittee")

 This development permit is for the construction of four apartment buildings in lands designated within the Environmental – Riparian, Hillside and Natural Hazards and the Form and Character – Neighbourhood Hillside and Shoreline Development Permit Areas, applies to the lands described below, and any and all buildings, structures, and other development thereon:

The Northerly 5 Chains of Section 62, Esquimalt District, Except the Westerly 200 Feet and Except Part in Plans 36847, VIP74552, EPP52719, EPP63642 AND EPP79654 (the "Lands")

- This Development Permit regulates the development of the Lands, supplements
 the "Colwood Land Use Bylaw, 1989" (Bylaw No. 151), and amends and replaces DP-20-032 in its
 entirety for the purposes of environmental and form and character considerations of four
 apartment buildings consisting of 280 apartment dwelling units and associated
 site improvements, to be constructed on the Lands consistent with the guidelines contained within
 the City of Colwood Official Community Plan (Bylaw No. 1700).
- This Development Permit is NOT a Building Permit or a subdivision approval.
- This Development Permit is issued subject to compliance with all of the bylaws of the City of Colwood that apply to the development of the Lands, except as specifically supplemented by Council or supplemented by this Permit.
- 5. The Director of Development Services or their delegate may approve minor variations to the

- schedules attached to and forming part of this Development Permit, provided that such minor variations are consistent with the overall intent of the original plans and do not alter the form and character of the development authorized by those plans.
- 6. If the Permittee does not substantially start the construction permitted by this Permit within 24 months of the date of this Permit, the Permit shall lapse and be of no further force and effect.
- 7. The development is to be constructed in accordance with the following plans and specifications, which are attached to and form part of this permit:
 - Schedule 1 Architectural Drawings prepared by MJM Architect Inc., dated June 30, 2022

 Schedule 2 Landscape Plan prepared by ForSite Landscape Architecture, BCLSA dated

 December 9, 2021
 - Schedule 3 Riparian Areas Protection Regulation Assessment prepared by Aqua-Tex, dated April 16, 2021
 - Schedule 4 Riparian Alternative Approval Assessment Report prepared by Aqua-Tex, dated May 13, 2021
 - Schedule 5 Hillside Ecological Assessment and Habitat Assessment prepared by Aqua-Tex, dated May 11, 2021
 - Schedule 6 Memo to Provide More Information prepared by Aqua-Tex, dated October 10, 2021
 - Schedule 7 Restoration Works Cost Estimate for Areas 1 and 3-7 prepared by ForSite Architecture, dated August 3, 2022
 - Schedule 8 Tree Management Plan prepared by Talbot, Mackenzie and Associates, dated May 13, 2021
 - **Schedule 9** Stormwater Management Plan prepared by Islander Engineering, dated April 22, 2021
 - Schedule 10 Geotechnical Memo prepared by Ryzuk Geotechnical Engineering, dated May 6, 2021
- 8. Notwithstanding the conditions of this Permit, development of the subject property must meet all requirements contained within the Section 219 covenant registered as CA9955358 (Development Agreement).
- 9. This Development Permit authorizes the construction of four residential apartment buildings consisting of 280 units along with any associated site works. The Lands shall not be altered, nor any buildings or structures constructed, except in accordance with the following conditions:

GENERAL CONDITIONS

Fire and Life Safety

- 9.1. Prior to the issuance of a building permit, a Fire Underwriters Survey (FUS) fire flow calculation shall be provided and approved by the City of Colwood's Fire Department and shall meet the requirements of FUS based on the proposed building size, construction type, and applicable exposures.
 - 9.1.1. The FUS calculation must provide a comparison to the physical testing of existing water infrastructure to ensure that an adequate water supply is available for fire protection based on the proposed building size, construction type, occupancy, and applicable exposures.

- 9.1.2. All parameters of the calculations must be clearly outlined through a diagram which includes the site layout, building size(s), calculated exposure distances, number of fire hydrants (with distances), and fire hydrant flow data/graph (if applicable). Fire department review and approval will be required.
- 9.2. Prior to the issuance of a building permit, plans shall be provided and approved by the City of Colwood's Fire Department that demonstrates that:
 - 9.2.1. All fire truck access points will be engineered to meet the point and weight loading requirements for Colwood Fire Department's fire apparatuses, including the bridge access and the areas above the underground parking.
 - 9.2.2. A parking security gate override switch will be installed at each entrance to the secured parking to the specification of the Colwood Fire Department.

FORM AND CHARACTER CONDITIONS

Building Features

- 9.3. Any future additions of telecommunications antennas or equipment to the exterior of the buildings and/or structures included in this Permit shall be architecturally integrated into the buildings and/or structures they are mounted on or screened from views so as not to be visually obtrusive, to the satisfaction of the Director of Development Services or their delegate.
- 9.4. No future construction/installation of unenclosed or enclosed outdoor storage areas, and recycling/refuse collection and storage areas shall be undertaken without the issuance of a further Development Permit or amendment to this Permit.
- 9.5. All mechanical roof elements, including mechanical equipment, elevator housings, and vents shall be visually screened with sloped roofs or parapets, or other forms of solid screening to the satisfaction of the Director of Development Services or their delegate.

Signage

- 9.6. If any signage is required, the Permittee shall amend this Development Permit and provide a signage plan for the review and approval of the Development Services Department demonstrating that the proposed signage complies with the guidelines contained in the Official Community Plan (Bylaw No. 1700).
- 9.7. Signage indicating "No Parking Fire Lane" must be provided at all firetruck staging areas (as indicated in Schedule 1).

Landscaping

- 9.8. The design and construction of the proposed landscaping shall be in substantial compliance with the attached plans and details:
 - 9.8.1. Landscape Plan prepared by ForSite Landscape Architecture (Schedule 2).
- 9.9. Prior to the issuance of a building permit, the Permittee shall provide a security deposit in the amount of 110% of the estimated cost to install the landscaping works in accordance with Schedule 2.
 - 9.9.1. As part of their building permit application, the Permittee shall provide a detailed and itemized cost estimate for any landscaping works that are not captured within the restoration works (Areas 1-8 as shown in Schedule 2). The cost estimate must include the

- full cost of installing irrigation and hard and soft landscaping.
- 9.9.2. This amount, or a portion thereof, shall be returned upon receipt of a signed statement of partial or substantial completion from a registered landscape architect, to the satisfaction of the Director of Development Services or their delegate.

ENVIRONMENTAL CONDITIONS

General

9.10. Where required, Federal and Provincial environmental approvals shall be obtained prior to any works occurring on the Lands.

Habitat Restoration and Enhancement Areas

- 9.11. The design and construction of the proposed restoration works shall generally comply with the attached plans and details:
 - 9.11.1. Landscape Plan, prepared by ForSite Architecture (Schedule 2), specifically the details provided for Restoration Areas 1, 3, 4, 5, 6 and 7.
- 9.12. The recommendations, mitigation measures, and best practices outlined in the Riparian Areas Protection Regulation Assessment (Schedule 3), Riparian Alternative Approval Assessment Report (Schedule 4), the Hillside Ecological and Habitat Assessment (Schedule 5), and the Memo prepared by Aqua-tex dated October 10th, 2021 (Schedule 6) must be adhered to.
- 9.13. Under the supervision of a Qualified Environmental Professional, the Permittee shall install appropriate fencing along the Streamside Protection and Enhancement Area prior to any site modification.
- 9.14. Prior to the issuance of a building permit, an environmental security deposit in the amount of 110% of the cost estimates provided in Schedule 7 (Restoration Areas 1, 3, 4, 5, 6 and 7) must be submitted by the Permittee to the City of Colwood. The amount of security to be remitted is: \$68,860.00 (which is calculated as \$62,600 * 110%).
 - 9.14.1. The environmental security deposit will be returned no sooner than two years from the date that the restoration works are completed. For clarity, the completion date will be determined as the date which the City of Colwood receives written confirmation from the project's Qualified Environmental Professional that the restoration works have been installed in accordance with the recommendations in Schedules 3-6.
 - 9.14.2. The environmental security deposit will be released upon receipt of a satisfactory final inspection report prepared by the project's Qualified Environmental Professional that confirms that the restoration works have been successfully established and remain in place.

Tree Management and Compensation

- 9.15. The Permittee shall retain a Qualified Arborist to oversee the removal of protected trees and ensure compliance with the recommendations in the Tree Management Plan (Schedule 8).
- 9.16. The recommendations, mitigation measures, and best practices outlined in the Riparian Areas Protection Regulation Assessment (Schedule 3), the Riparian Alternative Approval Assessment Report (Schedule 4) and the Tree Management Plan (Schedule 8) must be adhered to.

9.17. Under the supervision of a Qualified Arborist, the Permittee shall install appropriate fencing and signage along the tree protection zones prior to any site modification and in accordance with the measures to protect trees in the SPEA as described in Schedules 3 and 4.

Environmental Monitoring and Reporting

- 9.18. The Permittee shall retain a Qualified Environmental Professional to oversee and monitor construction activities and prevent any unforeseen impacts to the riparian areas identified in Schedule 3 and Schedule 4.
- 9.19. The Qualified Environmental Professional shall, to the satisfaction of the Director of Development Services or their delegate, provide monthly documentation in writing to the City attesting that construction and restoration works are in accordance with the terms of this permit.
- 9.20. Upon completion of the restoration works, the project's Qualified Environmental Professional must submit to the City written notice and photographs of the works confirming that the restoration works have been planted in accordance with this permit.

Stormwater Management

- 9.21. Stormwater management and erosion and sediment control shall be conducted in accordance with the Stormwater Management Plan (Schedule 9) and must be approved by the City's Engineering department prior to the issuance of a Building Permit.
- 9.22. No sediment laden water shall be discharged into any aquatic receiving environment and no untreated excess stormwater is to be discharged to Latoria Northeast Creek. Stormwater from the site shall in no way be impacted by storm systems or overland flow-routes.

Grading

- 9.23. All grading works shall be completed in accordance with the plans and recommendations contained in the Geotechnical Memo (Schedule 10) prepared by Ryzuk Geotechnical.
- 9.24. The grading works and construction of all fill, retaining structures and slopes over 30 degrees must be certified and completed under the guidance and approval of the Geotechnical Engineer.

9.25. This permit does not authorize any blasting on the site.

ISSUED ON THIS '

DAY OF SEPTEMBER 2022.

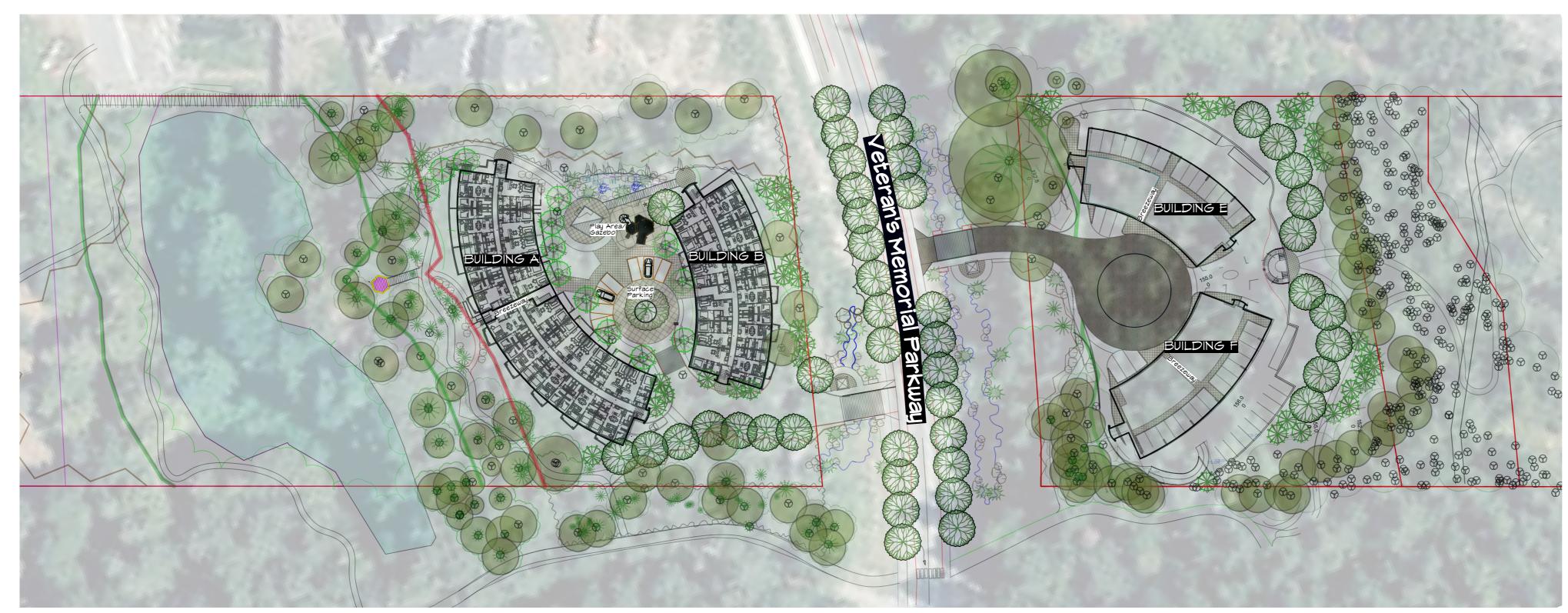
R**W**BERT E∕ARL

CHIEF ADMINISTRATIVE OFFICER

SCHEDULE 1, ARCHITECTURAL DRAWINGS

PERMIT RESUBMISSION APPLICATION

Resubmitted June 30th., 2022



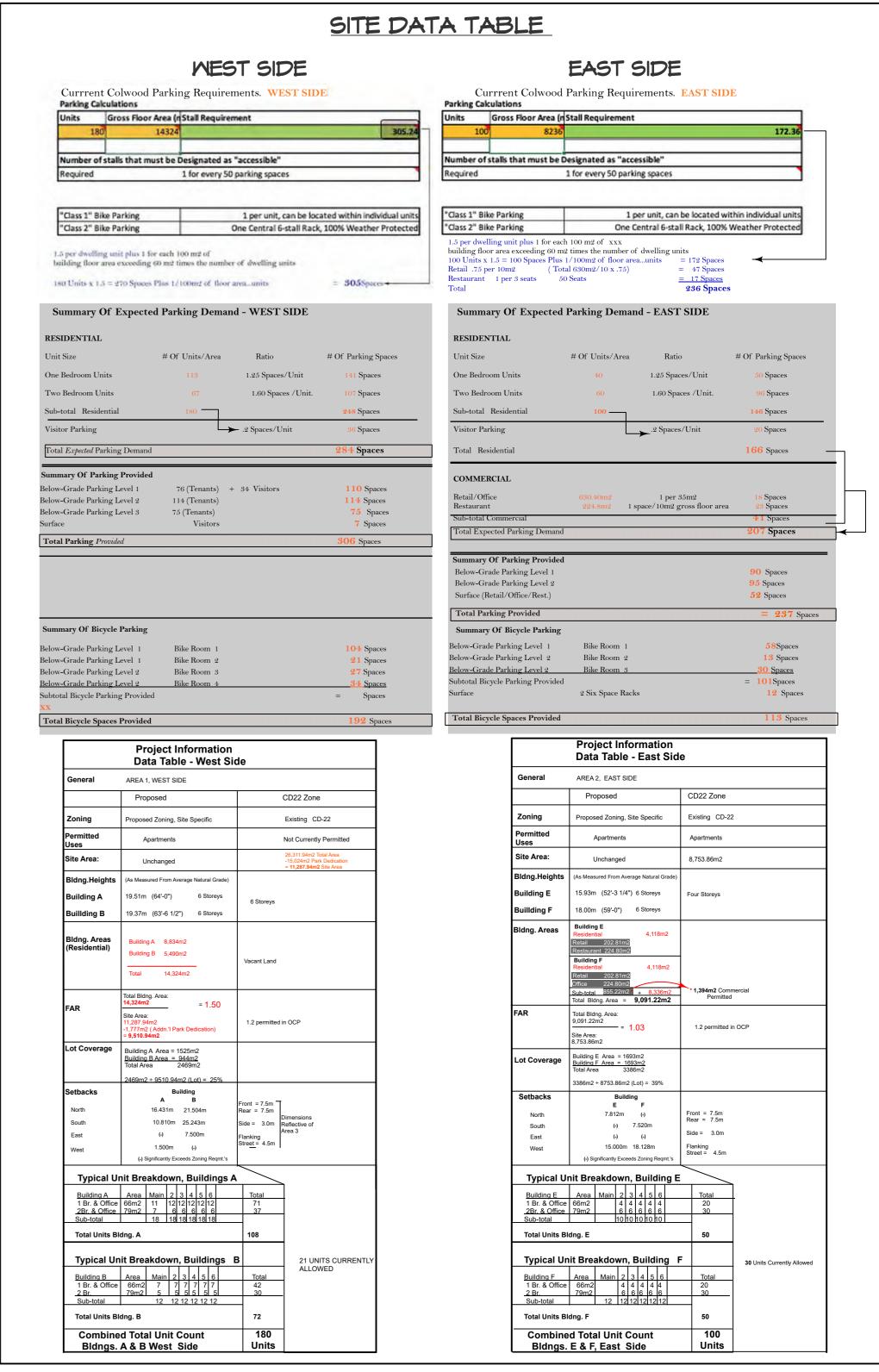
Mest Side Development

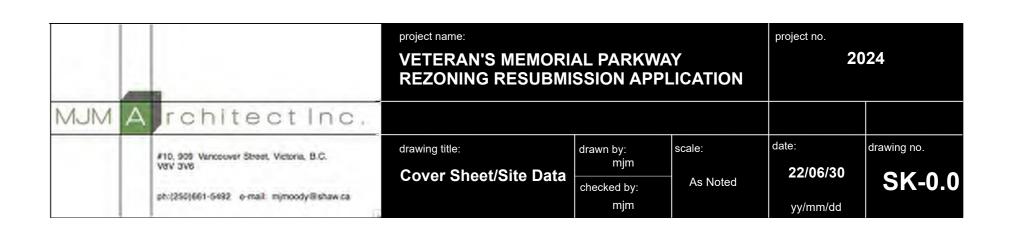
East Side Development











NOTE: All parking must comply with and meet the design and layout requirements as specified in Section 3.6 of the Colwood Off-street Parking Bylaw (Bylaw No. 1909)

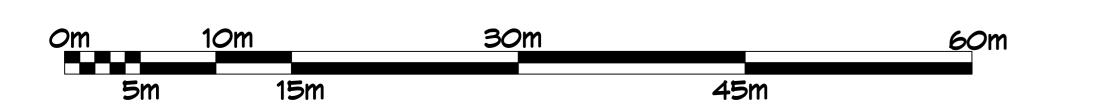


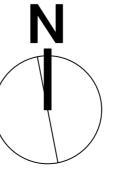
Key Reference Plan Scale - 1:1500

Building 'E' Average Grade Calcaulation						
GP-1	112.45m					
GP-2	114.64m					
GP-3	123.65m					
<u>GP-4</u>	118.58m					
Total	469.33					
469.32 ÷ 4	= 117.33m (ANG)					

Building 'F' Average Grade Calcaulation							
GP-5	110.92m						
GP-6	118.00m						
GP-7	122.57m						
<u>GP-8</u>	110.98m						
Total 471.14 ÷ 4 =	462.47 115.62m (ANG)						

Note: Contour Indicated At 3.00m Intervals

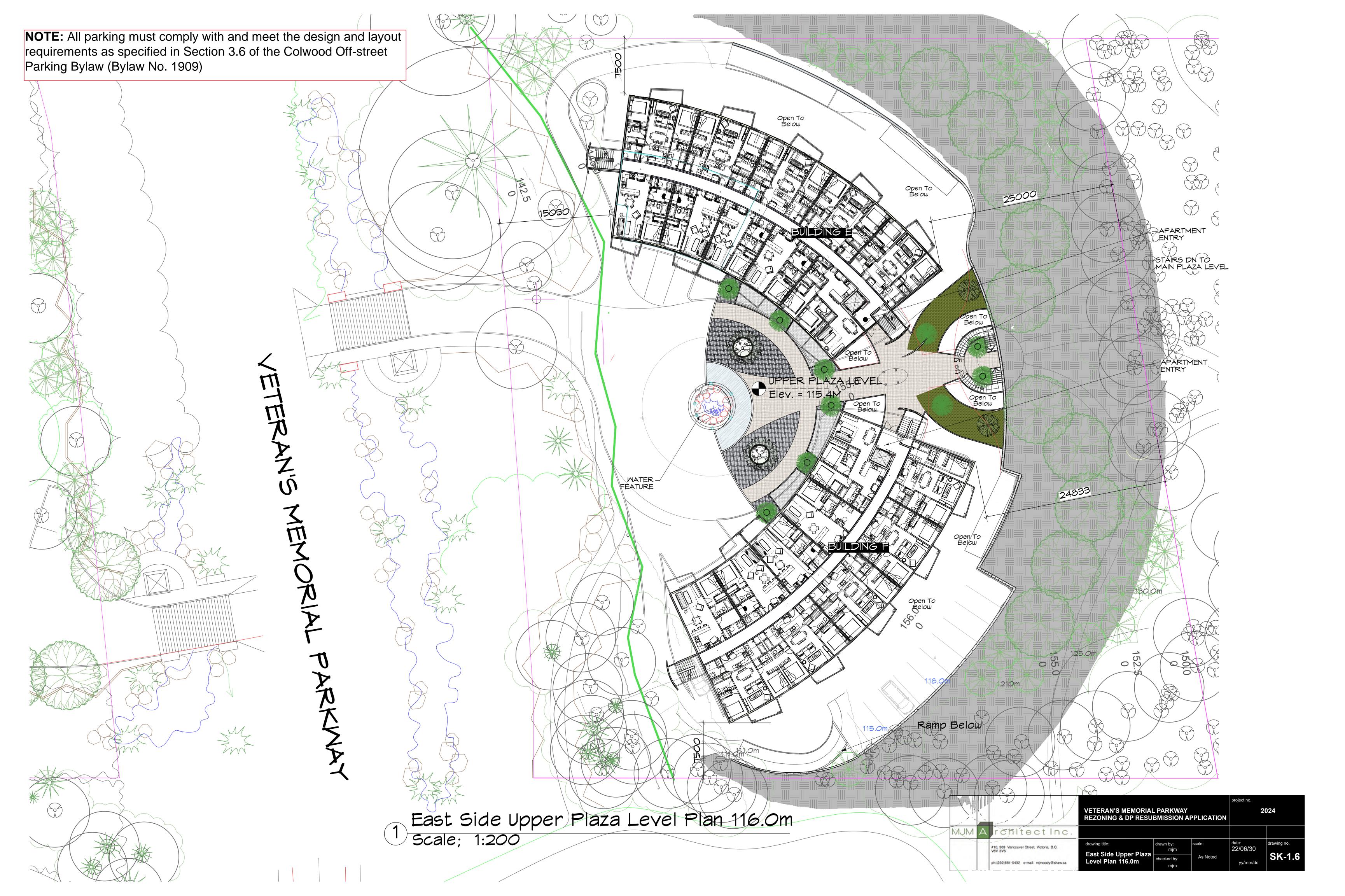




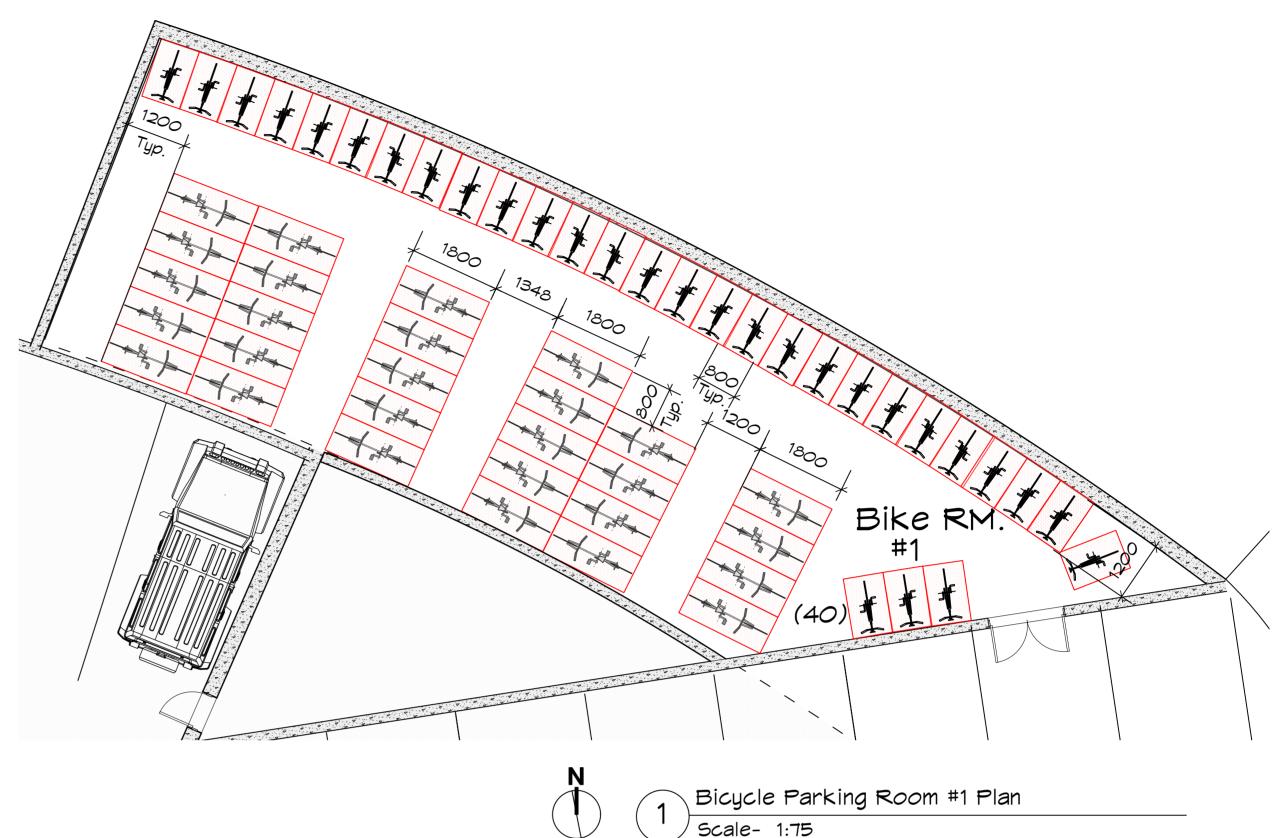
East Side Site Plan

Scale - 1:250

			project name:			project no.	
			VETERAN'S MEMORIA REZONING & DP RESU	2024			
MLN	А	rchitect Inc.					
		#10, 909 Vancouver Street, Victoria, B.C.	drawing title:	drawn by:	scale:	date:	drawing no.
		AaA aAe	East Side Site Plan	mjm checked by:	As Noted	22/06/30	SK-1.2
	ph:(250)661-5492 e-mail: mjmoody@shaw.ca		mjm		yy/mm/dd		

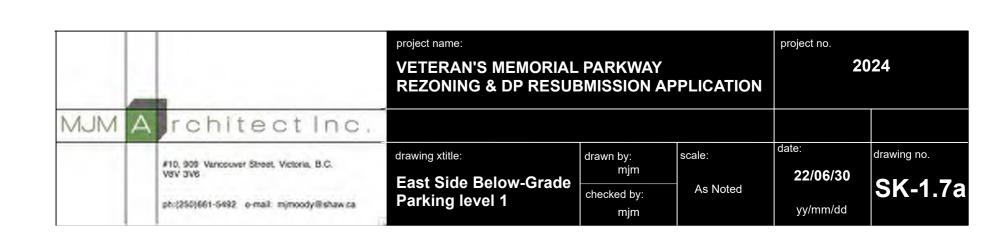


NOTE: All parking must comply with and meet the design and layout requirements as specified in Section 3.6 of the Colwood Off-street Parking Bylaw (Bylaw No. 1909) Outline Of -Building E Above ELECTRICAL East Side Below-Grade Parking Plan-Level 1 Total Parking Spaces = 90

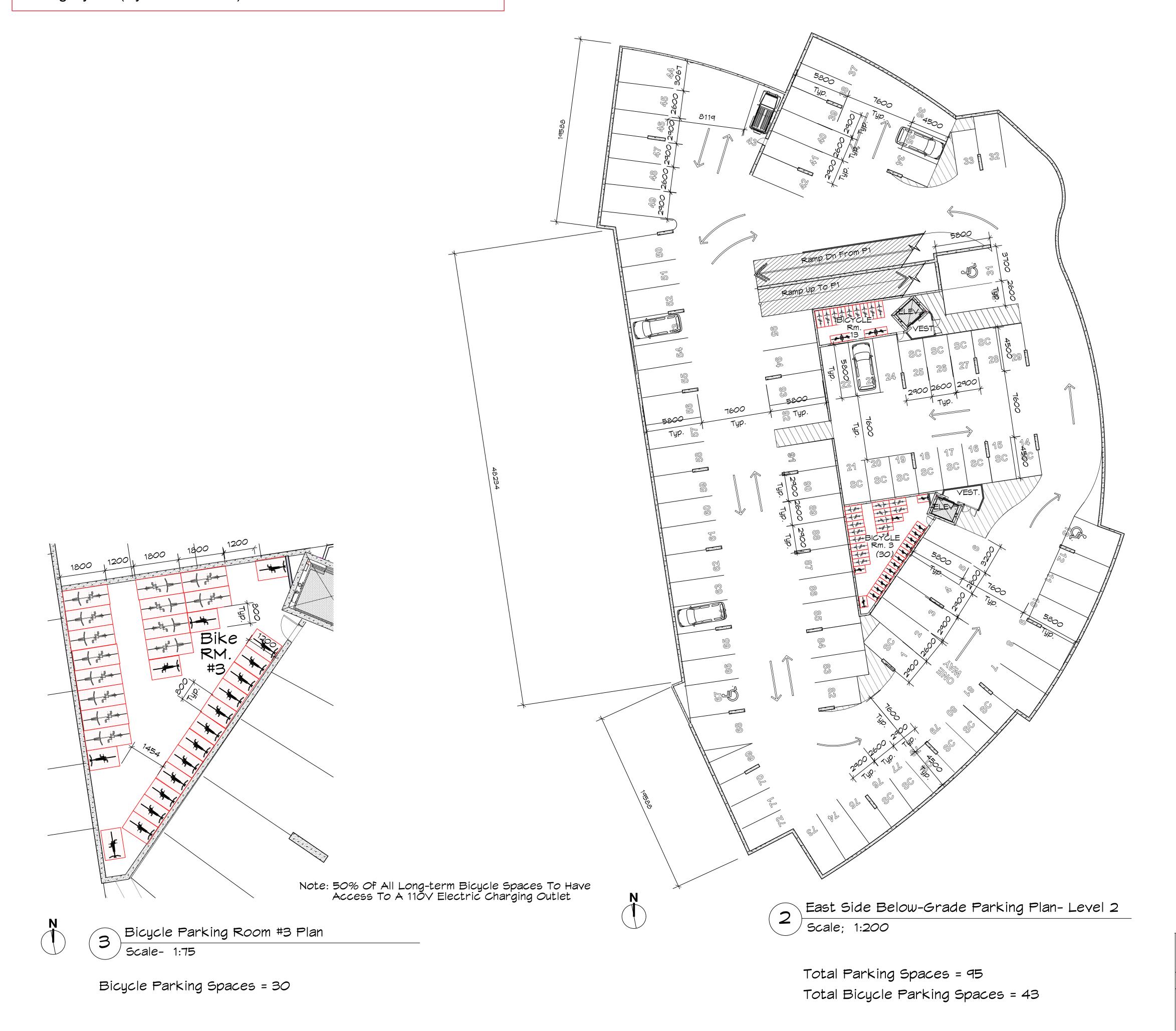


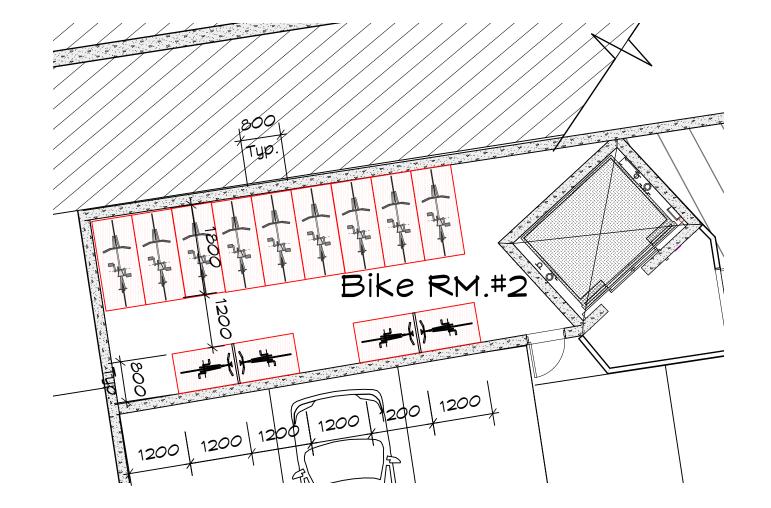
Note: 50% Of All Long-term Bicycle Parking Spaces To Have Access To A 110V Electric Charging Station

Bicycle Parking Spaces = 58



NOTE: All parking must comply with and meet the design and layout requirements as specified in Section 3.6 of the Colwood Off-street Parking Bylaw (Bylaw No. 1909)



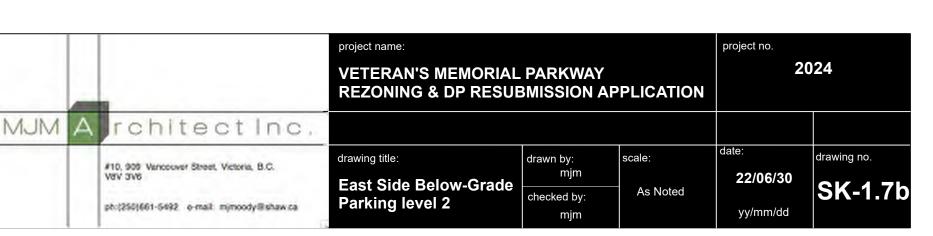


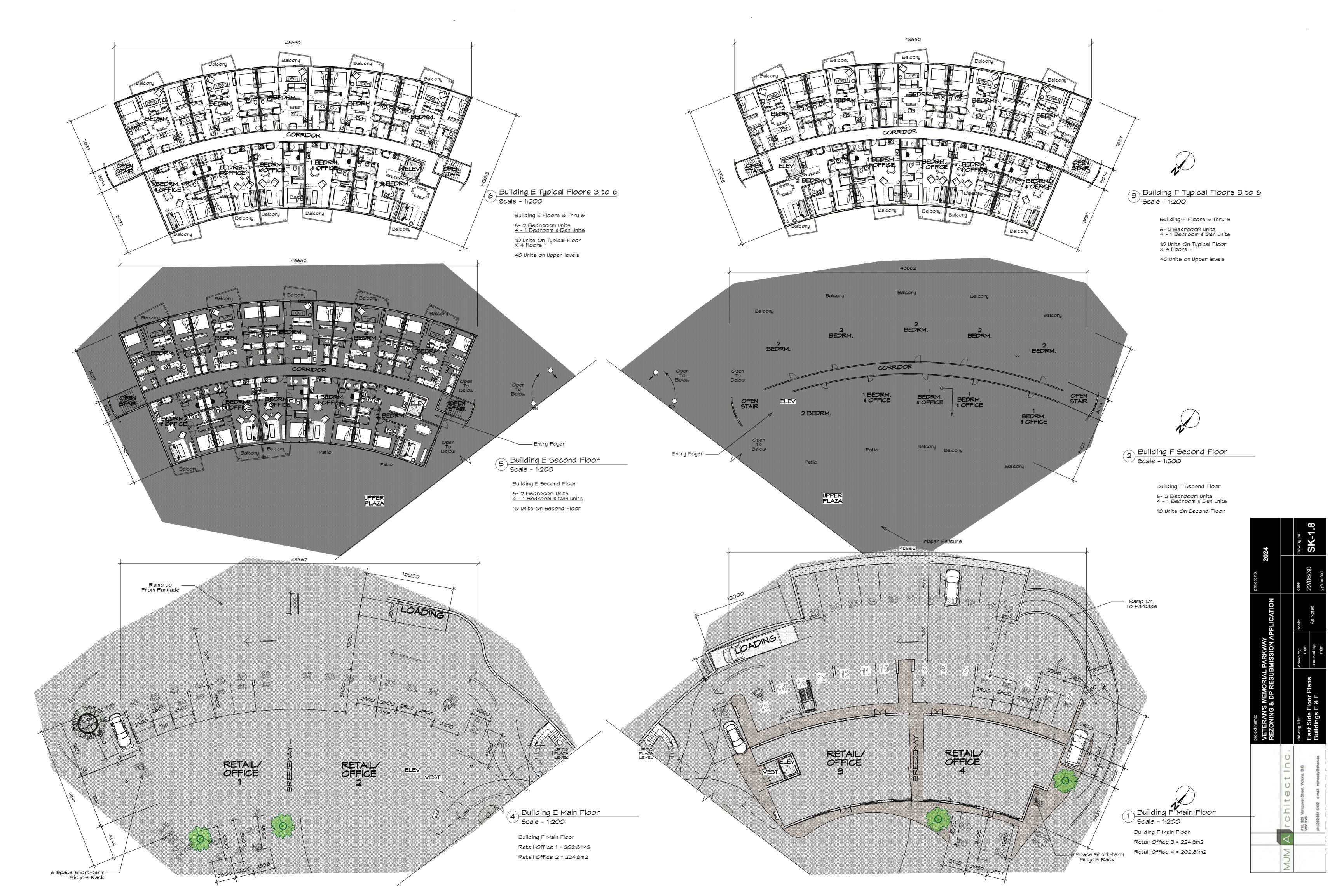


1 Bicycle Parking Room #2 Plan Scale- 1:75

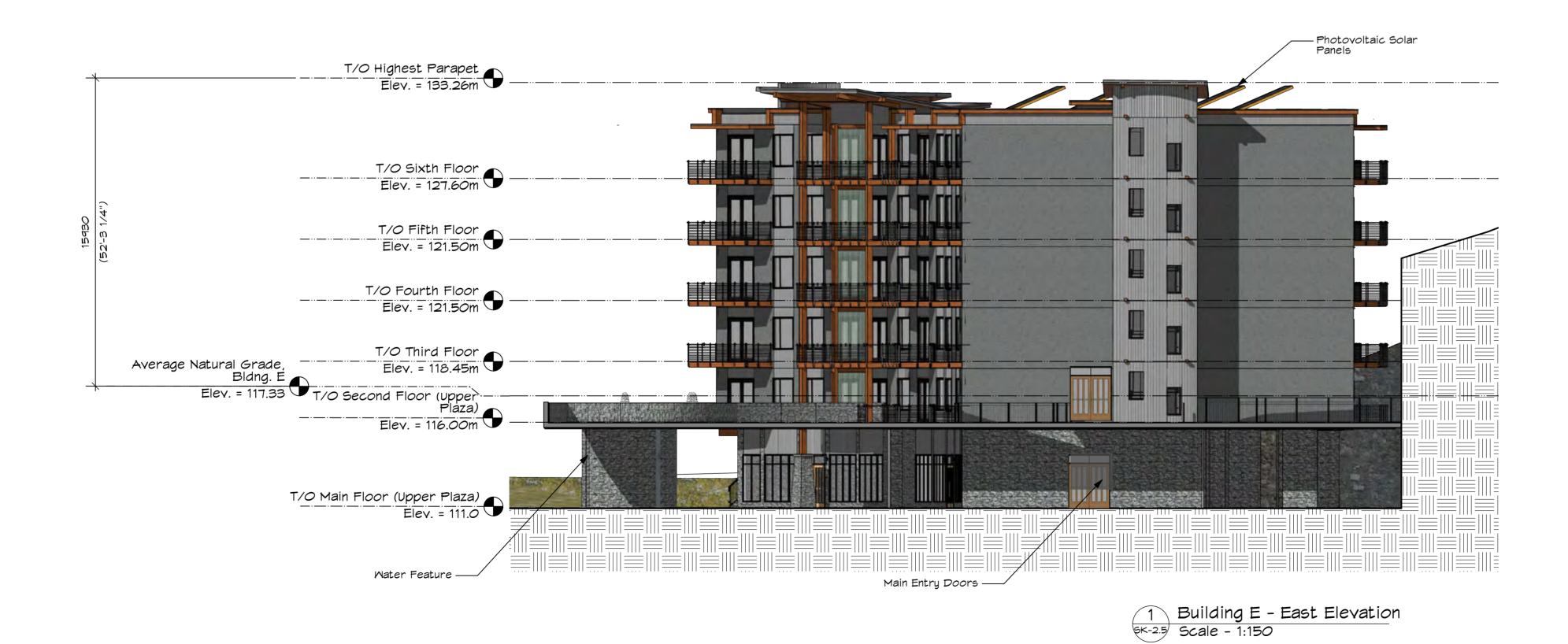
Bicycle Parking Spaces = 13

Note: 50% Of All Long-term Bicycle Spaces To Have Access To A 110Y Electric Charging Outlet





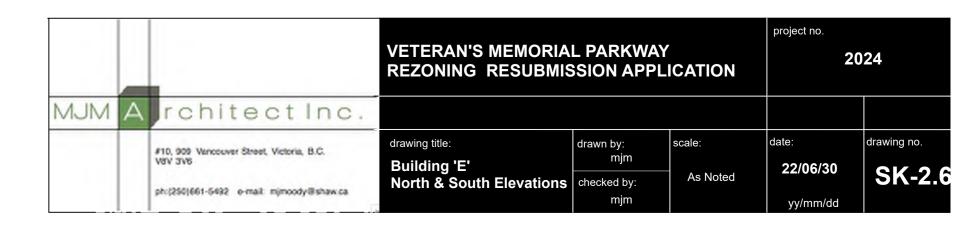


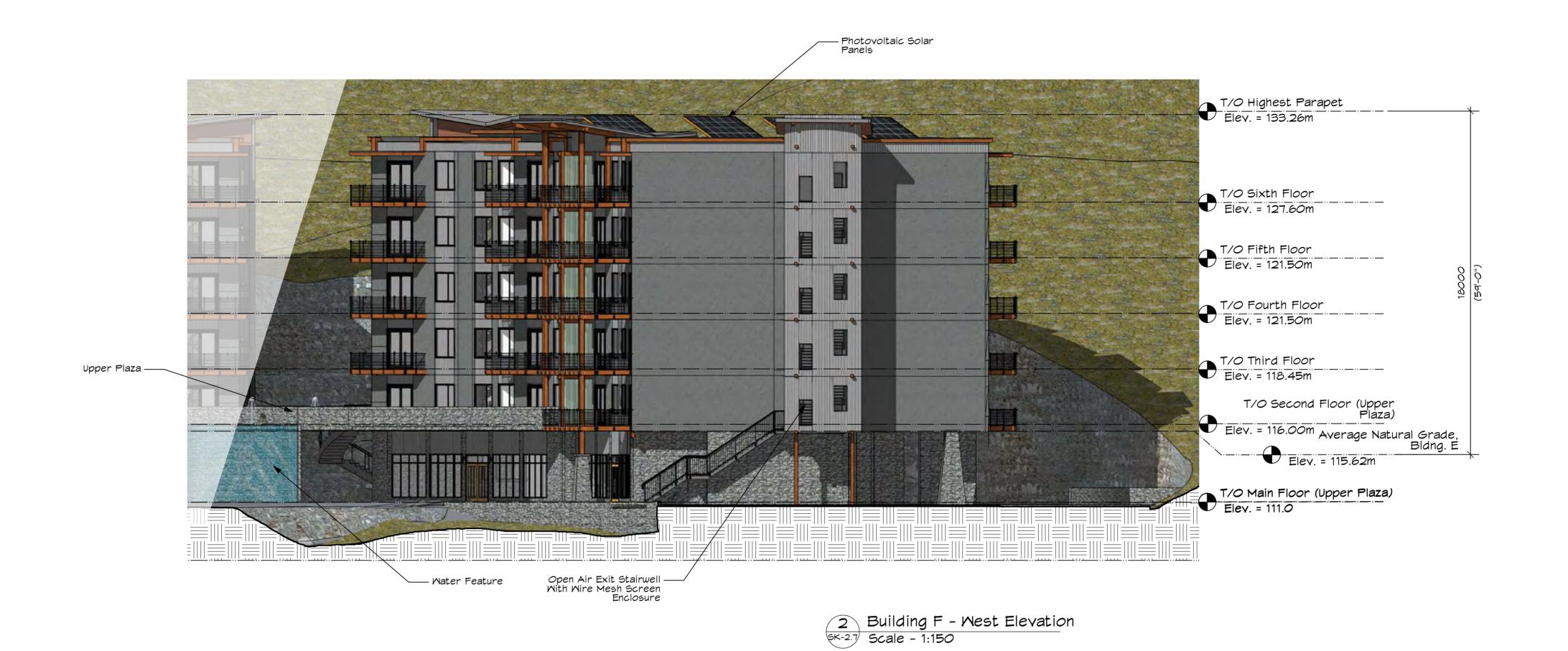


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MUM	А	rchitect Inc.					
		#10, 909 Vancouver Street, Victoria, B.C. VBV 3V6 ph:(250)661-5492 e-mail: mimoody@shaw.ca	drawing title: Building 'E' East & West Elevations	drawn by: mjm checked by:	scale: As Noted	date: 22/06/30	drawing no.
	proposteen-ones o-maic remousywanawica			mjm		yy/mm/dd	











project name:

Building 'F'

East & West Elevations

MJM A rchitectinc.

#10, 909 Vancouver Street, Victoria, B.C. VSV 3V6

ph:(250)661-5492 e-mail: mjmoody@shaw.ca

VETERAN'S MEMORIAL PARKWAY

REZONING RESUBMISSION APPLICATION

mjm checked by: 2024

SK-2.7

22/06/30

As Noted





			project name: VETERAN'S MEMORIA REZONING RESUBM	project no. 2024			
MUM	А	rchitect Inc.					
		#10, 909 Vancouver Street, Victoria, B.C. V8V 3V6	drawing title: Building 'F' North & South Elevations	drawn by: mjm checked by:	scale: As Noted	date: 22/06/30	drawing no.
		ph:(250)661-5492 e-mail: mjmoody@shaw.ca		mjm		yy/mm/dd	



1 Section Thru Building E SK-3.2 Scale - 1:150

VETERAN'S MEMORIAL PARKWAY

Site Sections-

East Side

REZONING RESUBMISSION APPLICATION

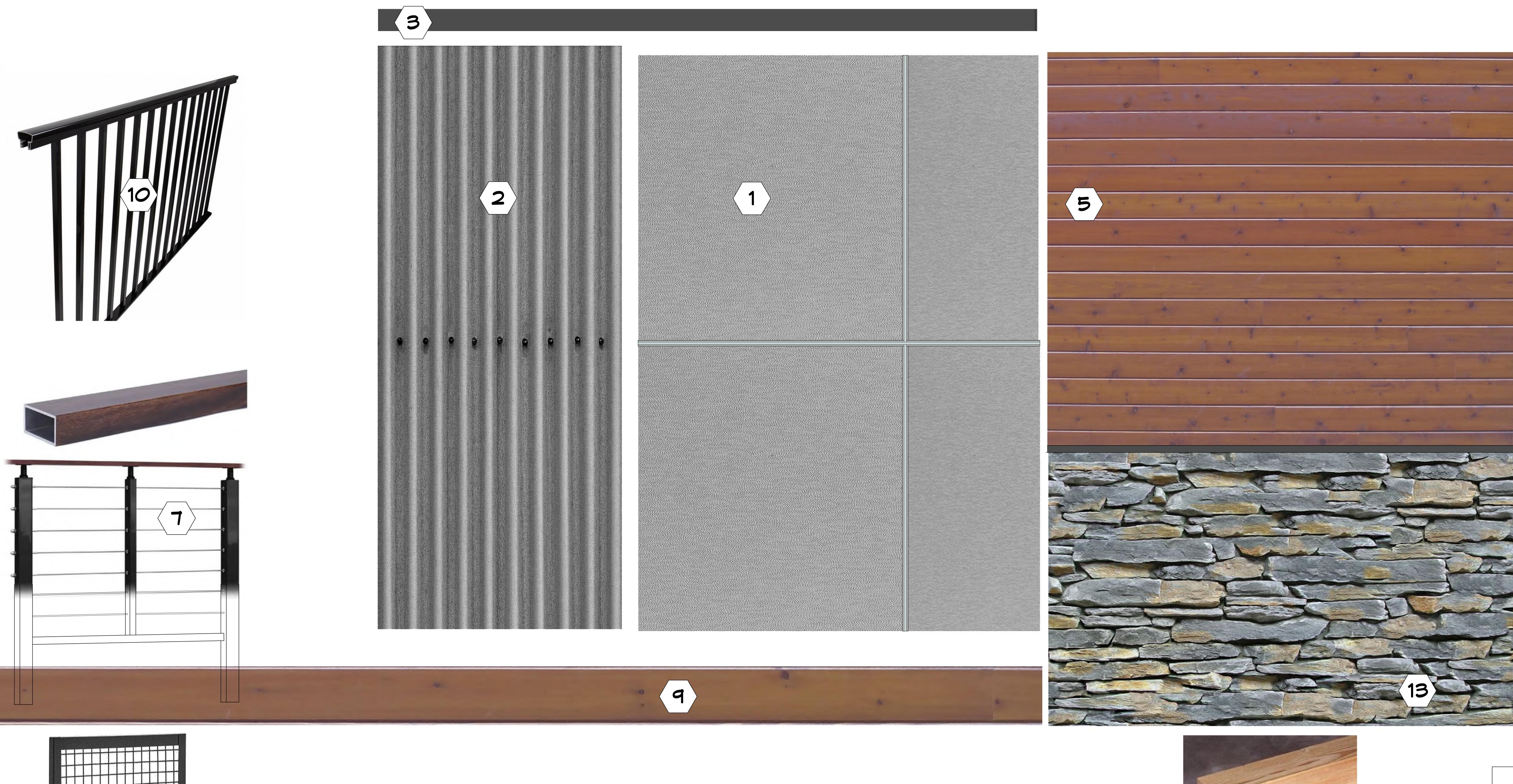
drawn by: mjm 2024

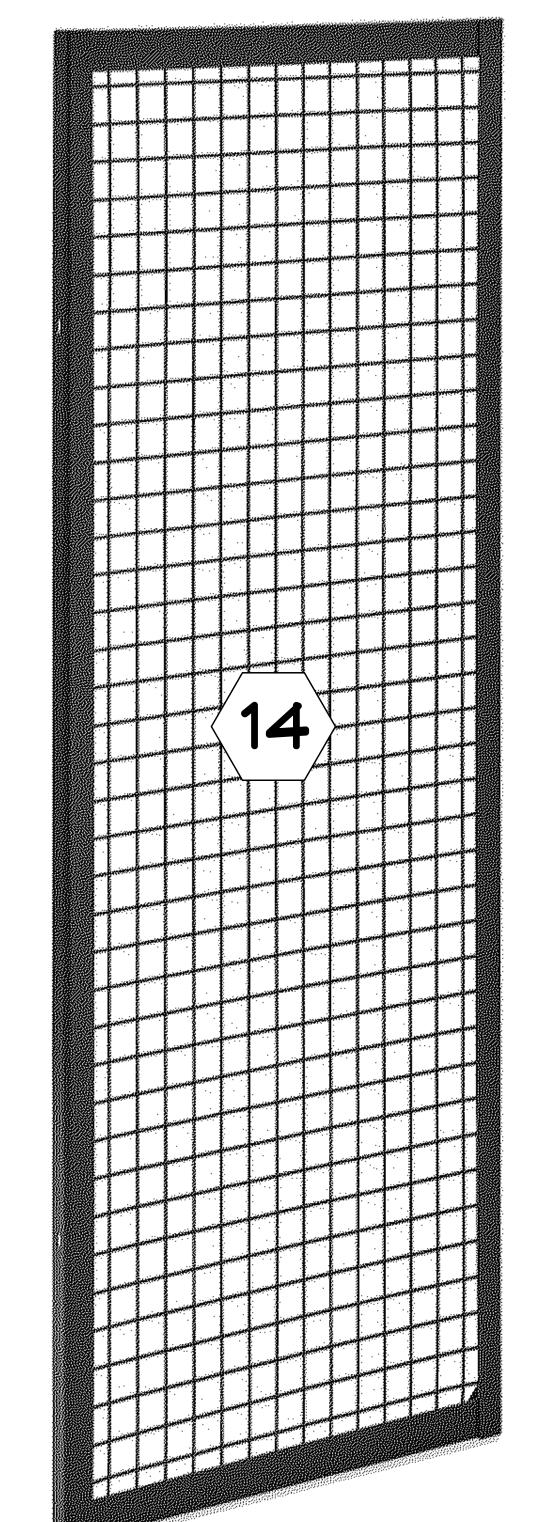
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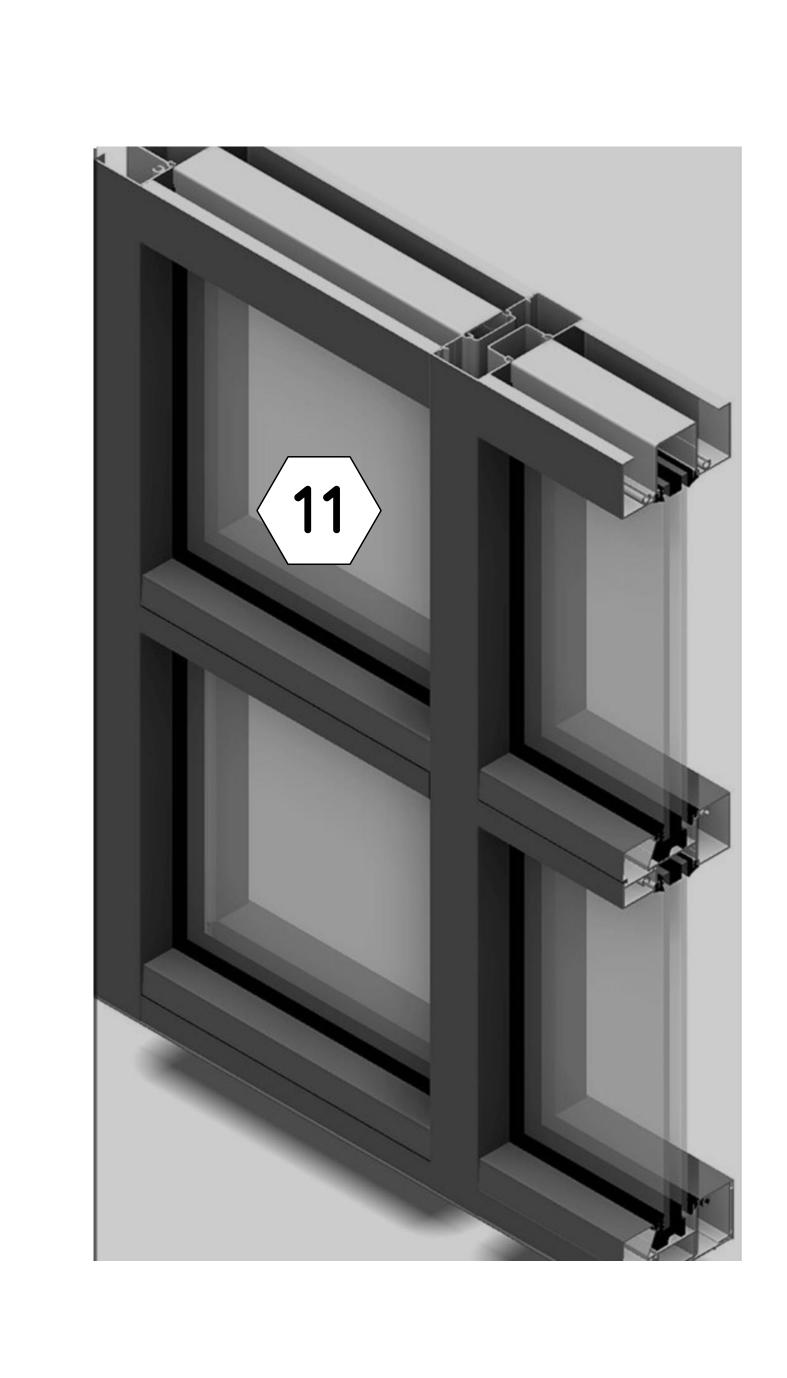
22/06/30

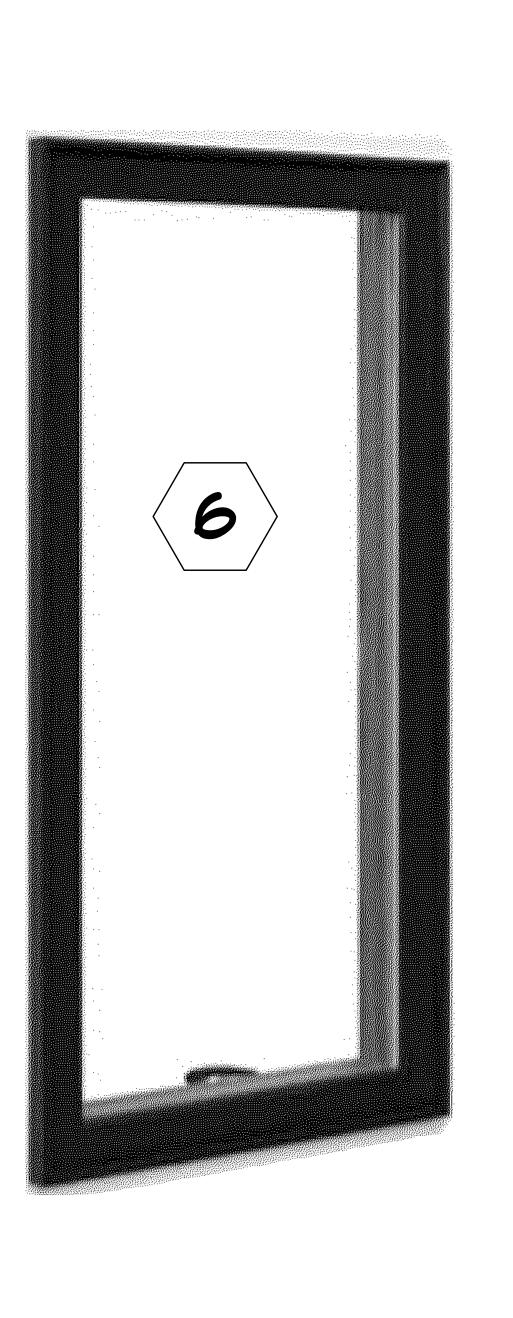
As Noted





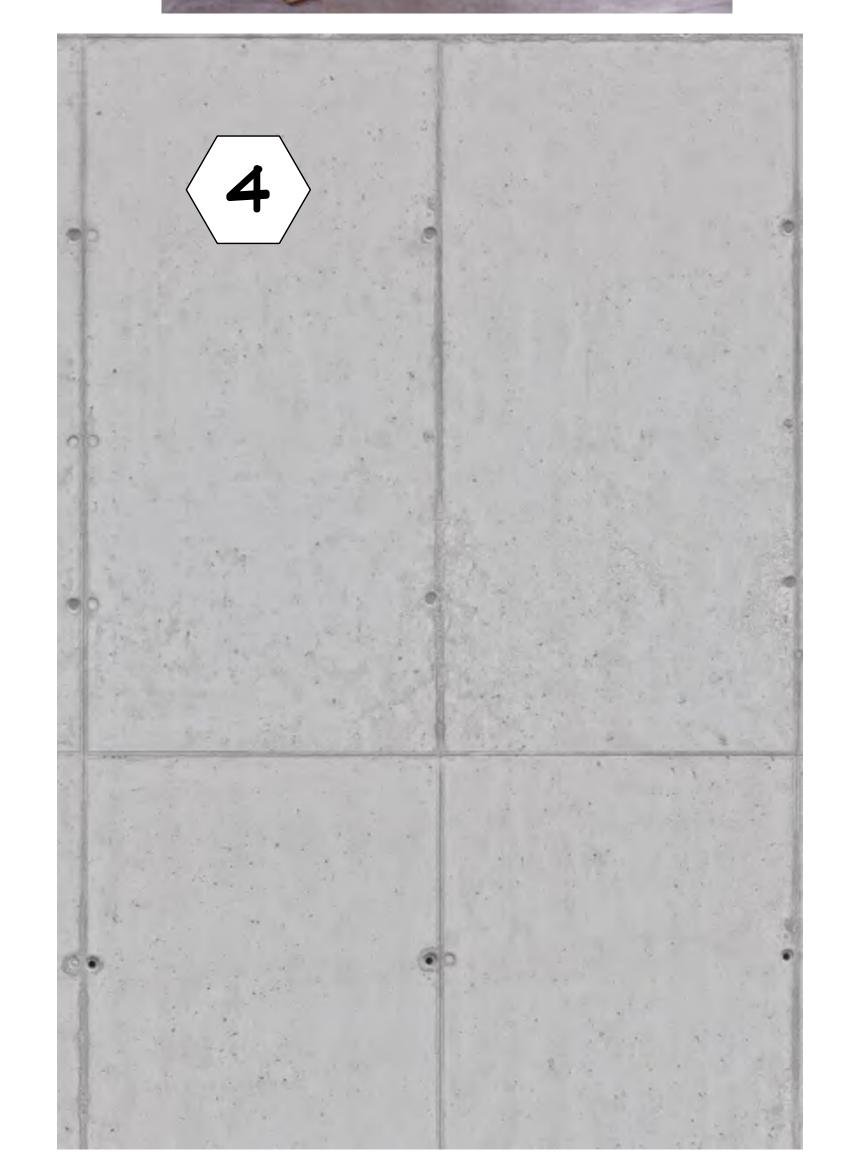








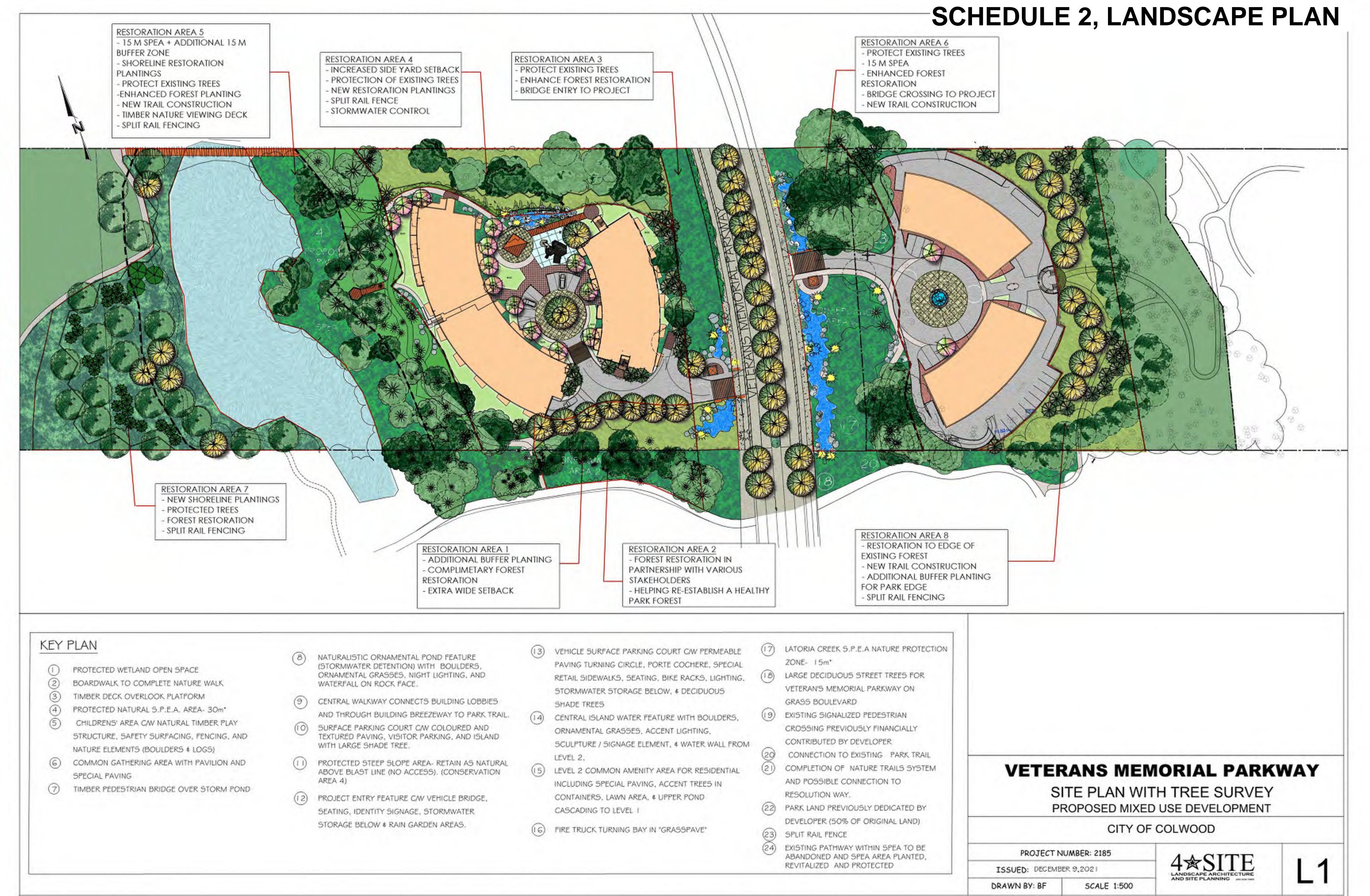




MATERIAL LEGEND

- Fibre-cement Board (FCB) Panels With Concealed Fasteners
- 2 Vert. Corrugated Steel Panels
- Pre-fin. Metal Flashing
- 4 Architectural Concrete
- 4" High Horiz. Butt-jointed T&G Mood Siding (Stained)
- Thermally-broken Double Glazed Vinyl Windows (Black Exterior)
- Powder-coated Aluminum Railing System (Black) With Horiz. Aircraft Cable Guards
- Rough-sawn Glu-lam Columns & Beams Stained To Match Horiz. Siding (5 above)
- Comb For ad Mond Thing & For sin Provide Chair
- Comb-faced Wood Trim & Fascia Boards Stained To Match Horiz. Siding (5 above)
- Powder-coated Light Steel Railings With 1 1/2" Φ T&B Rails C/W 5/8"Φ St. Rod Pickets @ 4" O.C. (Black)
- 4 1/2" Dp. Thermally Broken Aluminum Framing System C/N/ Double-glazed Mindows (Black Anodized)
- 2 Hollow Metal Door In Pressed Steel Frame
-) 1" (Nom.) Stone Veneer
- 1"x1" Metal Mesh Screens In 1 1/2" x 1 1/2" St. Angle Frames (Black)

			project name:			project no.	
			VETERAN'S MEMORIAL REZONING & DP RESU		PPLICATION)24
MUM	А	rchitect Inc.					
		#10, 909 Vancouver Street, Victoria, B.C. V6V 3V6	drawing title:	drawn by: mjm	scale:	date:	drawing no.
	ph:(250)661-5492 e-mail: mjmoody@shaw.ca	MATERIAL & SAMPLE BOARD	checked by:	As Noted	22/06/30	SK-5.1	



SCHEDULE 3, RIPARIAN ALTERNATIVE ASSESSMENT REPORT

Riparian Alternative Approval Assessment



Prepared for: Mike Achtem, P.Eng., Islander Engineering May 13th, 2021

Prepared by: Wm. Patrick Lucey, M.Sc., R.P. Bio., CBiol, MRSB Tracy Motyer, B.Sc., R.B. Tech

Jordana Herron, A.Sc., Trainee (R.B. Tech)



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1. Executive Summary

This report was prepared for Mike Achtem, P. Eng., for a proposed multi-family, residential development adjacent to Veterans' Memorial Parkway (VMP), and Havenwood Park, in the City of Colwood.

There are two distinct property parcels on either side of VMP (Figure 2). The *Riparian Areas and Marine Shoreline Environmental Development Permit Area* will be addressed for the western parcel following the provincial Riparian Area Protection Regulation (RAPR) process and the eastern parcel will be addressed under the City of Colwood's Alternative Approval Process, as per Section 20.1 of their OCP. This report specifically addresses the eastern parcel and the Alternative Approval Process.

This assessment is seeking approval under the alternative assessment option for the following reasons:

- 1. While the maintaining riparian buffer width along Latoria North Creek as prescribed under RAPR is feasible, it is not possible to protect the trees within the buffer due to their current unhealthy condition and potential for windthrow. This means that the site is not compliant with RAPR and an alternative approval path is needed.
- 2. Based on the arborists' reports and on-site meetings, even if the development did not proceed, significant windthrow would continue to occur in the riparian buffer.
- 3. The removal of dead and dying overstory trees (due to root disease and drought stress) and replacement with younger healthier trees is a net ecological benefit to the ecological function of the site. There is still significant decadent forest in neighbouring Havenwood Park to meet the habitat needs of birds who are reliant on such trees (e.g. woodpeckers) and every effort will be made to convert suitable trees into wildlife trees instead of completely removing them.
- 4. Replacing this portion of the forest now, before the whole thing, including Havenwood Park, is in a similar condition, will provide incremental recovery and help buffer future tree losses.

This report conforms to the RAPR standard and assessment process in all other regards.

A RAPR assessment was undertaken for the east parcel to determine the riparian setback. The riparian assessment included a review of the potential tree canopy response to the removal of the majority of the trees within the development footprint within this parcel. The findings of the tree assessment found that a significant portion of the trees on the property are impacted by a root rot fungus and trees within the riparian area are not good candidates for retention with future development. The trees pose a windthrow and danger tree hazard to Veterans' Memorial Parkway (VMP) and the proposed future development and are proposed for removal. Provided there is no increase in fuel loading, trees within the riparian zone will be left as wildlife trees and branches and trunks will be left on the forest floor, as prescribed by the Consulting Arborist. A tree replanting plan has been recommended by the arborists for both the trees on parkland and any trees within the

SPEA. The replanting plan will require a replacement ratio specified by the City of Colwood.

The RAPR calculated a 15.6 m SPEA for Latoria North Creek. The City of Colwood Land Use Bylaw riparian setback is 15.0 m. The assessment team determined that a 15.0 m SPEA is appropriate for Latoria North Creek. No relocation or in-filling of any portion of a watercourse or water body is proposed, only a stream crossing to be addressed under the Water Sustainability Act (Section 11 Notification Process). This Alternative Approval Process for the eastern parcel is triggered by the need to actively manage trees within the SPEA for windthrow and danger-tree considerations.

The stream and riparian buffer are currently in a state of Proper Functioning Condition (PFC) and will be maintained in this state¹. The proposed removal of trees within the Streamside Protection and Enhancement Area (SPEA *a.k.a* riparian buffer) shall be subject to a City of Colwood approved plan for compensatory mitigation measures on the subject property or elsewhere in the watershed. This replanting plan is described by the arborist's report. The replanting plan will achieve a significant net ecological benefit, that shall be demonstrated by the Qualified Environmental Professional (QEP) to the satisfaction of the City. Compensatory mitigation measures must result in replacement habitat that achieves a state of PFC. The replanting of the tree portion of the riparian plant community shall be based upon a plan that addresses the fungal infections present in many of the existing riparian trees, as well as those trees on the steep slopes.

Note: As *per* the "Summary of Comments Received for RZ-20-010 in Response to City of Colwood Referrals Sent December 15, 2020" document dated February 19th, 2021, both the stream west of VMP and the stream east of VMP have been requested to be named "Latoria North Creek." To ensure there is no confusion throughout this report, the tributaries to Latoria Creek shall be referred to by the authors as follows (Figure 3):

- The tributary arm that flows from the headwater wetland on the west parcel of the subject property, through the west parcel of Havenwood Park, and under VMP shall be referred to as Latoria Northwest Creek.
- The tributary arm that flows parallel to VMP adjacent to the east parcel of the property shall be referred to as Latoria Northeast Creek.
- The section of the tributary downstream of the confluence of the above two arms and until it flows into Latoria Creek shall be referred to as Latoria North Creek.

2. Introduction and Proposed Development

There are two distinct property parcels on either side of VMP (Figure 2). A provincial Riparian Area Protection Regulation (RAPR) assessment was undertaken and Streamside Protection and Enhancement Areas (SPEAs) were assigned to watercourses on both parcels. During that process it became apparent that trees within the SPEA of the east parcel would require active management beyond what is permitted in the RAPR. Therefore, an Alternative Approval Process was undertaken, as per Section 20.1 of the City of Colwood's Official Community Plan. This report specifically addresses the eastern parcel and the Alterative Approval Process within the City's *Riparian Areas and Marine Shoreline Environmental Development Permit Area*.

Development on the east parcel will maintain a 15.0 m setback width. No relocation or in-filling of any portion of a watercourse or water body is proposed only a stream crossing to be addressed under the Water Sustainability Act (Section 11 Notification Process). This alternative approval process is triggered by the need to actively manage trees within the SPEA for windthrow and danger-tree considerations.

The proposed timeline for construction of the eastern parcel is July 2021 to December 2023.

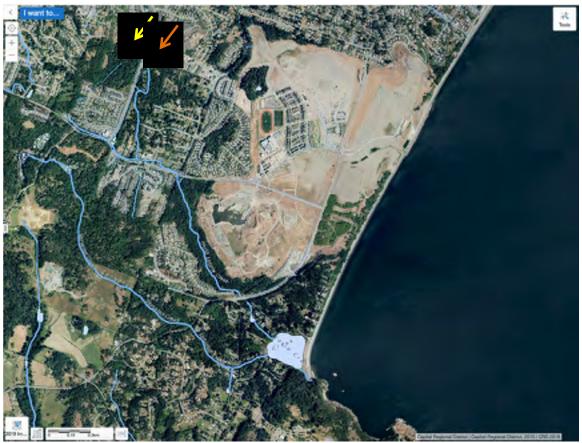


Figure 1. Overview map showing the location of the subject property (yellow arrow = west parcel; orange arrow = east parcel), which is divided into two segments by Veterans' Memorial Parkway (VMP) and is located within the City of Colwood. Image Source: CRD Regional Community Atlas (2019 orthophoto).



Figure 2. Aerial photograph of the subject property (outlined in red) and adjacent lands showing the eastern and western parcels. This report is specific to the eastern parcel. Image Source: CRD Regional Community Atlas (2019 orthophoto).

3. Assessment Team

The field assessment was conducted by Patrick Lucey, R.P. Bio., with assistance from Tracy Motyer, B.Sc. R.B. Tech, and Jordana Herron, A.Sc, Trainee (RBTech). The report was prepared by Mr. Lucey. Specialists engaged to contribute to this report included Graham Mackenzie, Consulting Arborist, Dr. Julian A Dunster R.P.F., R.P.P., M.C.I.P., ISA Certified Arborist, ASCA Registered Consulting Arborist # 378, ISA Tree Risk Assessment Qualified, and Mike Achtem, P. Eng.

The experience of the QEP Riparian Assessment team is included as Appendix 1.

4. Watershed Overview

Latoria Creek Watershed covers approximately 200 ha and includes a small portion of the southwest corner of Triangle Mountain, Havenwood Park, a portion of the Olympic View Golf Course property, as well as residential and undeveloped properties on either side of Latoria Road between VMP and the ocean (Figure 3). Latoria Creek, which is between 1 and 3 m wide, drains through Latoria Creek Park, and ultimately discharges into Albert Head Lagoon. It has been ditched throughout most of its length along Latoria Road and is the receiving water for storm drainage. The stream contains sticklebacks, but does not appear to support salmonids in the upper reaches, due to an impassable barrier upstream of Albert Head Lagoon which prevents anadromous species from migrating upstream. A pond upstream of Albert Head Lagoon was stocked with rainbow trout many years ago, but they do not appear to have colonized the stream. Latoria Northwest Creek is a headwater tributary stream, draining a wetland on the west parcel of the subject property, that flows through Havenwood Park, crossing under Veterans' Memorial Parkway and then flowing into Latoria North Creek (Figure 3). Latoria Northeast Creek flows south along the east side of VMP and flows into Latoria North Creek, which then flows into Latoria Creek (Figure 3).

Latoria Creek Watershed

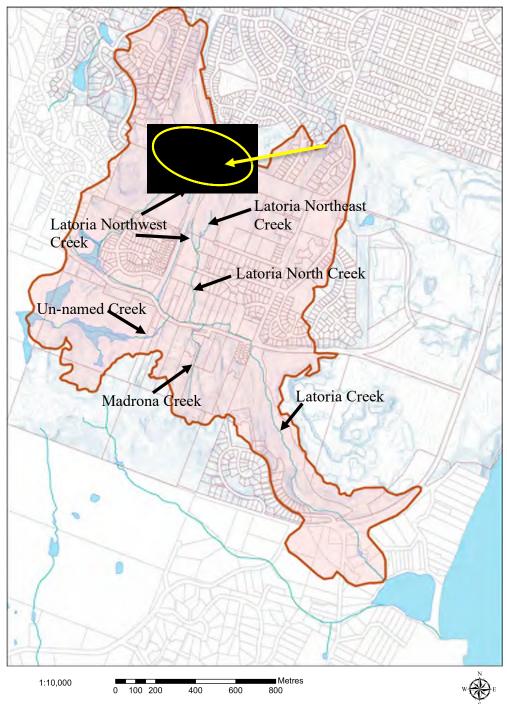


Figure 3. Latoria Creek Watershed showing the entire catchment, as well as the sub-catchment streams and riparian-wetland areas. The subject property is marked with the yellow circle and arrow. Note this watershed map is a general drainage catchment.

Precipitation

Precipitation measured near the subject property is greatest between November and January and typically falls as rain between 120 mm and 180 mm per month. During the dry period, rainfall averages around 25 mm per month. Temperatures average around 16°C in summer and 5-6°C in winter

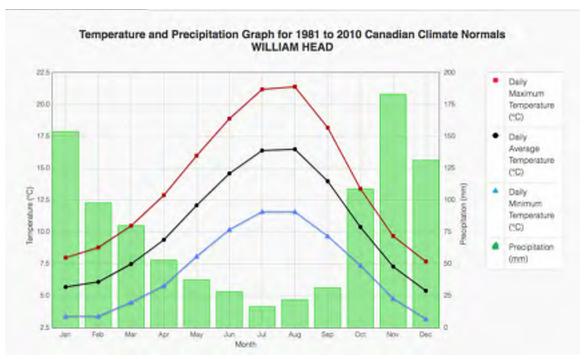


Figure 4. Graph of Environment Canada temperature and precipitation normals for 1981-2010 for the William Head weather station, located near the subject property.

Table 1. Table of Environment Canada temperature and precipitation normals for 1981-2010 for the William Head weather station.

Temperature														
		198	1 to 20	10 Cana	dian Cli	imate N	ormals	station	data					
					Temp	erature								
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Daily Average (°C)	5.7	6.1	7.5	9.4	12.1	14.6	16.4	16.5	14.0	10.4	7.3	5.4	10.5	9
Standard Deviation	1.3	1.4	1.1	0.9	1.0	0.9	1.0	0.8	1.0	0.8	1.6	1.4	1.3	9
Daily Maximum (°C)	8.0	8.8	10.5	12.9	16.0	18.9	21.2	21.4	18.2	13.4	9.7	7.7	13.9	9
Daily Minimum (°C)	3.4	3.4	4.5	5.8	8.1	10.2	11.6	11.6	9.7	7.4	4.8	3.2	7.0	0
Extreme Maximum (°C)	17.0	16.7	20.0	23.0	28.9	29.4	31.0	31.1	26.5	22.0	17.2	16.0		
Date (yyyy/dd)	2005/ 19	1963/	2004/	2006/	1969/	1966/	1998/ 27	1960/	1998/	2003/ 01	1975/ 03	1980/ 26		
Extreme Minimum (°C)	-8.5	-11.0	4.5	-0.6	1.1	3.9	6.0	5.0	2.2	-1.5	-9.5	-13.9		
Date (yyyy/dd)	1982/ 06	1989/	1989/	1963/	1965/ 06	1972/ 07	2006/	1980/ 29	1972/ 27	1984/	1985/ 27	1968/ 29		
Precipitation														
		198	1 to 20	10 Cana	dian Cl	imate N	ormals	station	data					
					Precis	oitation								
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Rainfall (mm)	150.1	94.3	78.6	53.1	37.6	28.3	16.6	22.1	31.4	108.8	180.7	128.8	930.3	9
Snowfall (cm)	3.7	3.6	1.5	0.0	0.0	0.0	0.0	0.0	0.0	.0.1	2.4	2.6	13.8	9
Precipitation (mm)	153.8	97.9	80.1	53.1	37.6	28.3	16.6	22.1	31.4	108.9	183.1	131.4	944.1	0

Climate Patterns

In April 2017, the CRD published the *Climate Projections for the Capital Region* report. Models for precipitation and temperature were used to assess changes in climate expected by the 2050s and the 2080s. General climate projections for the region include wetter winters, drier summers, warmer average temperatures throughout the year (though unevenly distributed over the seasons), and "more intense extreme events". The following is an excerpt from this report:

"As our climate warms, our region can expect the number of summer days above 25°C to triple, from an average of 12 days per year to 36 days per year. The 1-in-20 hottest day's temperature is projected to increase from 32°C to 36°C by the 2050s. These rising temperatures will result in a 22% increase in the growing season length and a 49% increase in growing degree days by the 2050s. This projected warming will have implications for regional ecosystems, watersheds, agriculture and horticulture, and communities. Warmer winters mean the region will experience a 69% decrease in the number of frost days, significantly impacting the natural environment.... The "new normal" is a climate that is almost entirely frost-free at lower elevations.

Annual precipitation projections are a modest 5% increase by the 2050s and 12% by the 2080s. Projections indicate that the fall season will see the greatest increase in precipitation.

This precipitation is expected during increasingly extreme events, with about 31% more precipitation on very wet days (95th percentile wettest days precipitation indicator) and 68% more on extremely wet days (99th percentile wettest days precipitation indicator). Despite the projected increased intensity of wet events, the amount of rain in summer is expected to decrease by 20%, while the duration of dry spells will lengthen by about 20%."

These climate projections may have a serious effect on stream habitats such as Latoria Creek and its tributaries, including Latoria North Creek, especially since it is a fish-bearing system. Warmer summer temperatures may increase water temperatures and lower dissolved oxygen concentrations in streams, as well as contribute to lower flows, both of which negatively impact cold-water fish stocks such as trout and salmon, found in the lower reaches of Latoria Creek, below the impassible falls upstream of Albert Head Lagoon. Additionally, more extreme precipitation events in the fall, winter and spring may cause higher flows, with increased velocities, and negatively affect fish-spawning habitat through channel erosion, and the deposition of sediment.

5. Study Area and Fisheries Resources

The subject property at 3461 Veterans' Memorial Parkway is located within the City of Colwood on the east side of VMP and is bordered to the south by Havenwood Park (Figure 1 and Figure 2).

The subject property lies within the Latoria Creek watershed. The property is located near a height of land that forms part of the headwaters of Latoria Northeast Creek (eastern property parcel) and Latoria Northwest Creek (western property parcel). Latoria Northeast Creek and Latoria Northwest Creek, along with Latoria North Creek, are major tributaries to Latoria Creek (Figure 3).

A search through the Provincial Fisheries Information Database Query (FIDQ) did not yield any results for Latoria North Creek or Latoria Creek; however, observations threespine stickleback and signal crayfish have been made throughout Latoria Creek and sculpin and trout have been observed in the lower reaches. Latoria North Creek, and, therefore, Latoria Northeast Creek, is assumed to be fish bearing, for the purposes of this assessment, due to its connection to fish bearing Latoria Creek. No fish trapping studies have been conducted to verify the presence or absence of fish in the upper reaches of Latoria Northeast Creek, where the project site is located.

6. Methods

A detailed RAPR field assessment was conducted for the site *per* standard RAPR methods. The Stream Boundary was identified in the field and then surveyed by a BC Land Surveyor and placed on a Site Plan. A 15.6 m SPEA, measured horizontally from the Stream Boundary, was calculated for the riparian setback for Latoria Northeast Creek in the east parcel. The minimum riparian setback prescribed in the Colwood OCP, and the 2019 *Fisheries Act* is 15m. The treed canopy within the SPEA has been assessed by Julian

Dunster, R.P.F., who has provided recommendations for post-construction/development plant community management.

7. Field Assessment

Latoria Northeast Creek

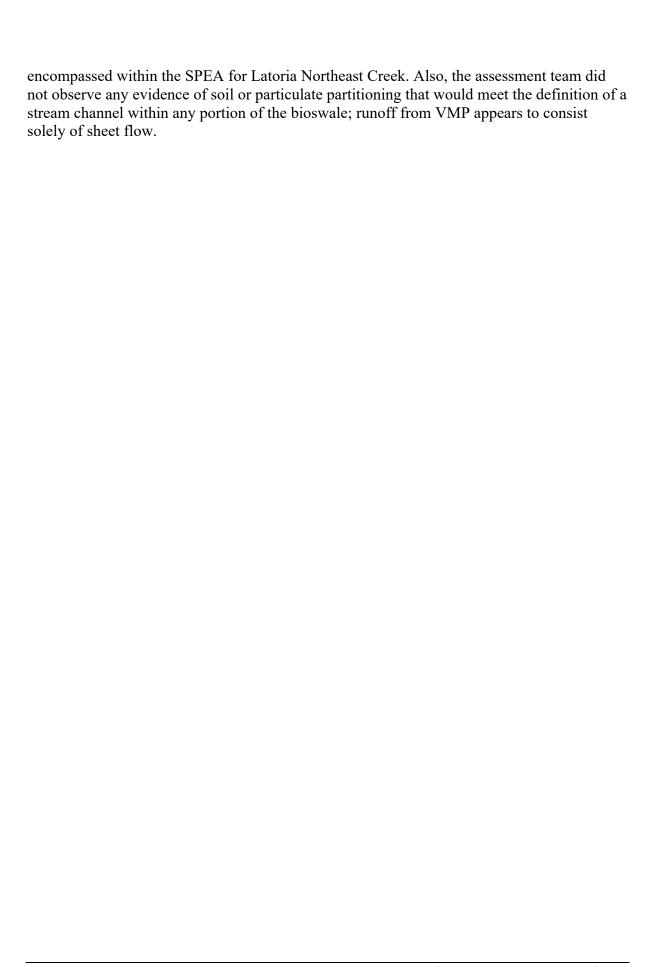
Latoria Northeast Creek flows south along the western edge of the eastern portion of the property in close proximity to VMP. Most of the stream lies within the road allowance for VMP and the channel is heavily overgrown with salmonberry (*Rubus spectabilis*), and Himalayan blackberry (*Rubus discolor*). There are several veteran trees and snags present in this area including western redcedar (*Thuja plicata*) and Douglas-fir (*Pseudotsuga menziesii*); a significant amount of blowdown was noted along the edge of the canopy adjacent to VMP. Other species present include: sword fern (*Polystichum munitum*), salmonberry (*Rubus spectabilis*), red alder (*Alnus rubra*), bigleaf maple (*Acer macrophyllum*), English holly (*Ilex aquifolium*), Daphne (*Daphne laureola*), and dull Oregon-grape (*Mahonia nervosa*).

Latoria Northeast Creek on the east parcel begins near the height of land approximately 450m upstream (north) of the subject property and flows south through a series of small ponds/wetlands largely within the road allowance for VMP. Downstream of the subject property, Latoria Northeast Creek flows southwest through Havenwood Park, eventually flowing into Latoria North Creek, which then flows into Latoria Creek along Latoria Road (Figure 3). Havenwood Creek consists of a mixture of channel types: narrow Rosgen C short reaches, interspersed with broad over-widened reaches showing evidence of excessive erosion and bank scour. Large deposits of sediment are evident, down cutting has occurred, and the bank plant community is dominated by a dense thicket of invasive species. In general the channel shows extensive evidence of excessive erosion given the legacy of road construction and loss of mature riparian vegetation. A significant amount of windthrow was also observed in the riparian zone and adjacent area.

Veterans' Memorial Parkway; Roadside Channels

Along the VMP frontage of the subject property, there is a shallow grassy swale on the east side of VMP, between the road and Latoria Northeast Creek. This swale is present along the southern half of the property frontage. This swale intercepts and treats road runoff from VMP and is separated from Latoria North Creek by a large berm. The swale is located entirely within the road allowance for VMP. The east swale drains into Latoria Northeast Creek at the outlet of a cross culvert under VMP which conveys water from the west side of VMP to the Creek.

The east swale has not been included in the RAPR assessment or the Alternative Approval Process because it is beyond the property boundary and would not have any SPEA setback implications for any proposed development on the subject property. Given its location between VMP and Latoria Northeast Creek, any setbacks on the swale would be



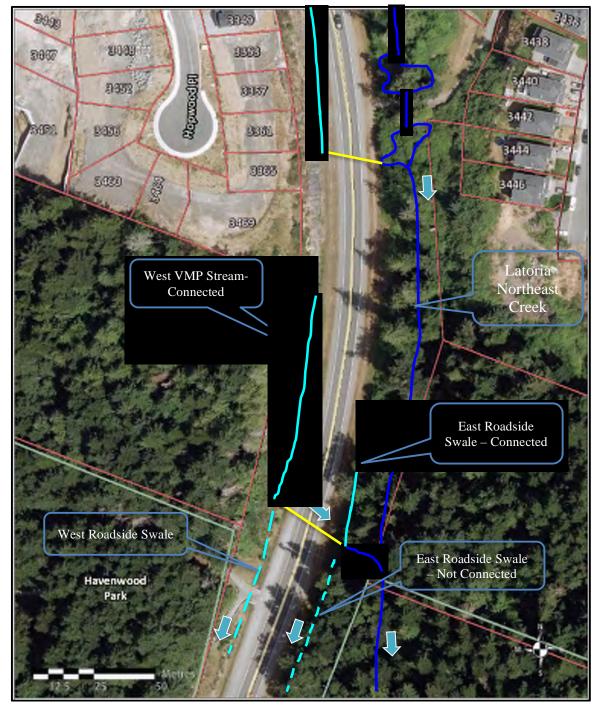


Figure 5. Sketch of Latoria Northeast Creek and the roadside swales along Veterans' Memorial Parkway. Solid lines (teal and dark blue) indicate channels directly connected to Latoria North Creek, while the dashed teal line represents the roadside swale which is not directly connected to Latoria North Creek; arrows denote the direction of flow. Sketch is approximate, this figure is intended for illustrative purposes only. Image Source: CRD Regional Community Atlas (2013 orthophoto).

Zones of Sensitivity and Streamside Protection and Enhancement Area.
The Zones of Sensitivity and SPEA width, as calculated in the RAPR are included below in the provincial forms to demonstrate that the RAPR setback was calculated and is being maintained.

8. Results of Detailed Riparian Assessment

Latoria Northeast Creek

Refer to Section 3 of	Technical Man	ual	Date: 2020-06-23
Description of Wa	ater bodies i	involved (number, type)	e) Latoria Northeast Creek, Reach 1
Stream	X		
Wetland			
Lake			
Ditch			
lumber 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	5.0			I, Wm. Patrick Lucey, R.P. Bio, hereby certify that:
upstream	4.5			a) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the <i>Riparian</i>
	12.4		2	Areas Protection Act;
	6.8			b) I am qualified to carry out this part of the assessment of the
	4.2			development proposal made by the developer <u>BC-ALTA</u>
downstream	2.8		5	Developments; c) I have carried out an assessment of the development proposal
	6.2			and my assessment is set out in this Assessment Report; and
	3.7		5	d) In carrying out my assessment of the development proposal, I
	9.0			have followed the technical manual to the Riparian Areas Protection Regulation.
	3.0			1 Totobion Progulation.
	4.0		4	
Total: minus high /low	46.4			
mean	5.2		4	
	R/P	C/P	S/P	
Channel Type		Χ		

Site Potential Vegetation Type (SPVT)

	Yes	No		
SPVT Polygons		Х	Tick yes o	only if multiple polygons, if No then fill in one set of SPVT data boxes
			a) I am a d Regular b) I am qu made b c) I have d set out	rick Lucey, R.P. Bio, hereby certify that: qualified environmental professional, as defined in the Riparian Areas Protection tion made under the <i>Riparian Areas Protection Act</i> ; alified to carry out this part of the assessment of the development proposal y the developer <u>BC-ALTA Developments</u> ; carried out an assessment of the development proposal and my assessment is in this Assessment Report; and ing out my assessment of the development proposal, I have followed the
		_	technic	al manual to the Riparian Areas Protection Regulation.
Polygon No:	1			Method employed if other than TR
	LC	SH	TR	
SPVT Type			X	
		_		
Polygon No:				Method employed if other than TR
	LC	SH	TR	
SPVT Type				

<u></u>
Polygon No: Method employed if other than TR
SPVT Type
Zone of Sensitivity (ZOS) and resultant SPEA
Segment 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 10.4 Stability ZOS (m)
Litter fall and insect drop 15.0
ZOS (m)
Shade ZOS (m) max 15.6* South bank Yes X No
Ditch Justification description for classifying as a ditch (manmade,
no significant headwaters or springs, seasonal flow)
Ditch Fish Yes No If non-fish bearing insert no fish
Bearing bearing status report
SPEA maximum 15.6* (For ditch use table3-7)
Segment 2 If two sides of a stream involved, each side is a separate segment. For all water
No: bodies multiple segments occur where there are multiple SPVT polygons
LWD, Bank and Channel 10.4 Stability ZOS (m)
Litter fall and insect drop 15.0
ZOS (m)
Shade ZOS (m) max 15.6 South bank Yes No X
SPEA maximum 15.0* (For ditch use table3-7)
Segment If two sides of a stream involved, each side is a separate segment. For all water
No: bodies multiple segments occur where there are multiple SPVT polygons
LWD, Bank and Channel
Stability ZOS (m)
Litter fall and insect drop
ZOS (m)
Shade ZOS (m) max South bank Yes No
SPEA maximum (For ditch use table3-7)
The point and the state of the
I, <u>Wm. Patrick Lucey, R.P.Bio.</u> , hereby certify that: a) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the <i>Riparian</i>
Areas Protection Act;

- I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>BC-ALTA Developments</u>;
- 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 technical manual to the Riparian Areas Protection Regulation.

Comments

- Latoria Northeast Creek flows south in close proximity to VMP; most of the stream lies within the road allowance.
- Headwaters at height of land ~450m upstream.
- Channel is heavily overgrown with salmonberry (*Rubus spectalbilis*), and Himalayan blackberry (*Rubus discolour*).
- Numerous veteran trees and snags present including western redcedar (*Thuja plicata*) and Douglas-fir (*Pseudotsuga menziesii*); a significant amount of blowdown was noted along the edge of the canopy adjacent to VMP.
- Other species present include: sword fern (*Polystichum munitum*), salmonberry (*Rubus spectalbilis*), red alder (*Alnus rubra*), bigleaf maple (*Acer macrophyllium*), English holly (*Ilex aquifolium*), Daphne (*Daphne laureola*), and dull Oregon-grape (*Mahonia nervosa*).
- Flows into Latoria North Creek, which then flows into Latoria Creek at Latoria Road.
- Note: The 15.6m SPEA width exceeds the 15m leave strip requirement in the Riparian and Wet Area Guidelines of the Colwood OCP.
- * It is worth noting that the ZOS for shade of 15.6 m is on a due south trajectory and does not affect the horizontal setback, which would be 15.0 m.*

9. Results of Proper Functioning Condition Assessment

The stream was assessed in April 2021 and found to be in Proper Functioning Conditionⁱⁱ, but at the low end. Areas of concern included the fact that the riparian zone is not improving, as it is subject to routine disturbance, and that the conifers in the riparian zone are subject to root rot. Finally, the stream lies partially within the municipal road allowance and the stream course has been historically altered by the construction of Veterans' Memorial Parkway.

Complete details of the PFC Assessment are contained in Appendix 2.

10. Site Plans

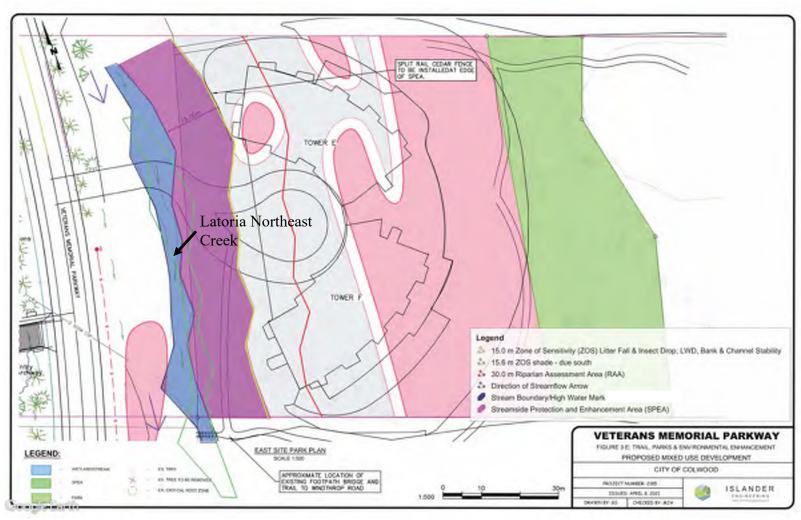


Figure 6. Site Plan for the east development showing the RAPR ZOSs, HWMs, property boundaries, and building footprint. Pink polygons on this site plan indicate steep slope areas.



Figure 7. Site Plan for the east development.

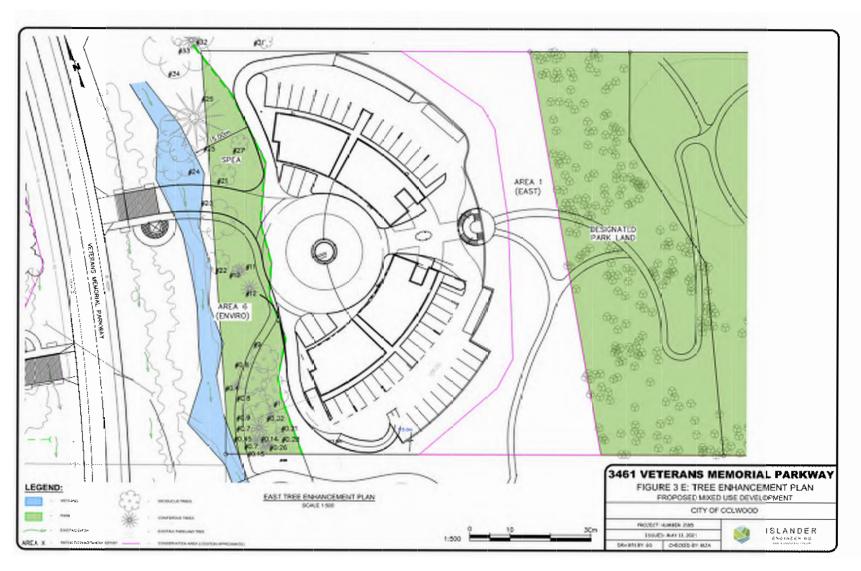


Figure 8. Tree Enhancement Plan for the east development.

11. Measures to Protect and Maintain the Riparian Setback

Measures - Danger Trees

Riparian vegetation in the SPEA, including trees, is vital to streamside soil function and stability and must be protected. The only vegetation management that is permitted in the SPEA is the treatment of Danger Trees. A Danger Tree is a tree that is a hazard to people or property due to its location or lean, its physical damage, overhead conditions, deterioration of its limbs, stem or root system, or any combination of these conditions.

See reports by Julian Dunster and Graham Mackenzie.

1. Danger Trees

- I, Julian Dunster, R.P.F., 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;
- I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>BC-ALTA</u> <u>Developments</u>;
- 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.

Measures - Windthrow

Windthrow (trees knocked over due to wind) can be a risk to people and property, and if excessive, can result in a loss of function of riparian vegetation in the SPEA. Windthrow is especially a risk when adjacent forest or individual trees are cleared or new structures are built, thus changing wind patterns and creating new stresses on remaining trees that are not adapted to the new wind patterns.

See reports by Julian Dunster and Graham Mackenzie.

2. Windthrow

I Julian Dunster, R.P.F., 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 <u>BC-ALTA</u> Developments;
- 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.

Measures - Slope Stability

Typical field indicators of instability include buttress wood on trees, evidence of slumps or landslip, soil and rock accumulated on the uphill sides of trees, tension cracks in soil, poorly drained or gullied fine-textured soils, shallow or wet organic soils on slopes, or very steep slopes or debris at the bottom of slopes.

• There are no indicators of slope instability on the subject property.

3. Slope Stability

- I, Wm. Patrick Lucey, 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;
- I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>BC-ALTA</u> Developments;
- 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.

Measures - Protection of Trees in the SPEA

Riparian vegetation in the SPEA, including trees, is vital to stream function and stability and must be protected. This includes root zones, which may extend beyond the SPEA boundary.

See reports by Julian Dunster and Graham Mackenzie.

Encroachment into the SPEA will be prevented with temporary orange fencing during construction (See Preventing Encroachment in the SPEA below).

- The SPEA trees will be protected by having a temporary orange snow fencing barrier, demarcating the non-disturbance zone, upstream and downstream of the construction footprint shall be constructed prior to ANY construction activity.
- The temporary barrier fence shall be at least 1.5 metres in height; it shall be constructed of 2" x 4" lumber, with orange snow fencing attached to the wooden barrier. The fence shall remain in place until all construction activity has been completed and the structure has been commissioned for occupancy.
- Signage every 5 metres on the orange snow fencing will indicate the SPEA and that it is a non-disturbance management zone. Signage shall be printed using weather proof materials.
- Silt fencing shall be installed across the full frontage of the property (east to west) under the supervision of the QEP.
- A Certified Danger Tree Assessor shall be retained prior to any danger trees being considered for removal outside the SPEA to ensure that the removal does not result in harm to trees within the SPEA.
- Photopoint Monitoring of the trees beyond the temporary wooden barrier shall be
 photographed to document the health of the trees and shrub understory prior to
 construction, as a baseline of riparian health. This Photopoint baseline shall be used
 to assess post-construction conservation/protection of the SPEA outside the
 construction footprint and be used as part of the Post-construction Report.
- The design and implementation of the E&SC Plan will ensure that no harmful runoff leaves the construction footprint/disturbance zone that could potentially harm tree roots.
- The E&SC Plan, including Monitoring, shall be maintained to ensure trees are protected during construction.
- All trees along both property boundaries shall be protected and conserved.
- During the removal of the existing dwelling the trees adjacent to the dwelling, along the property boundary, shall be fenced off behind an orange snow fence.
- Any demolition activity of the existing dwelling shall ensure that the root zones (under the tree's drip line) shall be protected from disturbance.

4. Protection of Trees

I, Julian Dunster, R.P.F., 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;
- I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>BC-ALTA</u> Developments;

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.

Measures - Preventing Encroachment in the SPEA

As part of the proposed subdivision, potential sites for dwellings are included on the site plan. There are no proposed buildings within the SPEA.

During construction, the SPEA will be delineated with orange snow fencing and signage as a visual reminder not to stockpile materials or trample tree roots.

- The temporary barrier fence shall be at least 1.5 metres in height; it shall be constructed of 2" x 4" lumber, with orange snow fencing attached to the wooden barrier. The fence shall remain in place until all construction activity has been completed and the structure has been commissioned for occupancy.
- Signage every 5 metres on the orange snow fencing will indicate the SPEA and that
 it is a non-disturbance management zone. Signage shall be printed using weather
 proof materials.
- Note: the initial silt fence and orange snow fence are to be **erected outside the SPEA during construction.**

5. Encroachment

I, Wm. Patrick Lucey, 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 <u>BC-ALTA</u> Developments;
- 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.

Measures – Sediment and Erosion Control During Construction

Measures to prevent sediment flowing into the wetland shall be implemented under the supervision and monitoring of the QEP.

The owner or a contract professional Ecologist, Landscape Architect or Engineer (e.g., a QEP), is responsible for designing an effective erosion and sediment control plan to ensure that during construction, no sediment-laden water enters the stream or wetland SPEA and that erosion of exposed soils does not occur such that the SPEA is damaged. The Latoria Creek watershed is in a fish-bearing system, therefore, there is zero tolerance for turbid or sediment-laden runoff entering the wetland and streams of this development. The RAPR also prohibits treatment, including infiltration, of stormwater within the SPEA.

The plan need not be complicated, but it should be followed carefully.

The Federal Fisheries Act prohibits the deposition of a deleterious substance (including sediment) in water frequented by fish. Furthermore, any stormwater discharges into adjacent receiving environments (especially freshwater ecosystems) must ensure that the Federal and Provincial water quality guidelines for the protection of aquatic life are not exceeded in the receiving environments. The Federal Guidelines are administered by the Canadian Council of Ministers of the Environment (CCME) and Provincial Guidelines are administered by the B.C. Ministry of Environment (BC MoE).

In order to comply with the Act and Guidelines, it is essential that any Erosion and Sediment Control Plan be designed to an adequate standard. Three documents that outline general principles and approaches for managing stormwater and controlling sediment and erosion are:

- "Stormwater Planning: a Guidebook for British Columbia," produced by BC MoE (2002)iii;
- "Land Development Guidelines for the Protection of Aquatic Habitat," produced by DFO (1992)iv; and
- "Storm water management for industrial activities: developing pollution prevention plans and best management practices," produced by the U.S. Environmental Protection Agency (1992)v.

The EPA (1992) document has been found to be the most stringent in its standards and best management practices (BMPs), which meet and exceed provincial BMPs and guidelines. The principal requirement of the US EPA method is the development of a Stormwater Pollution Prevention Plan (SPPP or PPP), which must be implemented prior to commencement of any on-site construction activity. Guidelines for the implementation of a Pollution Prevention Plan are outlined below:

- Always maintain a clean and organized work area.
- Stage work to minimize the disturbed area and duration of exposure.
- Ensure that debris from demolition is properly contained and that debris does not enter the wetland and streams.
- Silt fences should be used to prevent sediment-laden water from entering the SPEA. Silt fences are useful for slowing, diverting and preventing runoff from

- entering a watercourse. It is not appropriate to use silt fences to try and filter flowing turbid water.
- Prevent upslope water from running over disturbed areas, using diversion berms or other methods to intercept flows.
- Wherever possible, preserve vegetation and cover soils. Stabilize disturbed areas as quickly as possible with temporary or permanent covers (e.g. straw/mulch, grass seed, tarp etc.).
- Ensure runoff velocities are maintained at the lowest practical value. Maintain sheet flow and avoid channelizing runoff.
- Use site-specific sediment control structures to ensure suspended solids are retained on-site wherever possible.
- Avoid the siting of soil and debris stockpiles near the SPEA.
- Prepare for and clean up any and all spills. Repair all equipment oil and fuel leaks. A
 Spill Cleanup Kit should be included as part of the heavy equipment operators'
 Standard Operating Procedures; all equipment operators should be properly trained
 in the use of the Spill Cleanup Kits.
- Take care when using concrete and ensure that fresh concrete and concrete wash water do not runoff into the streams or wetland. Un-cured concrete, and concrete wash water, is extremely toxic to aquatic organisms.
- Avoid the unnecessary use of water for cleaning to minimize the subsequent need for treatment of suspended solids.
- Ensure the regular inspection and monitoring of sediment control structures (e.g. silt fences, settling ponds etc.) as part of the construction program, particularly after rainstorm events. Remove sediment build-up to ensure continued effectiveness.
- Weekly inspections, combined with Photopoint Monitoring, are essential to monitor and document the effectiveness of the erosion and sediment control plan. See the Environmental Monitoring section of this report for a more detailed description about environmental monitoring procedures recommended for this project.
- See attached Tips on Installing Silt Fences.

6. Sediment and Erosion Control

- I, Wm. Patrick Lucey, 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 <u>BC-ALTA Developments</u>;
- 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.

Measures – Stormwater Management

Care should be taken when designing the stormwater management measures to ensure there are no deleterious effects to the stream or wetland SPEAs. Stormwater flows must be discharged in a manner that prevents channelization and erosive forces, and prevents sediment deposition into the riparian management zones. There is zero tolerance for untreated runoff entering the riparian management zones.

• The stormwater management plan shall be designed by the project civil engineer with input from a QEP.

7. Stormwater Management

I, Mike Achtem, P.Eng., 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;
- I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>BC-ALTA</u> <u>Developments</u>;
- 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.

Measures - Floodplain Concerns

There are no floodplain concerns on this site.

8. Floodplain Concerns (highly mobile channel)

I, Wm. Patrick Lucey, 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;
- I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>BC-ALTA</u> <u>Developments</u>;
- 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.

12. Field Reviews and Environmental Monitoring

In general, the most environmentally dangerous period of development is the initial construction phase when land is cleared of vegetation and graded to create a proper surface for construction. This initial phase tends to involve open exposed soils, often involves demolition and debris, and may involve contractors who are not familiar with the site or the required best management practices. As construction proceeds, risk generally declines. Soil disturbing activities should be scheduled for low-risk periods of prolonged dry weather, not in the wet winter season.

Field Reviews

A field review is required prior to initiation of any disturbance. Aqua-Tex, or another suitably qualified QEP, must be advised at least one week in advance of the work. The field review should confirm that the recommended measures are in place:

- Prior to site disturbance, including demolition, the SPEA should be clearly marked across the width of the property with orange snow fencing and signs indicating the debris and stockpiles of excavated material are not to be placed in or adjacent to the SPEA.
- An erosion and sediment control plan should be developed and appropriate monitoring measures included on a monitoring checklist (see recommendation in Measures – Sediment and Erosion Control During Construction).
- A silt fence should be installed on the downhill side of the proposed area of disturbance.
- Areas outside the SPEA should be selected for stockpiling of excavated materials.
- Prior to site disturbance, key locations on the site for monitoring photographs should be chosen. These should be locations which will not be disturbed by the development activities and enable photography of key site features. These locations should be used as Photopoint Monitoring locations where regular photographs will be taken (camera locations). These locations should provide a broad and complete overview of site activities in addition to specific areas of interest (e.g. water clarity in the streams or wetland).

Environmental Monitoring

In order to ensure that the SPEA water quality is protected, the site should be monitored regularly to ensure that no erosion or sedimentation is occurring, that signage, fencing and erosion control measures are in place, and that stockpiles and debris do not enter the SPEA. The use of repeat photography is a simple method for documenting site conditions and should be a core component of the environmental monitoring program – this method is called Photopoint Monitoring.

Photopoint Monitoring is a standardized procedure, developed largely by Dr. Fred Hall of the U.S. Forest Service, for taking precisely replicable photographs of resources that require long-term management^{vi}. Photopoint Monitoring is both a qualitative and quantitative tool that can assist in detecting unacceptable conditions in target resources before severe or irreversible changes occur and allow time to implement corrective actions.

• During construction, the site should be checked on a weekly basis and after every significant rainstorm (6mm [1/4"] or greater).

- Repeat photos should be taken at each camera location as well as candid photos showing activities of interest and the general condition of the site.
- Photos should be time and date stamped and stored in a central location for future reference if requested.
- During weekly inspections, the environmental monitor should utilize a standardized checklist which includes all the items noted above as well as measures from the erosion and sediment control plan.
- The monitor should check that the items listed under "Field Reviews" above remain in place in addition to confirming the following:
 - O Debris should be contained in construction bins and debris capable of being blown around by wind (plastics, asphalt shingles, etc.) should be contained in a bin or other container with a lid.
 - O During months when rain is anticipated, stockpiles must be covered with tarps, poly or other means to prevent runoff. Ideally excavated material would be removed from site and properly disposed of in a designated facility.

The intent with environmental monitoring is to document changes to the landscape and that any such changes to the landscape have not resulted in harm to the ecology of the site or watershed.

13. Measures to Protect, Enhance, And Restore Ecosystem Values

As noted above, this Alternate Approval Process is being sought, not because the width of the riparian buffer (SPEA) cannot be maintained, but because the trees within the buffer are dying and already subject to considerable windthrow. The RAPR permits removal of danger trees within the SPEA, but it does not permit removal of other trees as a preventative measure, even if the trees are in poor health. The arborists have recommended a program of tree removal, with forest floor protection, within the SPEA. They have also prescribed a tree replanting program which will be supplemented by a riparian shrub replanting and enhancement program. These removal/ replanting plans are detailed within the arborists' report and also within the *Hillside Ecological Assessment and Habitat Enhancement* report (Aqua-Tex). The numbers and locations of shrubs are included in the Landscape Plans for ease of explanation.

It is our professional opinion, that this program will not only maintain the stream in a state of Proper Functioning Condition, but it will ultimately enhance the ecological condition as a new healthy forest replaces the diseased and windthrown forest that is present. Wherever possible, the larger diameter trees will be retained as wildlife trees to support birds and other terrestrial wildlife and the wood on the forest floor will be retained to support amphibians and reptiles. The riparian zone will be fenced to prevent trampling and invasive species will be removed. We believe this is a significant improvement beyond simply fencing off the existing buffer which is in poor and declining health.

14. Photos



Photo 1. Latoria Northeast Creek, south of the southern property boundary, looking downstream of the bridge and culvert stream crossing installed by the City of Colwood in Havenwood Park in August 2016 (Photo 3).



Photo 2. Outlet of culvert under municipal stream crossing over Latoria Northeast Creek.



Photo 3. Inlet of culvert under municipal stream crossing over Latoria Northeast Creek on the east parcel of Havenwood Park.



Photo 4. Latoria Northeast Creek looking upstream from southern property boundary. Note the ferns adjacent to the stream HWM, indicating minimal flow fluctuations, given the very small headwater catchment. Photo taken on June 22nd, 2020.



Photo 5. Himalayan blackberry (*Rubus armeniacus*) brambles in Latoria Northeast Creek are well-established, likely resulting from the construction of Veterans' Memorial Parkway.

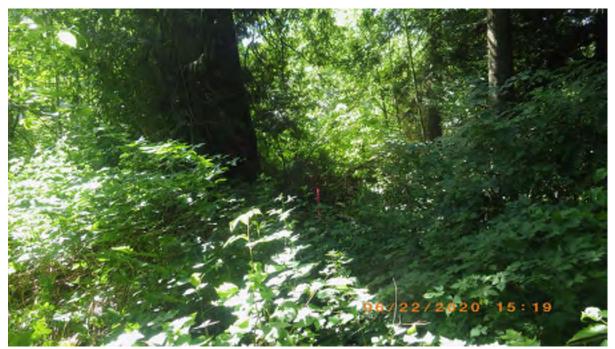


Photo 6. Upstream end of Latoria Northeast Creek on the east parcel. Note the presence of large conifers and the dense shrub layer surrounding the creek. The stream and its riparian stream banks are maintained in a low light intensity during the growing seasons.

15. Professional Opinion

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

Date April 15th, 2021

1. I/We, Wm. Patrick Lucey R.P.Bio.,

Please list name(s) of qualified environmental professional(s) and their professional designation that are involved in assessment.)

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 <u>BC-ALTA Developments</u>, which proposal is described in section 3 of this Assessment Report (the "development proposal"),
- 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.
 - c) Under the City of Colwood Alternative Approval Process the protection of the stream and its riparian buffer will be maintained and the stream will remain in a state of PFC if the proposed development complies with the measures recommended in this report.

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

Appendix 1: Experience of Assessment Team

	0010 D 10
Date:	2018-Dec-13
Name of Qualified Environmental Professional (QEP):	Wm. Patrick Lucey
Professional designation:	R.P. Bio., C. Biol.
Professional association:	College of Applied Biology of BC; Royal Society of Biology (UK)
Registration number:	1467; P0119549
Training in Riparian Areas Protection	,
Regulation assessment methods	
Organization or agency delivery training:	Vancouver Island University
Name of trainer:	
Date of training sessions:	November 2005 and July 2020
Other relevant education, training or	
experience	
RAR Professional Practice Guidelines	May 2018
Training, Nanaimo BC	, == :=
Field Soil Description and Classification,	June 2017
Wayne Blashill, P.Ag. (Instructor). Columbia	
Mountains Institute, Revelstoke BC	
Forest and Range Evaluation Program (FREP)	November 2016
riparian protocol training, 3-day course. Mr.	
Derek Tripp, instructor. Victoria BC	
BCWF Wetland Institute- Eastern Vancouver	September 2014
Island	·
Riparian Roads Workshop- US National	May 2001
Riparian Roads Team, Portland OR	
CVRD Development Services RAR Workshop,	April 2015
Duncan BC	
RAR QEP Workshop, Nanaimo BC	January 2013
RAR QEP Workshop, Victoria BC	January 2013
RAR QEP Workshop, Nanaimo BC	February 2012
Applied Fluvial Geomorphology, Level 1.	June 2006
Dr. Dave Rosgen (Instructor) Wildland	
Hydrology, Pagosa Springs, CO.	
Greenline Vegetation Monitoring for Riparian	July 2000
Areas. Dr. Alma Winward (Instructor),	
Richfield, Utah	
Instructor Training PFC Train the Trainer- US	May 1999
National Riparian Service Team	
Proper Functioning Condition (PFC)	March 1998
Assessment Training. US National Riparian	
Service Team. Whistler, Pemberton and	
Victoria.	A
Proper Functioning Condition (PFC)	August 1997
Assessment Training. Oregon State University,	
Klamath Falls, OR	1004
M.Sc., Biology, University of Victoria. Thesis:	1994
Periphyton functional and structural response,	
within semi-natural surrogate streams, to	
artificially induced water quality perturbations B.A. Geography, University of Victoria.	1990
Aquatic Resource Management	1990
Aquatio Hesource Management	

Riparia	n assessments completed or	Primary QEP	Secondary QEP
contrib	uted to		
1.	Lantzville Foothills Estates (Kettle Creek) (2006-02-20) (#52)	Patrick Lucey	Paul DeGreeff, BCSLA
2.	1945 Sooke Road (Colwood Creek) (2006-04) (not uploaded)	Patrick Lucey	Cori Barraclough Don Skinner, RP Bio Arborist
3.	551 Latoria Road ("Madrona Creek"- unnamed tributary of Latoria Creek) (2006-04-09)	Patrick Lucey	
4.	Arbutus Mountain Estates - Phase 1 (Shawnigan Creek) (2006-03-29) (#60)	Patrick Lucey	Lehna Malmkvist, RP Bio.
5.	Westlock Rd. Subdivision (Trumpeter Pointe) (Quamichan Lake) (2005-08-18) (#77)	Patrick Lucey	Rick Lloyd P.Eng.
6.	1404 Wild Cherry Drive (Metchosin Creek) (2006-04-15) (#78)	Patrick Lucey	
7.	Westlock Rd. Subdivision (Trumpeter Pointe) (Quamichan Lake) (2006-04- 25) (#77 revision)	Patrick Lucey	Rick Lloyd P.Eng.
8.	Baranti Developments (Mill Bay Tributary) (2007-04-25) (#435)	Patrick Lucey	Lehna Malmkvist, RP Bio., Alec Morse, P.Eg., Don Skinner, RP Bio
9.	Waldy Road (Cowichan Bay) (2008- 01-08) (#726)	Patrick Lucey	Lehna Malmkvist, RP Bio.
10.	1545 Cowichan Bay Road (2008-12- 08) (#727)	Patrick Lucey	Lehna Malmkvist, RP Bio.
11.	Westhills Community (Langford Lake & tributaries) (2008-06-12) (not submitted- Langford not registered in RAR database)	Patrick Lucey	Lehna Malmkvist, RP Bio.
12.	Oasis Lake (Sooke Lake Road) (2008- 06-24) (#972)	Patrick Lucey	
13.	2215 Clearihue Road (Shawnigan Lake) (2008-06-26) (#976)	Patrick Lucey	
14.	3031 Phillips Road (Sooke River) (2008-08-12 updated 2009-01) (#1044)	Patrick Lucey	Lehna Malmkvist, RP Bio.
15.	3501 Paradise Valley Road (Cheakamus River) (2008-09-23) (#1097)	Patrick Lucey	Lehna Malmkvist, RP Bio. Brian LaCas, P.Eng.
16.	9270 Lochside Drive (Reay Creek) (2008-11-24) (#1157)	Patrick Lucey	Cori Barraclough

17.	Sooke Business Park (3220 Otter	Patrick Lucey	Lehna Malmkvist, RP Bio
	Point Rd) (2008-06-05 revised 2008-		-,
	12-18) (#1180)		
18.	Goldstream Avenue (Millstream Creek)	Patrick Lucey	
	(2010-02-17) (#1557)		
19.	Stebbings Road (VanHorne Creek)	Patrick Lucey	Lehna Malmkvist, RP Bio.
	(2010-04-14; modified 2011-01-11)		
	(#1597)		
20.	Morgan Maples RV Park (Chemainus	Patrick Lucey	Lehna Malmkvist, RP Bio.
	River trib) (2010-04-26) (#1610)		
21.	Elkington Forest – Comprehensive	Patrick Lucey	
	(Shawnigan Creek tribs) (2010-07-23)		
	(#1712)		
22.	1785 Whiffen Spit Road (Wright Road	Patrick Lucey	
	Creek) (2010-07-27) (#1723)		
23.	Elkington Forest (Creek 19B) (2010-	Patrick Lucey	
	12-09)(#1850)		
24.	3055 Phillips Road (Sooke River)	Patrick Lucey	
	(2010-12-17) (#1857)		
25.	St. Rose of Lima - 2191 Townsend	Patrick Lucey	Cori Barraclough
	Road (Knott Creek) (2011-01-10)		
	(#1876)	D. I. I. I.	
26.	1585 W. Shawnigan Lake Road	Patrick Lucey	
	(Shawnigan Lake) (2011-01-13)		
07	(#1878)	Dataialalaaaaa	
27.	2585 Selwyn Road (Millstream Creek)	Patrick Lucey	
	(not submitted- Langford not		
20	registered in RAR database) 1609 Keating Cross Road (Graham	Patrick Lucov	Cori Barraclough
∠8.	Creek) (2010-12-03) (not submitted at	Patrick Lucey	CON DanaClough
	client request)		
20	2637 Savory Road (Florence Lake)	Patrick Lucey	
29.	(2011-05-3) (#LANGFORD- NOT	I allick Lucey	
	UPLOADED TO RARNS)		
30	Goodwin Farms-Munn Road (Fizzle	Patrick Lucey	Cori Barraclough
	Creek) (2011-06-06) (#2054)	. all on Edocy	5 511 Ballaolougii
31	2907 Phillip St Duncan (Holmes	Patrick Lucey	
	Creek) (2011-09-09) (#2131) (note:	Latitoric Edocoy	
	also submitted as #2112- should be		
	deleted, wrong regional district)		
32.	Sahtlam Lodge (Cowichan River)	Patrick Lucey	
	(2011-09-16) (#2145)		
33.	Lot 6, Shawnigan Lake Road (Van	Patrick Lucey	
	Horne Creek) (2011-09-16, updated		
	, , , , , , ,	<u> </u>	

	2011-10-03, updated 2012-02-06)		
	(#2147)		
34.	227 Meadowbrook Road, Saanich BC	Patrick Lucey	
	(OCP revision- not uploaded) (2012-		
0.5	01-25)	Databalala	Ohana Maana D. Oaa
35.	Elkington Trailhead Creek #19 (2012-	Patrick Lucey	Shane Moore, P. Geo.
	06-19) (#2412)	D	
36.	Elkington Creek 17 and Lower	Patrick Lucey	
	Elkington Tributary (2012-08-08,		
0.7	revised 2018-09) (#2482)	Datable Lorens	
37.	288/290 Beecher Bay Road (2013-09-	Patrick Lucey	
	04) (#2877)	B	
38.	1591 W. Shawnigan Lake Road, Don	Patrick Lucey	
	Calveley (Shawnigan Lake) (#2478)		
39.	2054 Butler Avenue, Gary Henshaw	Patrick Lucey	
	(Shawnigan Lake)(2013-04-12) (#2749)		
40.	5080 Cowichan Lake Road, Deborah	Patrick Lucey	Justin Straker, P.Ag.
	Juch (2014-07-10)(Simple		
	Assessment Tributary to Cowichan		
	River) (#3181)		
41.	875 Whittaker Road, Spectacle Creek	Patrick Lucey	
	& Unnamed Tributary (2015-08-21)		
	(#3689)		
42.	820 Latoria Road, Unnamed Tributary	Patrick Lucey	
	to Pritchard Creek, JTC Investment		
	Group (2015-07-26) (#LANGFORD-		
	NOT UPLOADED TO RARNS)		
43.	Craigflower Creek, Fort Victoria RAR,	Patrick Lucey	
	Goodwill Investments Ltd. (2015-07-		
	21) (#3662)		
44.	6244 Rodolph Road, Central Saanich	Patrick Lucey	Don Skinner RP Bio.,
	Creek, Aplomado Developments		Arborist
	(2014-08-26) (#3226)		
45.	2000 Renfrew Road, Shawnigan Lake	Patrick Lucey	
	(2014-07-28) (#3182)		
46.	Pritchard Creek, TJBS Holdings (Aug.	Patrick Lucey	
	2012) (#LANGFORD- NOT		
	UPLOADED TO RARNS)		
47.	2219 London Road, Shawnigan Lake	Patrick Lucey	
	(2014-08-26) (#3227)		
48.	Dovedale Road; Lot 41, Tributary to	Patrick Lucey	
	Shawnigan Lake (2014-10-22) (#3293)		
49.	2010 Renfrew Road Shawnigan Lake	Patrick Lucey	
	(2014-11-05) (#3304)		

w	89 Kangaroo Road, Hewitt Creek Vetland & Unnamed Tributary (2015- 3-29) (#3461)	Patrick Lucey	
	999 Renfrew Road Koksilah River 2015-07-12) (#3476)	Patrick Lucey	
(2	74 Latoria Road, Pritchard Creek 2015-03-31) (# LANGFORD- NOT IPLOADED)	Patrick Lucey	
	660 Monterey Avenue (2015-05-26) #3562)	Cori Barraclough	Patrick Lucey
	590 Gilbert Drive (2016-04-27) #4015)	Patrick Lucey	
	319 Stevenson Road, Shawnigan ake, (2016-06-22) (#4085)	Patrick Lucey	
	ot 4, Ark Road. Roofmart. (2017-04- 6) (#4595)	Patrick Lucey	
W	939 and 1945 Sooke Road, Brookes Vestshore School, Colwood Creek. 2017-03-30) (#4605	Patrick Lucey	Cori Barraclough
H	60 Stebbings Road, Goldstream leights, Tributary to Van Horne creek. (2017-06-13) (#4637)	Patrick Lucey	
М	68,474 and 476 Millstream Rd., fillstream Creek, (2017-06-02) fXXXX). NOT UPLOADED TO RARNS	Patrick Lucey	Tracy Motyer, Richard Brimmel, P.Eng., (Geotechnical) Jan Hoel, P.Eng. (stormwater), Tom Talbot (arborist)
	105 Cypress Road, Tharratt Brook 2017-11-03) (#4879)	Patrick Lucey	Tracy Motyer
(2	lorizon Terrace, Pritchard Creek 2018-03-29) (# LANGFORD- NOT IPLOADED)	Patrick Lucey	
	140 Payne Road, Duncan (2018-06- 1) (#5215)	Steve Voller	Tracy Motyer
	MCA Camp Thunderbird, Glinz Lake, 1ark Dodd (2018-10-12) (#5425)	Cori Barraclough	Tracy Motyer
	Goldstream Heights, Tarras. (2018- 2-04) (# 2018)	Patrick Lucey	Cori Barraclough Tracy Motyer
	368 Renfrew Road, Dan Nikirk, hawnigan Lake (2018-12-13) (#5514)	Patrick Lucey	Cori Barraclough Tracy Motyer
C	393 Turner Lane, John Laurie, cobble Hill (2018-12-31; revised 019-04-26) (#5542)	Patrick Lucey	Tracy Motyer

67.	7069 East Saanich Road, Darleen	Cori	
	Taylor, Saanichton (2019-03-15)	Barraclough	
	(#5632)		
68.	2222 Renfrew Road, Len	Patrick Lucey	Steve Voller
	Wansbrough, Shawnigan Lake (2019-		
	03-25) (#5549)		
69.	2220 Renfrew Road, Tom Wilson,	Patrick Lucey	Cori Barraclough
	Shawnigan Lake (2019-04-12)		
	(#Noname 17 - Submitted by email to		
	Charlotte Billingham, FLNRORD)		
70.	PID 009-861-823, Millstream Road,	Patrick Lucey	Cori Barraclough
	District of Highlands (CRD Korene		
	Torney, P. Geo., PMP, Supervisor,		
	Geo-Environmental Programs (2019-		
	08-22) (#5868a)		
71.	PID 009-861-815 & 024-273-163,	Patrick Lucey	Cori Barraclough
	Millstream Road, District of Highlands		
	(CRD Korene Torney, P. Geo., PMP,		
	Supervisor, Geo-Environmental		
	Programs (2019-08-22) (#5869a)		
72.	2201 Clearihue Road, Shawnigan	Patrick Lucey	
	Lake (CVRD); Calvin Cook; (#5860)		
73.	2040 Cullin Road, Shawnigan Lake	Patrick Lucey	
	(CVRD); Glen MacDonald; (#5916)		
74.	4890 Munn Road, District of	Patrick Lucey	
	Highlands; Ethan and Natasha		
	Ghidoni; (#5934)		
75.	2054 Butler Avenue, Shawnigan Lake	Patrick Lucey	
	(CVRD); Gary Henshaw; (#6500)		
76.	2143 Fulford-Ganges Road, Salt	Cori	Tracy Motyer
	Spring Island (Islands Trust); Suzanne	Barraclough	
	Drzymala; (#6505)		

Appendix 2: Proper Functioning Condition Lotic Checklist and Report

Riparian Area/Stream Name: <u>Latoria Northeast Creek, City of Colwood, 3461 Veterans'</u> <u>Memorial Parkway (VMP)</u> Date: <u>2021-04-15</u>

Segment/Reach ID: <u>I, adjacent to 3461 VMP</u> _ID Team Observers: <u>Wm. Patrick Lucey, Tracy Motyer</u>

Rosgen channel type: Bc	GPS start:	GPS end:
-------------------------	------------	----------

Yes	No	N/A	HYDROLOGY
		\checkmark	1) Floodplain is inundated in "relatively frequent" events.
		\checkmark	2) Beaver dams are stable.
\checkmark			3) Sinuosity, gradient, and width/depth ratio are in balance with the landscape setting (i.e. landform, geology, and bioclimatic region).
\checkmark	√		4) Riparian-wetland area is expanding or has achieved potential extent.
\checkmark			5) Riparian impairment from the upstream or upland watershed is absent (Old=Upland watershed is not contributing to riparian-wetland degradation).

Yes	No	N/A	VEGETATION
\checkmark			7)* There are adequate age classes of stabilizing riparian vegetation for recovery/maintenance.
\checkmark			6) There is adequate diversity of stabilizing riparian vegetation for recovery/maintenance (species present).
\checkmark			8) Species present indicate maintenance of riparian soil moisture characteristics.
✓			9) Stabilizing plant communities capable of withstanding moderately high streamflow events are present along the streambank (Old=Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (community types present)).
✓			10) Riparian plants exhibit high vigour.
\checkmark			11) An adequate amount of stabilizing riparian vegetation is present to protect banks and dissipate energy during moderately high flows (enough).

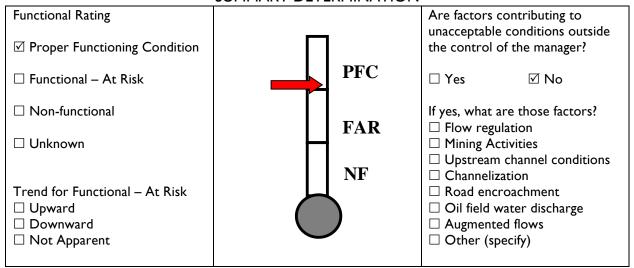
^{*}This is not a typo. The 2015 version of the checklist reverses questions 6 and 7. These are in the same order as earlier versions, but numbered to match the updated 2015 checklist.

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	\checkmark	12) Plant communities are an adequate source of woody material for maintenance/recovery.
--	--------------	--

Yes	No	N/A	GEOMORPHOLOGY
\checkmark			13) Floodplain and channel characteristics (<i>i.e.</i> rocks, woody material, vegetation, floodplain size, overflow channels) are adequate to dissipate energy.
		\checkmark	14) Point bars are revegetating with stabilizing riparian plants.
\checkmark			15) Streambanks are laterally stable (Old = Lateral stream movement is associated with natural sinuosity)
\checkmark			16) Stream system is vertically stable (not downcutting/incising)
\checkmark			17) Stream is in balance with the water and sediment being supplied by the drainage basin (<i>i.e.</i> no excessive erosion or deposition)

SUMMARY DETERMINATION



Remarks

Potential Channel Type: Bc
Present Channel Type: Bc

Potential Riparian-Wetland Vegetation: Douglas fir, western redcedar, grand fir, dense deciduous understory of shrubs.

Constraints: The channelized stream lies within the road allowance of a major municipal connector road (Veterans' Memorial Parkway). This channel is constrained by the road to the west and private land development to the east. The streambed lies within a municipal road allowance, as does the western riparian area, while the eastern riparian area lies on private property. The historic stand of mature conifers has extensive root rot leaving the trees vulnerable to blowdown (Dunster Report, 2021). The clearing of the treed hillside to the east will further exacerbate the risk of blowdown of mature conifers within the riparian area. The Arborist's

report recommends the removal of mature conifers within the riparian zone (Dunster Report, 2021), or their conversion to wildlife trees. There is a natural regenerative understory of young conifers within the riparian zone. The risk of wildfire within the treed canopy in the riparian zone is moderate given the dense deciduous understory and the recommended removal or height reduction of the mature conifers. Fuel management loading within the riparian zone should be considered in the context of the adjacent treed Havenwood Park.

Potential Restoration: Planting of young conifers and deciduous trees within the riparian zone is recommended. Species of conifers recommended for replanting are grand fir, Douglas fir, western redcedar, and Sitka spruce. Deciduous trees for replanting include bigleaf maple, Pacific dogwood, black hawthorn, and crabapple. After the clearing of large conifers, the creek will be able to stay in PFC with a deciduous shrub understory, while the new tree plantings grow. Note: given the small catchment and low gradient, this headwater stream is capable of maintaining bank soil stability with healthy shrub root systems. It does not require large trees for stability.

The swale on the east side of VMP is currently overgrown with invasive blackberry and represents a potential replanting ribbon with shrubs that offer bird habitat. To avoid future Danger Tree concerns, this area should not be considered a future treed site. Replanting within this bioswale ribbon would require approval from the municipality and would need to conform to municipal road shoulder maintenance requirements.

Notes (#'s from checklist):

- 1) Stream channel has flat adjacent terraces which are frequently flooded; channel type shifts between a Rosgen B and short segments of Rosgen C channel type.
- 2) No beavers are present and there is no historical evidence beavers lived in this rocky outcrop area.
- 3) The slope of 4% results in a partially channelized stream bed, modified by minor quantities of down-cutting and scouring during construction of the VMP as a major connector roadway.
- 4) This answer is a 'tweener' (lies between both 'yes' and 'no'). Vegetation growth has begun to narrow the stream channel over the 7-year period this channel has been observed, albeit on a sporadic basis. See attached photographs of channel.
- 5) The catchment for this headwater reach is small with small wetlands upstream that attenuate storm flow and runoff from the small segment of adjacent highway. A vegetated swale lies between the roadway and the reach, further attenuating storm flow events.
- 6) There are mature and second growth trees, with a dense understory of deciduous shrubs.
- 7) Very numerous species within the stream banks and adjacent riparian soils. See Arborist report attached.
- 8) The riparian plant community is dominated by riparian species.
- 9) Numerous mature and second growth trees are present; the very small catchment contributing to the stream flow limit erosive flow velocities; this headwater reach has the potential to have its stream banks stabilized by small, young trees (conifers) as well as deciduous trees and shrubs.
- 10) There is a significant fungal infestation amongst the conifers but not present within the deciduous tree and shrub plant community.
- 11) Stream banks have <10% bare soil; there are dense understory shrubs lining the banks.

- 12) This headwater channel has a very small catchment and large wood is not required for channel / bank stability.
- 13) The very small catchment contributing to the stream flow limit erosive flow velocities; this headwater reach has the potential to have its stream banks stabilized by small, young trees (conifers) as well as deciduous trees and shrubs.
- 14) This is a Rosgen B channel type; C segments are short and reflect stepped terraces.
- 15) There is no evidence of the stream moving laterally as this stream channel is a modified historical channel / wetland system; the construction of the VMP roadway resulted in the stream channel being confined by adjacent raised roadbeds.
- 16) The low gradient and small catchment preclude head-cutting.

Additional Comments:

- Shared management of aquatic habitat. Stream lies primarily on VMP road allowance/ROW (municipal); eastern riparian land predominantly on 3461 VMP (private).
- There are currently extensive invasive species, especially Himalayan blackberry.

Stream Name: Latoria Northeast Creek, City of Colwood, 3461 Veterans' Memorial Parkway

(VMP) Reach #1 Date: 2021-04-15

Riogeoclimatic Zone: CDFmm Team: Wm. Patrick Lucey, Tracy Motyer

Biog	eocl		Zone: <u>CDFmm</u>	Team: <u>Wm. Patrick Lucey, Tracy Motye</u>					
		Sym-							
	√	bol	Common Name	Scientific Name	AB	GS	WIC	SC	IN
	✓		Douglas-fir	Pseudotsuga menziesii					
			western hemlock	Tsuga heterophylla					
	✓		western redcedar	Thuja plicata					
	✓		Grand fir	Abies grandis					
			amabilis fir	Abies amabilis					
			vine maple	Acer circinatum (7-9 lobes)					
Trees			Douglas maple	Acer glabrum (3-4 lobes)					
Ļ	✓		big leaf maple	Acer macrophyllum					
			western white pine	Pinus monticola (5 needles)					
			shore pine	Pinus contorta (2 needles)					
	✓		red alder	Alnus rubra					
			Sitka spruce	Picea stichensis					
			yellow cedar	Chamaecyparis nootkatensis					
			black cottonwood	Populus balsamifera					
_	✓		salal	Gaultheria shallon					
	√		dull Oregon grape	Mahonia nervosa					
	√		salmonberry	Rubus spectabilis					
			creeping raspberry	Rubus pedatus					
			trailing blackberry	Rubus ursinus					
Shrubs			false azalea	Menziesia ferruginia					
			Alaskan blueberry	Vaccinium alaskaense					
Š			oval-leaved blueberry	Vaccinium ovalifolium					
	✓		red huckleberry	Vaccinium parvifolium					
			dwarf dogwood	Cornus canadensis					
			prince's pine	Chimaphila umbellata					
			devil's club	Oplopanax horridus					
			red-flowering currant	Ribes sanguineum					
	✓		sword fern	Polystichum munitum					
	✓		bracken fern	Pteridium aquilinum					
			deer fern	Blechnum spicant					
			maidenhair fern	Adiantum pedatum					
S	✓		lady fern	Athyrium filix-femina					
Herbs			oak fern	Gymnocarpium dryopteris					
I			licorice fern	Polypodium glycyrrhiza					
			twinflower	Linnaea borealis					
			broad-leaved starflower	Trientalis latifolia					
			vanilla leaf	Achlys triphylla					
	√		skunk cabbage	Symphocarpus foetidus					
			flat moss	Plagiothecium undulatum					
Mosses			lanky moss	Rhytidadelphus loreus					
10s			step moss	Hylocomium splendens					
_			Oregon beaked moss	Kindbergia oregana					
U	√		Daphne	Daphne laureola					
Exotic	√		Himalayan blackberry	Rubus discolor					
ŭ	√		English holly	Ilex aquifolium					

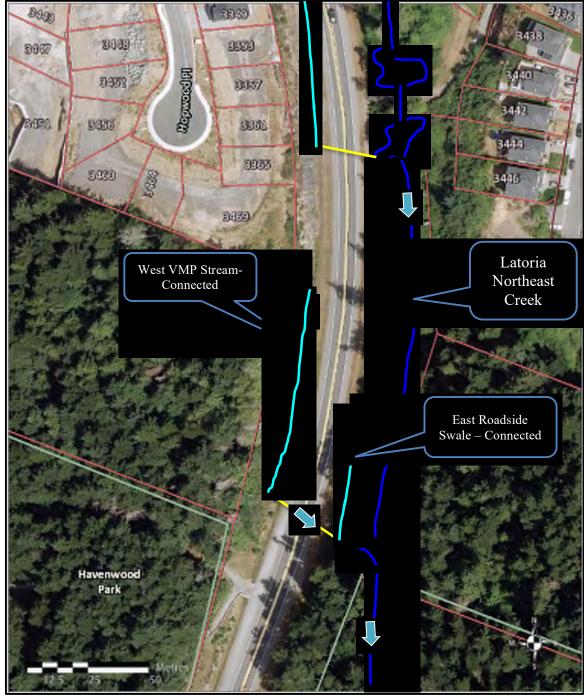


Figure 1. Sketch of Latoria Northeast Creek and the roadside swales along Veterans' Memorial Parkway. Solid lines (teal and dark blue) indicate channels directly connected to Latoria Northeast Creek, while the dashed teal line represents the roadside swale which is not directly connected to Latoria Northeast Creek; arrows denote the direction of flow. Sketch is approximate, this figure is intended for illustrative purposes only. The distance between the solid teal line (western side of VMP) and the property line is approximately 10-15 metres. Image Source: CRD Regional Community Atlas (2013 orthophoto).



Figure 2. Looking downstream along Latoria Northeast Creek Reach 1 just south of the southern property boundary of the east parcel. Photograph taken in Havenwood Park on May 28th 2020.



Figure 3. Latoria Northeast Creek Reach 1 looking upstream. The creek makes its way through a dense shrub canopy along the eastern edge of Veterans' Memorial Parkway. (Photograph taken 2014)



Figure 4. New culvert and trail crossing. Photograph taken May 28th 2020.



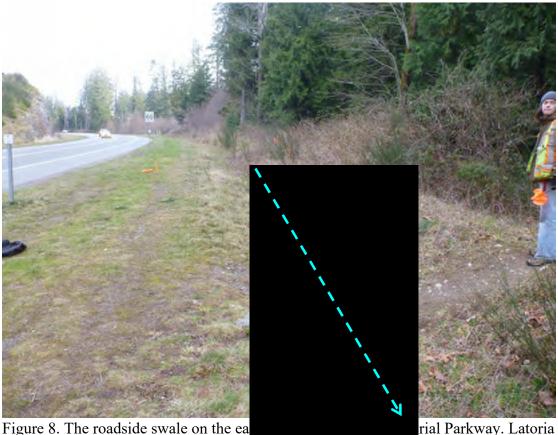
Figure 5. Himalayan blackberry brambles in Latoria Northeast Creek are well-established likely as a result of the construction of Veterans' Memorial Parkway, which left disturbed landscapes adjacent to the new road. (Photograph taken 2014)



Figure 6. Mature second growth trees with root rot that are proposed to be removed or topped and left as wildlife trees (Dunster & Associates Windthrow and Tree Health Report, 2021). Large wood from the trees shall be left within the riparian zone but shall not create blockages in the stream channel which could result in avulsions or stream braiding. Note the dense shrub understory. Photograph taken May 28th 2020.



Figure 7. Image looking NE across VMP at the treed canopy within the east parcel's SPEA zone. Note the understory growth that has extended west across the grassy landscape shown in Figure 8. Yellow arrow = a large snag. Photo taken May 28th 2020.



Northeeast Creek Reach 1 is located on the east side (right) of the swale in the treed canopy to the right of the photograph. The swale and its east banks are a potential replanting ribbon for shrubs. Photograph taken 2020.

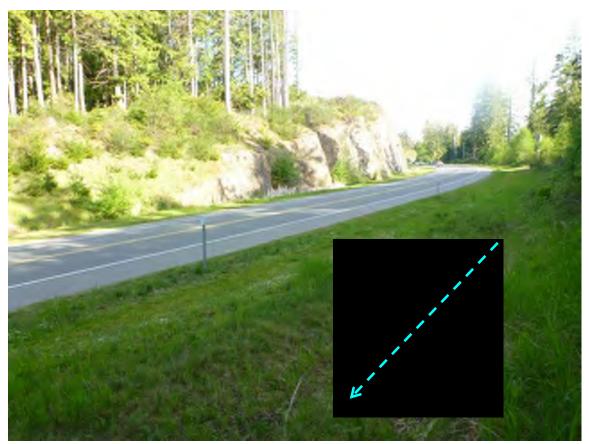


Figure 9. Roadside swale on the east side of VMP. Note there is no evidence of soil or particulate partitioning that would meet the definition of a stream channel within any portion of the bioswale; runoff from VMP appears to consist solely of sheet flow. Dashed line = runoff flow direction. (Photograph taken 2014)



Figure 10. Dry stream bed during the late spring, 2020, showing scouring of bed soils; the stream has a wide terraced braided width. Photograph taken June 22nd 2020.



Figure 11. Dry stream bed showing moderate slope angle, dense understory vegetation, mosaic light into riparian understory and adjacent treed canopy. Photograph taken June 22nd 2020.



Figure 12. Large mature conifer snag, with top broken and heartwood decay. Note the dense shrub understory. Photograph taken June 22nd 2020.

Statement of Limitations

Aqua-Tex has provided this report for the client, BC-ALTA Developments, solely for the purpose noted above.

Aqua-Tex has exercised reasonable professional skill, care and diligence to assess the information acquired during the preparation of this report but makes no guarantees or warranties as to the accuracy or completeness of this information. The information contained in this report is based upon, and limited by, the circumstances and conditions acknowledged herein, and upon information available at the time of its preparation. The information provided by others is believed to be accurate but cannot be guaranteed.

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This PFC report <u>remains valid for two years</u> only if the site conditions remain unaltered and the proposed development remains the same. If the development plans change, or if site conditions change, the report may no longer be valid.

Appendix 3: Arborist and Forester's Report	

References

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http://www.env.gov.bc.ca/epd/epdpa/mpp/stormwater/stormwater.html

¹ U.S. Department of the Interior. 2015. Riparian area management: Proper functioning condition assessment for lotic areas. Technical Reference 1737-15. Bureau of Land Management, National Operations Center, Denver, CO.

ⁱⁱ Dickard, M., M. Gonzalez, W. Elmore, S. Leonard, D. Smith, S. Smith, J. Staats, P. Summers, D.Weixelman, S. Wyman. 2015. Riparian area management: Proper functioning conditionassessment for lotic areas. Technical Reference 1737-15.U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO.

iii British Columbia Ministry of Environment. 2002. Stormwater Planning: a Guidebook for British Columbia.

^{iv} Department of Fisheries and Oceans Canada. 1992. Land Development Guidelines for the Protection of Aquatic Habitat. www.dfo-mpo.gc.ca/Library/165353.pdf

^v United States Environmental Protection Agency (EPA). 2007. Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites. EPA 833-R-06-004.

vi Hall, F.C., 2001. Ground-based photographic monitoring. Gen. Tech. Rep. PNW-GTR-503. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 340 p. http://www.fs.fed.us/pnw/pubs/gtr503/

SCHEDULE 3, RIPARIAN ALTERNATIVE ASSESSMENT REPORT

Riparian Alternative Approval Assessment



Prepared for: Mike Achtem, P.Eng., Islander Engineering May 13th, 2021

Prepared by: Wm. Patrick Lucey, M.Sc., R.P. Bio., CBiol, MRSB Tracy Motyer, B.Sc., R.B. Tech

Jordana Herron, A.Sc., Trainee (R.B. Tech)



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1. Executive Summary

This report was prepared for Mike Achtem, P. Eng., for a proposed multi-family, residential development adjacent to Veterans' Memorial Parkway (VMP), and Havenwood Park, in the City of Colwood.

There are two distinct property parcels on either side of VMP (Figure 2). The *Riparian Areas and Marine Shoreline Environmental Development Permit Area* will be addressed for the western parcel following the provincial Riparian Area Protection Regulation (RAPR) process and the eastern parcel will be addressed under the City of Colwood's Alternative Approval Process, as per Section 20.1 of their OCP. This report specifically addresses the eastern parcel and the Alternative Approval Process.

This assessment is seeking approval under the alternative assessment option for the following reasons:

- 1. While the maintaining riparian buffer width along Latoria North Creek as prescribed under RAPR is feasible, it is not possible to protect the trees within the buffer due to their current unhealthy condition and potential for windthrow. This means that the site is not compliant with RAPR and an alternative approval path is needed.
- 2. Based on the arborists' reports and on-site meetings, even if the development did not proceed, significant windthrow would continue to occur in the riparian buffer.
- 3. The removal of dead and dying overstory trees (due to root disease and drought stress) and replacement with younger healthier trees is a net ecological benefit to the ecological function of the site. There is still significant decadent forest in neighbouring Havenwood Park to meet the habitat needs of birds who are reliant on such trees (e.g. woodpeckers) and every effort will be made to convert suitable trees into wildlife trees instead of completely removing them.
- 4. Replacing this portion of the forest now, before the whole thing, including Havenwood Park, is in a similar condition, will provide incremental recovery and help buffer future tree losses.

This report conforms to the RAPR standard and assessment process in all other regards.

A RAPR assessment was undertaken for the east parcel to determine the riparian setback. The riparian assessment included a review of the potential tree canopy response to the removal of the majority of the trees within the development footprint within this parcel. The findings of the tree assessment found that a significant portion of the trees on the property are impacted by a root rot fungus and trees within the riparian area are not good candidates for retention with future development. The trees pose a windthrow and danger tree hazard to Veterans' Memorial Parkway (VMP) and the proposed future development and are proposed for removal. Provided there is no increase in fuel loading, trees within the riparian zone will be left as wildlife trees and branches and trunks will be left on the forest floor, as prescribed by the Consulting Arborist. A tree replanting plan has been recommended by the arborists for both the trees on parkland and any trees within the

SPEA. The replanting plan will require a replacement ratio specified by the City of Colwood.

The RAPR calculated a 15.6 m SPEA for Latoria North Creek. The City of Colwood Land Use Bylaw riparian setback is 15.0 m. The assessment team determined that a 15.0 m SPEA is appropriate for Latoria North Creek. No relocation or in-filling of any portion of a watercourse or water body is proposed, only a stream crossing to be addressed under the Water Sustainability Act (Section 11 Notification Process). This Alternative Approval Process for the eastern parcel is triggered by the need to actively manage trees within the SPEA for windthrow and danger-tree considerations.

The stream and riparian buffer are currently in a state of Proper Functioning Condition (PFC) and will be maintained in this state¹. The proposed removal of trees within the Streamside Protection and Enhancement Area (SPEA *a.k.a* riparian buffer) shall be subject to a City of Colwood approved plan for compensatory mitigation measures on the subject property or elsewhere in the watershed. This replanting plan is described by the arborist's report. The replanting plan will achieve a significant net ecological benefit, that shall be demonstrated by the Qualified Environmental Professional (QEP) to the satisfaction of the City. Compensatory mitigation measures must result in replacement habitat that achieves a state of PFC. The replanting of the tree portion of the riparian plant community shall be based upon a plan that addresses the fungal infections present in many of the existing riparian trees, as well as those trees on the steep slopes.

Note: As *per* the "Summary of Comments Received for RZ-20-010 in Response to City of Colwood Referrals Sent December 15, 2020" document dated February 19th, 2021, both the stream west of VMP and the stream east of VMP have been requested to be named "Latoria North Creek." To ensure there is no confusion throughout this report, the tributaries to Latoria Creek shall be referred to by the authors as follows (Figure 3):

- The tributary arm that flows from the headwater wetland on the west parcel of the subject property, through the west parcel of Havenwood Park, and under VMP shall be referred to as Latoria Northwest Creek.
- The tributary arm that flows parallel to VMP adjacent to the east parcel of the property shall be referred to as Latoria Northeast Creek.
- The section of the tributary downstream of the confluence of the above two arms and until it flows into Latoria Creek shall be referred to as Latoria North Creek.

2. Introduction and Proposed Development

There are two distinct property parcels on either side of VMP (Figure 2). A provincial Riparian Area Protection Regulation (RAPR) assessment was undertaken and Streamside Protection and Enhancement Areas (SPEAs) were assigned to watercourses on both parcels. During that process it became apparent that trees within the SPEA of the east parcel would require active management beyond what is permitted in the RAPR. Therefore, an Alternative Approval Process was undertaken, as per Section 20.1 of the City of Colwood's Official Community Plan. This report specifically addresses the eastern parcel and the Alterative Approval Process within the City's *Riparian Areas and Marine Shoreline Environmental Development Permit Area*.

Development on the east parcel will maintain a 15.0 m setback width. No relocation or in-filling of any portion of a watercourse or water body is proposed only a stream crossing to be addressed under the Water Sustainability Act (Section 11 Notification Process). This alternative approval process is triggered by the need to actively manage trees within the SPEA for windthrow and danger-tree considerations.

The proposed timeline for construction of the eastern parcel is July 2021 to December 2023.

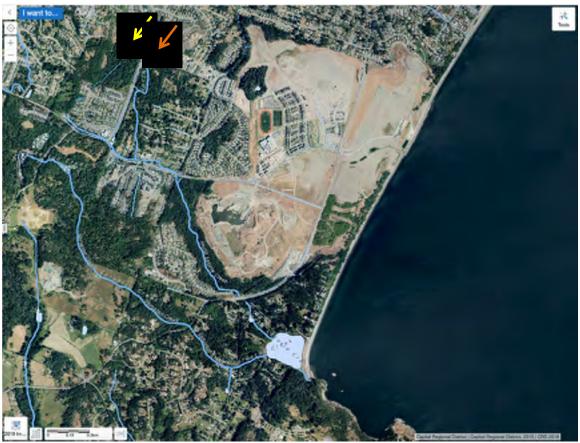


Figure 1. Overview map showing the location of the subject property (yellow arrow = west parcel; orange arrow = east parcel), which is divided into two segments by Veterans' Memorial Parkway (VMP) and is located within the City of Colwood. Image Source: CRD Regional Community Atlas (2019 orthophoto).



Figure 2. Aerial photograph of the subject property (outlined in red) and adjacent lands showing the eastern and western parcels. This report is specific to the eastern parcel. Image Source: CRD Regional Community Atlas (2019 orthophoto).

3. Assessment Team

The field assessment was conducted by Patrick Lucey, R.P. Bio., with assistance from Tracy Motyer, B.Sc. R.B. Tech, and Jordana Herron, A.Sc, Trainee (RBTech). The report was prepared by Mr. Lucey. Specialists engaged to contribute to this report included Graham Mackenzie, Consulting Arborist, Dr. Julian A Dunster R.P.F., R.P.P., M.C.I.P., ISA Certified Arborist, ASCA Registered Consulting Arborist # 378, ISA Tree Risk Assessment Qualified, and Mike Achtem, P. Eng.

The experience of the QEP Riparian Assessment team is included as Appendix 1.

4. Watershed Overview

Latoria Creek Watershed covers approximately 200 ha and includes a small portion of the southwest corner of Triangle Mountain, Havenwood Park, a portion of the Olympic View Golf Course property, as well as residential and undeveloped properties on either side of Latoria Road between VMP and the ocean (Figure 3). Latoria Creek, which is between 1 and 3 m wide, drains through Latoria Creek Park, and ultimately discharges into Albert Head Lagoon. It has been ditched throughout most of its length along Latoria Road and is the receiving water for storm drainage. The stream contains sticklebacks, but does not appear to support salmonids in the upper reaches, due to an impassable barrier upstream of Albert Head Lagoon which prevents anadromous species from migrating upstream. A pond upstream of Albert Head Lagoon was stocked with rainbow trout many years ago, but they do not appear to have colonized the stream. Latoria Northwest Creek is a headwater tributary stream, draining a wetland on the west parcel of the subject property, that flows through Havenwood Park, crossing under Veterans' Memorial Parkway and then flowing into Latoria North Creek (Figure 3). Latoria Northeast Creek flows south along the east side of VMP and flows into Latoria North Creek, which then flows into Latoria Creek (Figure 3).

Latoria Creek Watershed

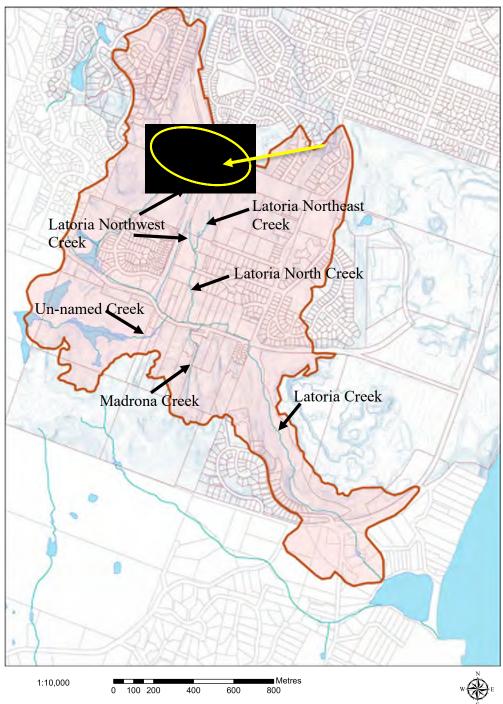


Figure 3. Latoria Creek Watershed showing the entire catchment, as well as the sub-catchment streams and riparian-wetland areas. The subject property is marked with the yellow circle and arrow. Note this watershed map is a general drainage catchment.

Precipitation

Precipitation measured near the subject property is greatest between November and January and typically falls as rain between 120 mm and 180 mm per month. During the dry period, rainfall averages around 25 mm per month. Temperatures average around 16°C in summer and 5-6°C in winter

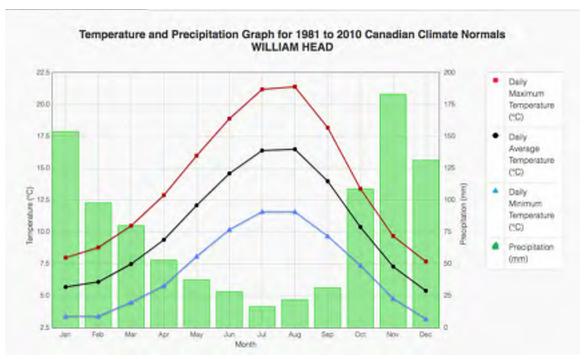


Figure 4. Graph of Environment Canada temperature and precipitation normals for 1981-2010 for the William Head weather station, located near the subject property.

Table 1. Table of Environment Canada temperature and precipitation normals for 1981-2010 for the William Head weather station.

Temperature														
		198	1 to 20	10 Cana	dian Cli	imate N	ormals	station	data					
					Temp	erature								
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Daily Average (°C)	5.7	6.1	7.5	9.4	12.1	14.6	16.4	16.5	14.0	10.4	7.3	5.4	10.5	9
Standard Deviation	1.3	1.4	1.1	0.9	1.0	0.9	1.0	0.8	1.0	0.8	1.6	1.4	1.3	9
Daily Maximum (°C)	8.0	8.8	10.5	12.9	16.0	18.9	21.2	21.4	18.2	13.4	9.7	7.7	13.9	9
Daily Minimum (°C)	3.4	3.4	4.5	5.8	8.1	10.2	11.6	11.6	9.7	7.4	4.8	3.2	7.0	0
Extreme Maximum (°C)	17.0	16.7	20.0	23.0	28.9	29.4	31.0	31.1	26.5	22.0	17.2	16.0		
Date (yyyy/dd)	2005/ 19	1963/	2004/	2006/	1969/	1966/	1998/ 27	1960/	1998/	2003/ 01	1975/ 03	1980/ 26		
Extreme Minimum (°C)	-8.5	-11.0	4.5	-0.6	1.1	3.9	6.0	5.0	2.2	-1.5	-9.5	-13.9		
Date (yyyy/dd)	1982/ 06	1989/	1989/	1963/	1965/ 06	1972/ 07	2006/	1980/ 29	1972/ 27	1984/	1985/ 27	1968/ 29		
Precipitation														
		198	1 to 20	10 Cana	dian Cli	imate N	ormals	station	data					
					Precis	oitation								
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Rainfall (mm)	150.1	94.3	78.6	53.1	37.6	28.3	16.6	22.1	31.4	108.8	180.7	128.8	930.3	0
Snowfall (cm)	3.7	3.6	1.5	0.0	0.0	0.0	0.0	0.0	0.0	.0.1	2.4	2.6	13.8	9
Precipitation (mm)	153.8	97.9	80.1	53.1	37.6	28.3	16.6	22.1	31.4	108.9	183.1	131.4	944.1	0

Climate Patterns

In April 2017, the CRD published the *Climate Projections for the Capital Region* report. Models for precipitation and temperature were used to assess changes in climate expected by the 2050s and the 2080s. General climate projections for the region include wetter winters, drier summers, warmer average temperatures throughout the year (though unevenly distributed over the seasons), and "more intense extreme events". The following is an excerpt from this report:

"As our climate warms, our region can expect the number of summer days above 25°C to triple, from an average of 12 days per year to 36 days per year. The 1-in-20 hottest day's temperature is projected to increase from 32°C to 36°C by the 2050s. These rising temperatures will result in a 22% increase in the growing season length and a 49% increase in growing degree days by the 2050s. This projected warming will have implications for regional ecosystems, watersheds, agriculture and horticulture, and communities. Warmer winters mean the region will experience a 69% decrease in the number of frost days, significantly impacting the natural environment.... The "new normal" is a climate that is almost entirely frost-free at lower elevations.

Annual precipitation projections are a modest 5% increase by the 2050s and 12% by the 2080s. Projections indicate that the fall season will see the greatest increase in precipitation.

This precipitation is expected during increasingly extreme events, with about 31% more precipitation on very wet days (95th percentile wettest days precipitation indicator) and 68% more on extremely wet days (99th percentile wettest days precipitation indicator). Despite the projected increased intensity of wet events, the amount of rain in summer is expected to decrease by 20%, while the duration of dry spells will lengthen by about 20%."

These climate projections may have a serious effect on stream habitats such as Latoria Creek and its tributaries, including Latoria North Creek, especially since it is a fish-bearing system. Warmer summer temperatures may increase water temperatures and lower dissolved oxygen concentrations in streams, as well as contribute to lower flows, both of which negatively impact cold-water fish stocks such as trout and salmon, found in the lower reaches of Latoria Creek, below the impassible falls upstream of Albert Head Lagoon. Additionally, more extreme precipitation events in the fall, winter and spring may cause higher flows, with increased velocities, and negatively affect fish-spawning habitat through channel erosion, and the deposition of sediment.

5. Study Area and Fisheries Resources

The subject property at 3461 Veterans' Memorial Parkway is located within the City of Colwood on the east side of VMP and is bordered to the south by Havenwood Park (Figure 1 and Figure 2).

The subject property lies within the Latoria Creek watershed. The property is located near a height of land that forms part of the headwaters of Latoria Northeast Creek (eastern property parcel) and Latoria Northwest Creek (western property parcel). Latoria Northeast Creek and Latoria Northwest Creek, along with Latoria North Creek, are major tributaries to Latoria Creek (Figure 3).

A search through the Provincial Fisheries Information Database Query (FIDQ) did not yield any results for Latoria North Creek or Latoria Creek; however, observations threespine stickleback and signal crayfish have been made throughout Latoria Creek and sculpin and trout have been observed in the lower reaches. Latoria North Creek, and, therefore, Latoria Northeast Creek, is assumed to be fish bearing, for the purposes of this assessment, due to its connection to fish bearing Latoria Creek. No fish trapping studies have been conducted to verify the presence or absence of fish in the upper reaches of Latoria Northeast Creek, where the project site is located.

6. Methods

A detailed RAPR field assessment was conducted for the site *per* standard RAPR methods. The Stream Boundary was identified in the field and then surveyed by a BC Land Surveyor and placed on a Site Plan. A 15.6 m SPEA, measured horizontally from the Stream Boundary, was calculated for the riparian setback for Latoria Northeast Creek in the east parcel. The minimum riparian setback prescribed in the Colwood OCP, and the 2019 *Fisheries Act* is 15m. The treed canopy within the SPEA has been assessed by Julian

Dunster, R.P.F., who has provided recommendations for post-construction/development plant community management.

7. Field Assessment

Latoria Northeast Creek

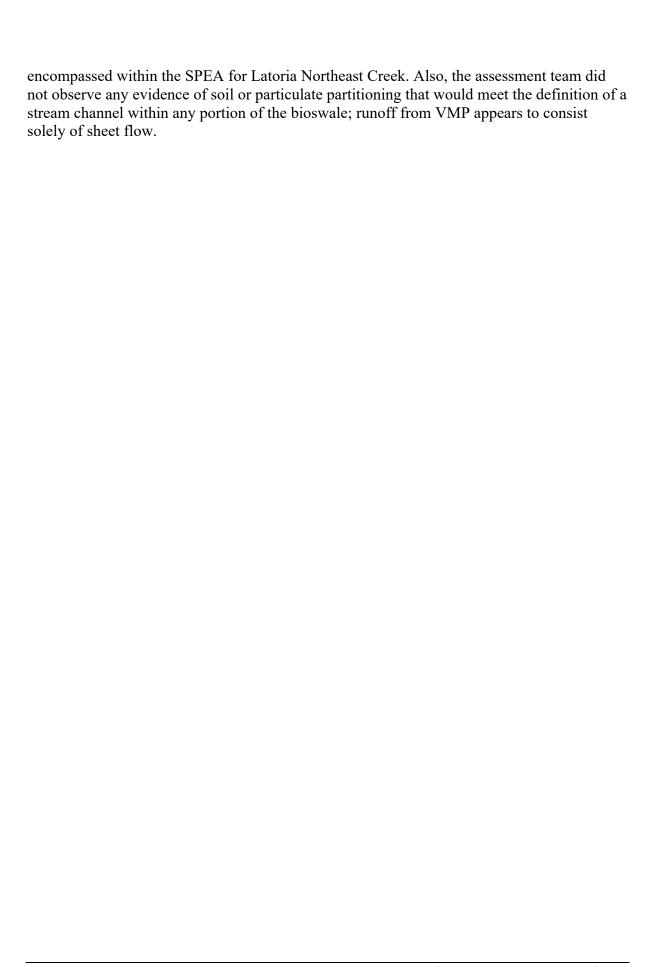
Latoria Northeast Creek flows south along the western edge of the eastern portion of the property in close proximity to VMP. Most of the stream lies within the road allowance for VMP and the channel is heavily overgrown with salmonberry (*Rubus spectabilis*), and Himalayan blackberry (*Rubus discolor*). There are several veteran trees and snags present in this area including western redcedar (*Thuja plicata*) and Douglas-fir (*Pseudotsuga menziesii*); a significant amount of blowdown was noted along the edge of the canopy adjacent to VMP. Other species present include: sword fern (*Polystichum munitum*), salmonberry (*Rubus spectabilis*), red alder (*Alnus rubra*), bigleaf maple (*Acer macrophyllum*), English holly (*Ilex aquifolium*), Daphne (*Daphne laureola*), and dull Oregon-grape (*Mahonia nervosa*).

Latoria Northeast Creek on the east parcel begins near the height of land approximately 450m upstream (north) of the subject property and flows south through a series of small ponds/wetlands largely within the road allowance for VMP. Downstream of the subject property, Latoria Northeast Creek flows southwest through Havenwood Park, eventually flowing into Latoria North Creek, which then flows into Latoria Creek along Latoria Road (Figure 3). Havenwood Creek consists of a mixture of channel types: narrow Rosgen C short reaches, interspersed with broad over-widened reaches showing evidence of excessive erosion and bank scour. Large deposits of sediment are evident, down cutting has occurred, and the bank plant community is dominated by a dense thicket of invasive species. In general the channel shows extensive evidence of excessive erosion given the legacy of road construction and loss of mature riparian vegetation. A significant amount of windthrow was also observed in the riparian zone and adjacent area.

Veterans' Memorial Parkway; Roadside Channels

Along the VMP frontage of the subject property, there is a shallow grassy swale on the east side of VMP, between the road and Latoria Northeast Creek. This swale is present along the southern half of the property frontage. This swale intercepts and treats road runoff from VMP and is separated from Latoria North Creek by a large berm. The swale is located entirely within the road allowance for VMP. The east swale drains into Latoria Northeast Creek at the outlet of a cross culvert under VMP which conveys water from the west side of VMP to the Creek.

The east swale has not been included in the RAPR assessment or the Alternative Approval Process because it is beyond the property boundary and would not have any SPEA setback implications for any proposed development on the subject property. Given its location between VMP and Latoria Northeast Creek, any setbacks on the swale would be



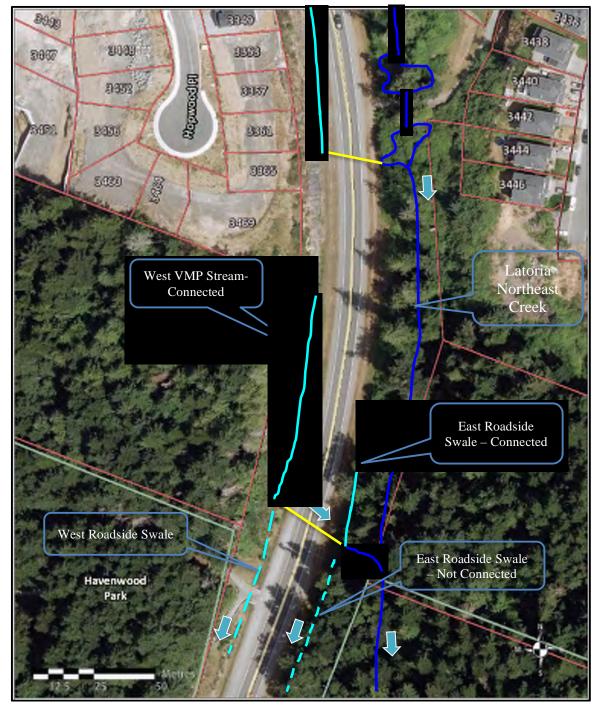


Figure 5. Sketch of Latoria Northeast Creek and the roadside swales along Veterans' Memorial Parkway. Solid lines (teal and dark blue) indicate channels directly connected to Latoria North Creek, while the dashed teal line represents the roadside swale which is not directly connected to Latoria North Creek; arrows denote the direction of flow. Sketch is approximate, this figure is intended for illustrative purposes only. Image Source: CRD Regional Community Atlas (2013 orthophoto).

Zones of Sensitivity and Streamside Protection and Enhancement Area.
The Zones of Sensitivity and SPEA width, as calculated in the RAPR are included below in the provincial forms to demonstrate that the RAPR setback was calculated and is being maintained.

8. Results of Detailed Riparian Assessment

Latoria Northeast Creek

Refer to Section 3 of	Technic	cal Manual	Date: 2020-06-23						
Description of Wa	ater bo	odies involv	ved (number, type)	Latoria Northeast Creek, Reach 1					
Stream		Χ							
Wetland									
Lake									
Ditch									
lumber 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	5.0			I, Wm. Patrick Lucey, R.P. Bio, hereby certify that:
upstream	4.5			a) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the <i>Riparian</i>
	12.4		2	Areas Protection Act;
	6.8			b) I am qualified to carry out this part of the assessment of the
	4.2			development proposal made by the developer <u>BC-ALTA</u>
downstream	2.8		5	Developments; c) I have carried out an assessment of the development proposal
	6.2			and my assessment is set out in this Assessment Report; and
	3.7		5	d) In carrying out my assessment of the development proposal, I
	9.0			have followed the technical manual to the Riparian Areas Protection Regulation.
	3.0			1 Totodon 1 togulation.
	4.0		4	
Total: minus high /low	46.4			
mean	5.2		4	
	R/P	C/P	S/P	
Channel Type		Χ		

Site Potential Vegetation Type (SPVT)

	Yes	No					
SPVT Polygons		Х	Tick yes only if multiple polygons, if No then fill in one set of SPVT data boxes				
			a) I am a d Regular b) I am qu made b c) I have d set out	rick Lucey, R.P. Bio, hereby certify that: qualified environmental professional, as defined in the Riparian Areas Protection tion made under the <i>Riparian Areas Protection Act</i> ; alified to carry out this part of the assessment of the development proposal y the developer <u>BC-ALTA Developments</u> ; carried out an assessment of the development proposal and my assessment is in this Assessment Report; and ing out my assessment of the development proposal, I have followed the			
		_	technical manual to the Riparian Areas Protection Regulation.				
Polygon No:	1			Method employed if other than TR			
	LC	SH	TR				
SPVT Type			X				
		_					
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 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 10.4 Stability ZOS (m)
Litter fall and insect drop ZOS (m)
Shade ZOS (m) max 15.6* South bank Yes X No
Ditch Justification description for classifying as a ditch (manmade,
no significant headwaters or springs, seasonal flow)
Ditch Fish Yes No If non-fish bearing insert no fish
Bearing bearing status report
SPEA maximum 15.6* (For ditch use table3-7)
Segment 2 If two sides of a stream involved, each side is a separate segment. For all water
No: bodies multiple segments occur where there are multiple SPVT polygons
LWD, Bank and Channel 10.4 Stability ZOS (m)
Litter fall and insect drop 15.0
ZOS (m)
Shade ZOS (m) max 15.6 South bank Yes No X
SPEA maximum 15.0* (For ditch use table3-7)
(1 or allow deer tables 1)
Segment If two sides of a stream involved, each side is a separate segment. For all water
No: bodies multiple segments occur where there are multiple SPVT polygons
LWD, Bank and Channel
Stability ZOS (m)
Litter fall and insect drop
ZOS (m)
Shade ZOS (m) max South bank Yes No
SPEA maximum (For ditch use table3-7)
I, Wm. Patrick Lucey, 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;
Aledo I follodio I Alei,

- I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>BC-ALTA Developments</u>;
- 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 technical manual to the Riparian Areas Protection Regulation.

Comments

- Latoria Northeast Creek flows south in close proximity to VMP; most of the stream lies within the road allowance.
- Headwaters at height of land ~450m upstream.
- Channel is heavily overgrown with salmonberry (*Rubus spectalbilis*), and Himalayan blackberry (*Rubus discolour*).
- Numerous veteran trees and snags present including western redcedar (*Thuja plicata*) and Douglas-fir (*Pseudotsuga menziesii*); a significant amount of blowdown was noted along the edge of the canopy adjacent to VMP.
- Other species present include: sword fern (*Polystichum munitum*), salmonberry (*Rubus spectalbilis*), red alder (*Alnus rubra*), bigleaf maple (*Acer macrophyllium*), English holly (*Ilex aquifolium*), Daphne (*Daphne laureola*), and dull Oregon-grape (*Mahonia nervosa*).
- Flows into Latoria North Creek, which then flows into Latoria Creek at Latoria Road.
- Note: The 15.6m SPEA width exceeds the 15m leave strip requirement in the Riparian and Wet Area Guidelines of the Colwood OCP.
- * It is worth noting that the ZOS for shade of 15.6 m is on a due south trajectory and does not affect the horizontal setback, which would be 15.0 m.*

9. Results of Proper Functioning Condition Assessment

The stream was assessed in April 2021 and found to be in Proper Functioning Conditionⁱⁱ, but at the low end. Areas of concern included the fact that the riparian zone is not improving, as it is subject to routine disturbance, and that the conifers in the riparian zone are subject to root rot. Finally, the stream lies partially within the municipal road allowance and the stream course has been historically altered by the construction of Veterans' Memorial Parkway.

Complete details of the PFC Assessment are contained in Appendix 2.

10. Site Plans

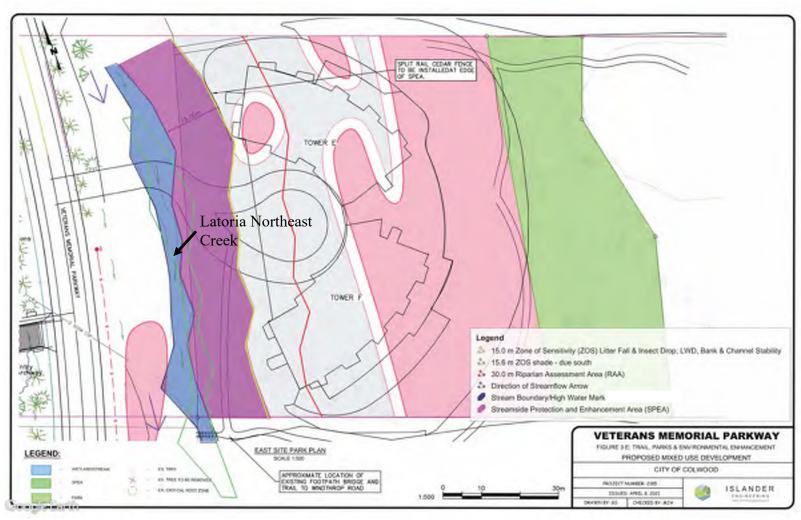


Figure 6. Site Plan for the east development showing the RAPR ZOSs, HWMs, property boundaries, and building footprint. Pink polygons on this site plan indicate steep slope areas.



Figure 7. Site Plan for the east development.

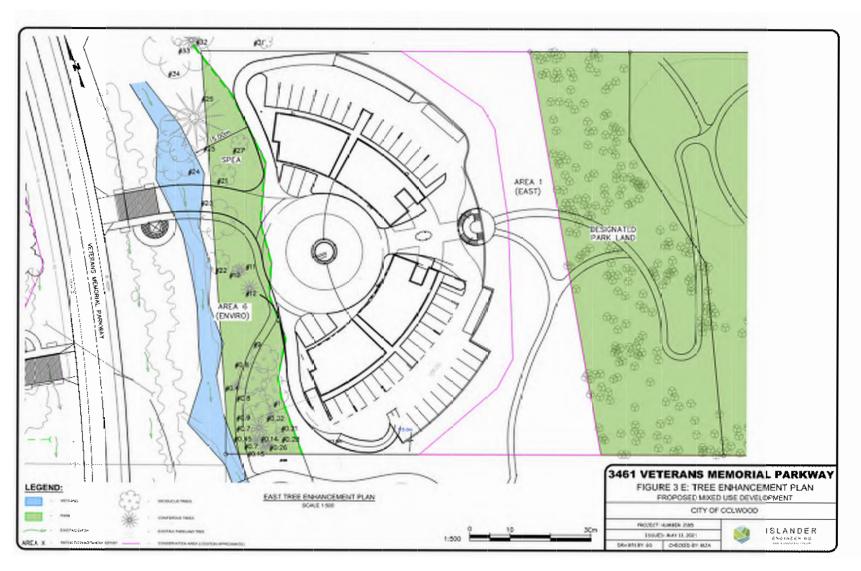


Figure 8. Tree Enhancement Plan for the east development.

11. Measures to Protect and Maintain the Riparian Setback

Measures - Danger Trees

Riparian vegetation in the SPEA, including trees, is vital to streamside soil function and stability and must be protected. The only vegetation management that is permitted in the SPEA is the treatment of Danger Trees. A Danger Tree is a tree that is a hazard to people or property due to its location or lean, its physical damage, overhead conditions, deterioration of its limbs, stem or root system, or any combination of these conditions.

See reports by Julian Dunster and Graham Mackenzie.

1. Danger Trees

- I, Julian Dunster, R.P.F., 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;
- I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>BC-ALTA</u> <u>Developments</u>;
- 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.

Measures - Windthrow

Windthrow (trees knocked over due to wind) can be a risk to people and property, and if excessive, can result in a loss of function of riparian vegetation in the SPEA. Windthrow is especially a risk when adjacent forest or individual trees are cleared or new structures are built, thus changing wind patterns and creating new stresses on remaining trees that are not adapted to the new wind patterns.

See reports by Julian Dunster and Graham Mackenzie.

2. Windthrow

I Julian Dunster, R.P.F., 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;
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Measures - Slope Stability

Typical field indicators of instability include buttress wood on trees, evidence of slumps or landslip, soil and rock accumulated on the uphill sides of trees, tension cracks in soil, poorly drained or gullied fine-textured soils, shallow or wet organic soils on slopes, or very steep slopes or debris at the bottom of slopes.

• There are no indicators of slope instability on the subject property.

3. Slope Stability

- I, Wm. Patrick Lucey, 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;
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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 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.

Measures - Protection of Trees in the SPEA

Riparian vegetation in the SPEA, including trees, is vital to stream function and stability and must be protected. This includes root zones, which may extend beyond the SPEA boundary.

See reports by Julian Dunster and Graham Mackenzie.

Encroachment into the SPEA will be prevented with temporary orange fencing during construction (See Preventing Encroachment in the SPEA below).

- The SPEA trees will be protected by having a temporary orange snow fencing barrier, demarcating the non-disturbance zone, upstream and downstream of the construction footprint shall be constructed prior to ANY construction activity.
- The temporary barrier fence shall be at least 1.5 metres in height; it shall be constructed of 2" x 4" lumber, with orange snow fencing attached to the wooden barrier. The fence shall remain in place until all construction activity has been completed and the structure has been commissioned for occupancy.
- Signage every 5 metres on the orange snow fencing will indicate the SPEA and that it is a non-disturbance management zone. Signage shall be printed using weather proof materials.
- Silt fencing shall be installed across the full frontage of the property (east to west) under the supervision of the QEP.
- A Certified Danger Tree Assessor shall be retained prior to any danger trees being considered for removal outside the SPEA to ensure that the removal does not result in harm to trees within the SPEA.
- Photopoint Monitoring of the trees beyond the temporary wooden barrier shall be
 photographed to document the health of the trees and shrub understory prior to
 construction, as a baseline of riparian health. This Photopoint baseline shall be used
 to assess post-construction conservation/protection of the SPEA outside the
 construction footprint and be used as part of the Post-construction Report.
- The design and implementation of the E&SC Plan will ensure that no harmful runoff leaves the construction footprint/disturbance zone that could potentially harm tree roots.
- The E&SC Plan, including Monitoring, shall be maintained to ensure trees are protected during construction.
- All trees along both property boundaries shall be protected and conserved.
- During the removal of the existing dwelling the trees adjacent to the dwelling, along the property boundary, shall be fenced off behind an orange snow fence.
- Any demolition activity of the existing dwelling shall ensure that the root zones (under the tree's drip line) shall be protected from disturbance.

4. Protection of Trees

I, Julian Dunster, R.P.F., 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;
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Measures - Preventing Encroachment in the SPEA

As part of the proposed subdivision, potential sites for dwellings are included on the site plan. There are no proposed buildings within the SPEA.

During construction, the SPEA will be delineated with orange snow fencing and signage as a visual reminder not to stockpile materials or trample tree roots.

- The temporary barrier fence shall be at least 1.5 metres in height; it shall be constructed of 2" x 4" lumber, with orange snow fencing attached to the wooden barrier. The fence shall remain in place until all construction activity has been completed and the structure has been commissioned for occupancy.
- Signage every 5 metres on the orange snow fencing will indicate the SPEA and that
 it is a non-disturbance management zone. Signage shall be printed using weather
 proof materials.
- Note: the initial silt fence and orange snow fence are to be **erected outside the SPEA during construction.**

5. Encroachment

I, Wm. Patrick Lucey, 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;
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Measures – Sediment and Erosion Control During Construction

Measures to prevent sediment flowing into the wetland shall be implemented under the supervision and monitoring of the QEP.

The owner or a contract professional Ecologist, Landscape Architect or Engineer (e.g., a QEP), is responsible for designing an effective erosion and sediment control plan to ensure that during construction, no sediment-laden water enters the stream or wetland SPEA and that erosion of exposed soils does not occur such that the SPEA is damaged. The Latoria Creek watershed is in a fish-bearing system, therefore, there is zero tolerance for turbid or sediment-laden runoff entering the wetland and streams of this development. The RAPR also prohibits treatment, including infiltration, of stormwater within the SPEA.

The plan need not be complicated, but it should be followed carefully.

The Federal Fisheries Act prohibits the deposition of a deleterious substance (including sediment) in water frequented by fish. Furthermore, any stormwater discharges into adjacent receiving environments (especially freshwater ecosystems) must ensure that the Federal and Provincial water quality guidelines for the protection of aquatic life are not exceeded in the receiving environments. The Federal Guidelines are administered by the Canadian Council of Ministers of the Environment (CCME) and Provincial Guidelines are administered by the B.C. Ministry of Environment (BC MoE).

In order to comply with the Act and Guidelines, it is essential that any Erosion and Sediment Control Plan be designed to an adequate standard. Three documents that outline general principles and approaches for managing stormwater and controlling sediment and erosion are:

- "Stormwater Planning: a Guidebook for British Columbia," produced by BC MoE (2002)iii;
- "Land Development Guidelines for the Protection of Aquatic Habitat," produced by DFO (1992)iv; and
- "Storm water management for industrial activities: developing pollution prevention plans and best management practices," produced by the U.S. Environmental Protection Agency (1992)v.

The EPA (1992) document has been found to be the most stringent in its standards and best management practices (BMPs), which meet and exceed provincial BMPs and guidelines. The principal requirement of the US EPA method is the development of a Stormwater Pollution Prevention Plan (SPPP or PPP), which must be implemented prior to commencement of any on-site construction activity. Guidelines for the implementation of a Pollution Prevention Plan are outlined below:

- Always maintain a clean and organized work area.
- Stage work to minimize the disturbed area and duration of exposure.
- Ensure that debris from demolition is properly contained and that debris does not enter the wetland and streams.
- Silt fences should be used to prevent sediment-laden water from entering the SPEA. Silt fences are useful for slowing, diverting and preventing runoff from

- entering a watercourse. It is not appropriate to use silt fences to try and filter flowing turbid water.
- Prevent upslope water from running over disturbed areas, using diversion berms or other methods to intercept flows.
- Wherever possible, preserve vegetation and cover soils. Stabilize disturbed areas as quickly as possible with temporary or permanent covers (e.g. straw/mulch, grass seed, tarp etc.).
- Ensure runoff velocities are maintained at the lowest practical value. Maintain sheet flow and avoid channelizing runoff.
- Use site-specific sediment control structures to ensure suspended solids are retained on-site wherever possible.
- Avoid the siting of soil and debris stockpiles near the SPEA.
- Prepare for and clean up any and all spills. Repair all equipment oil and fuel leaks. A
 Spill Cleanup Kit should be included as part of the heavy equipment operators'
 Standard Operating Procedures; all equipment operators should be properly trained
 in the use of the Spill Cleanup Kits.
- Take care when using concrete and ensure that fresh concrete and concrete wash water do not runoff into the streams or wetland. Un-cured concrete, and concrete wash water, is extremely toxic to aquatic organisms.
- Avoid the unnecessary use of water for cleaning to minimize the subsequent need for treatment of suspended solids.
- Ensure the regular inspection and monitoring of sediment control structures (e.g. silt fences, settling ponds etc.) as part of the construction program, particularly after rainstorm events. Remove sediment build-up to ensure continued effectiveness.
- Weekly inspections, combined with Photopoint Monitoring, are essential to monitor and document the effectiveness of the erosion and sediment control plan. See the Environmental Monitoring section of this report for a more detailed description about environmental monitoring procedures recommended for this project.
- See attached Tips on Installing Silt Fences.

6. Sediment and Erosion Control

- I, Wm. Patrick Lucey, 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;
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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 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.

Measures – Stormwater Management

Care should be taken when designing the stormwater management measures to ensure there are no deleterious effects to the stream or wetland SPEAs. Stormwater flows must be discharged in a manner that prevents channelization and erosive forces, and prevents sediment deposition into the riparian management zones. There is zero tolerance for untreated runoff entering the riparian management zones.

• The stormwater management plan shall be designed by the project civil engineer with input from a QEP.

7. Stormwater Management

I, Mike Achtem, P.Eng., 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;
- I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>BC-ALTA</u> <u>Developments</u>;
- 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.

Measures - Floodplain Concerns

There are no floodplain concerns on this site.

8. Floodplain Concerns (highly mobile channel)

I, Wm. Patrick Lucey, 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;
- I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>BC-ALTA</u> <u>Developments</u>;
- 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.

12. Field Reviews and Environmental Monitoring

In general, the most environmentally dangerous period of development is the initial construction phase when land is cleared of vegetation and graded to create a proper surface for construction. This initial phase tends to involve open exposed soils, often involves demolition and debris, and may involve contractors who are not familiar with the site or the required best management practices. As construction proceeds, risk generally declines. Soil disturbing activities should be scheduled for low-risk periods of prolonged dry weather, not in the wet winter season.

Field Reviews

A field review is required prior to initiation of any disturbance. Aqua-Tex, or another suitably qualified QEP, must be advised at least one week in advance of the work. The field review should confirm that the recommended measures are in place:

- Prior to site disturbance, including demolition, the SPEA should be clearly marked across the width of the property with orange snow fencing and signs indicating the debris and stockpiles of excavated material are not to be placed in or adjacent to the SPEA.
- An erosion and sediment control plan should be developed and appropriate monitoring measures included on a monitoring checklist (see recommendation in Measures – Sediment and Erosion Control During Construction).
- A silt fence should be installed on the downhill side of the proposed area of disturbance.
- Areas outside the SPEA should be selected for stockpiling of excavated materials.
- Prior to site disturbance, key locations on the site for monitoring photographs should be chosen. These should be locations which will not be disturbed by the development activities and enable photography of key site features. These locations should be used as Photopoint Monitoring locations where regular photographs will be taken (camera locations). These locations should provide a broad and complete overview of site activities in addition to specific areas of interest (e.g. water clarity in the streams or wetland).

Environmental Monitoring

In order to ensure that the SPEA water quality is protected, the site should be monitored regularly to ensure that no erosion or sedimentation is occurring, that signage, fencing and erosion control measures are in place, and that stockpiles and debris do not enter the SPEA. The use of repeat photography is a simple method for documenting site conditions and should be a core component of the environmental monitoring program – this method is called Photopoint Monitoring.

Photopoint Monitoring is a standardized procedure, developed largely by Dr. Fred Hall of the U.S. Forest Service, for taking precisely replicable photographs of resources that require long-term management^{vi}. Photopoint Monitoring is both a qualitative and quantitative tool that can assist in detecting unacceptable conditions in target resources before severe or irreversible changes occur and allow time to implement corrective actions.

• During construction, the site should be checked on a weekly basis and after every significant rainstorm (6mm [1/4"] or greater).

- Repeat photos should be taken at each camera location as well as candid photos showing activities of interest and the general condition of the site.
- Photos should be time and date stamped and stored in a central location for future reference if requested.
- During weekly inspections, the environmental monitor should utilize a standardized checklist which includes all the items noted above as well as measures from the erosion and sediment control plan.
- The monitor should check that the items listed under "Field Reviews" above remain in place in addition to confirming the following:
 - O Debris should be contained in construction bins and debris capable of being blown around by wind (plastics, asphalt shingles, etc.) should be contained in a bin or other container with a lid.
 - O During months when rain is anticipated, stockpiles must be covered with tarps, poly or other means to prevent runoff. Ideally excavated material would be removed from site and properly disposed of in a designated facility.

The intent with environmental monitoring is to document changes to the landscape and that any such changes to the landscape have not resulted in harm to the ecology of the site or watershed.

13. Measures to Protect, Enhance, And Restore Ecosystem Values

As noted above, this Alternate Approval Process is being sought, not because the width of the riparian buffer (SPEA) cannot be maintained, but because the trees within the buffer are dying and already subject to considerable windthrow. The RAPR permits removal of danger trees within the SPEA, but it does not permit removal of other trees as a preventative measure, even if the trees are in poor health. The arborists have recommended a program of tree removal, with forest floor protection, within the SPEA. They have also prescribed a tree replanting program which will be supplemented by a riparian shrub replanting and enhancement program. These removal/ replanting plans are detailed within the arborists' report and also within the *Hillside Ecological Assessment and Habitat Enhancement* report (Aqua-Tex). The numbers and locations of shrubs are included in the Landscape Plans for ease of explanation.

It is our professional opinion, that this program will not only maintain the stream in a state of Proper Functioning Condition, but it will ultimately enhance the ecological condition as a new healthy forest replaces the diseased and windthrown forest that is present. Wherever possible, the larger diameter trees will be retained as wildlife trees to support birds and other terrestrial wildlife and the wood on the forest floor will be retained to support amphibians and reptiles. The riparian zone will be fenced to prevent trampling and invasive species will be removed. We believe this is a significant improvement beyond simply fencing off the existing buffer which is in poor and declining health.

14. Photos



Photo 1. Latoria Northeast Creek, south of the southern property boundary, looking downstream of the bridge and culvert stream crossing installed by the City of Colwood in Havenwood Park in August 2016 (Photo 3).



Photo 2. Outlet of culvert under municipal stream crossing over Latoria Northeast Creek.



Photo 3. Inlet of culvert under municipal stream crossing over Latoria Northeast Creek on the east parcel of Havenwood Park.



Photo 4. Latoria Northeast Creek looking upstream from southern property boundary. Note the ferns adjacent to the stream HWM, indicating minimal flow fluctuations, given the very small headwater catchment. Photo taken on June 22nd, 2020.



Photo 5. Himalayan blackberry (*Rubus armeniacus*) brambles in Latoria Northeast Creek are well-established, likely resulting from the construction of Veterans' Memorial Parkway.

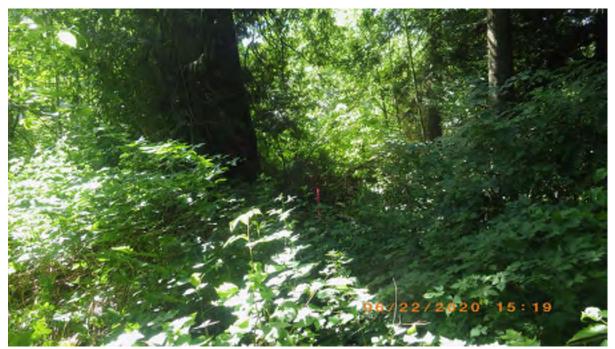


Photo 6. Upstream end of Latoria Northeast Creek on the east parcel. Note the presence of large conifers and the dense shrub layer surrounding the creek. The stream and its riparian stream banks are maintained in a low light intensity during the growing seasons.

15. Professional Opinion

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

Date	April 15 th , 2021
Duto	7 pm 10 , 2021

1. I/We, Wm. Patrick Lucey R.P.Bio.,

Please list name(s) of qualified environmental professional(s) and their professional designation that are involved in assessment.)

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 <u>BC-ALTA Developments</u>, 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.
 - c) Under the City of Colwood Alternative Approval Process the protection of the stream and its riparian buffer will be maintained and the stream will remain in a state of PFC if the proposed development complies with the measures recommended in this report.

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

Appendix 1: Experience of Assessment Team

	0010 D 10
Date:	2018-Dec-13
Name of Qualified Environmental Professional (QEP):	Wm. Patrick Lucey
Professional designation:	R.P. Bio., C. Biol.
Professional association:	College of Applied Biology of BC; Royal Society of Biology (UK)
Registration number:	1467; P0119549
Training in Riparian Areas Protection	,
Regulation assessment methods	
Organization or agency delivery training:	Vancouver Island University
Name of trainer:	
Date of training sessions:	November 2005 and July 2020
Other relevant education, training or	
experience	
RAR Professional Practice Guidelines	May 2018
Training, Nanaimo BC	, == :=
Field Soil Description and Classification,	June 2017
Wayne Blashill, P.Ag. (Instructor). Columbia	
Mountains Institute, Revelstoke BC	
Forest and Range Evaluation Program (FREP)	November 2016
riparian protocol training, 3-day course. Mr.	
Derek Tripp, instructor. Victoria BC	
BCWF Wetland Institute- Eastern Vancouver	September 2014
Island	·
Riparian Roads Workshop- US National	May 2001
Riparian Roads Team, Portland OR	
CVRD Development Services RAR Workshop,	April 2015
Duncan BC	
RAR QEP Workshop, Nanaimo BC	January 2013
RAR QEP Workshop, Victoria BC	January 2013
RAR QEP Workshop, Nanaimo BC	February 2012
Applied Fluvial Geomorphology, Level 1.	June 2006
Dr. Dave Rosgen (Instructor) Wildland	
Hydrology, Pagosa Springs, CO.	
Greenline Vegetation Monitoring for Riparian	July 2000
Areas. Dr. Alma Winward (Instructor),	
Richfield, Utah	
Instructor Training PFC Train the Trainer- US	May 1999
National Riparian Service Team	
Proper Functioning Condition (PFC)	March 1998
Assessment Training. US National Riparian	
Service Team. Whistler, Pemberton and	
Victoria.	A
Proper Functioning Condition (PFC)	August 1997
Assessment Training. Oregon State University,	
Klamath Falls, OR	1004
M.Sc., Biology, University of Victoria. Thesis:	1994
Periphyton functional and structural response,	
within semi-natural surrogate streams, to	
artificially induced water quality perturbations B.A. Geography, University of Victoria.	1990
Aquatic Resource Management	1990
Aquatio Hesource Management	

Riparia	n assessments completed or	Primary QEP	Secondary QEP
contrib	uted to		
1.	Lantzville Foothills Estates (Kettle Creek) (2006-02-20) (#52)	Patrick Lucey	Paul DeGreeff, BCSLA
2.	1945 Sooke Road (Colwood Creek) (2006-04) (not uploaded)	Patrick Lucey	Cori Barraclough Don Skinner, RP Bio Arborist
3.	551 Latoria Road ("Madrona Creek"- unnamed tributary of Latoria Creek) (2006-04-09)	Patrick Lucey	
4.	Arbutus Mountain Estates - Phase 1 (Shawnigan Creek) (2006-03-29) (#60)	Patrick Lucey	Lehna Malmkvist, RP Bio.
5.	Westlock Rd. Subdivision (Trumpeter Pointe) (Quamichan Lake) (2005-08-18) (#77)	Patrick Lucey	Rick Lloyd P.Eng.
6.	1404 Wild Cherry Drive (Metchosin Creek) (2006-04-15) (#78)	Patrick Lucey	
7.	Westlock Rd. Subdivision (Trumpeter Pointe) (Quamichan Lake) (2006-04- 25) (#77 revision)	Patrick Lucey	Rick Lloyd P.Eng.
8.	Baranti Developments (Mill Bay Tributary) (2007-04-25) (#435)	Patrick Lucey	Lehna Malmkvist, RP Bio., Alec Morse, P.Eg., Don Skinner, RP Bio
9.	Waldy Road (Cowichan Bay) (2008- 01-08) (#726)	Patrick Lucey	Lehna Malmkvist, RP Bio.
10.	1545 Cowichan Bay Road (2008-12- 08) (#727)	Patrick Lucey	Lehna Malmkvist, RP Bio.
11.	Westhills Community (Langford Lake & tributaries) (2008-06-12) (not submitted- Langford not registered in RAR database)	Patrick Lucey	Lehna Malmkvist, RP Bio.
12.	Oasis Lake (Sooke Lake Road) (2008- 06-24) (#972)	Patrick Lucey	
13.	2215 Clearihue Road (Shawnigan Lake) (2008-06-26) (#976)	Patrick Lucey	
14.	3031 Phillips Road (Sooke River) (2008-08-12 updated 2009-01) (#1044)	Patrick Lucey	Lehna Malmkvist, RP Bio.
15.	3501 Paradise Valley Road (Cheakamus River) (2008-09-23) (#1097)	Patrick Lucey	Lehna Malmkvist, RP Bio. Brian LaCas, P.Eng.
16.	9270 Lochside Drive (Reay Creek) (2008-11-24) (#1157)	Patrick Lucey	Cori Barraclough

17.	Sooke Business Park (3220 Otter	Patrick Lucey	Lehna Malmkvist, RP Bio
	Point Rd) (2008-06-05 revised 2008-		-,
	12-18) (#1180)		
18.	Goldstream Avenue (Millstream Creek)	Patrick Lucey	
	(2010-02-17) (#1557)		
19.	Stebbings Road (VanHorne Creek)	Patrick Lucey	Lehna Malmkvist, RP Bio.
	(2010-04-14; modified 2011-01-11)		
	(#1597)		
20.	Morgan Maples RV Park (Chemainus	Patrick Lucey	Lehna Malmkvist, RP Bio.
	River trib) (2010-04-26) (#1610)		
21.	Elkington Forest – Comprehensive	Patrick Lucey	
	(Shawnigan Creek tribs) (2010-07-23)		
	(#1712)		
22.	1785 Whiffen Spit Road (Wright Road	Patrick Lucey	
	Creek) (2010-07-27) (#1723)		
23.	Elkington Forest (Creek 19B) (2010-	Patrick Lucey	
	12-09)(#1850)		
24.	3055 Phillips Road (Sooke River)	Patrick Lucey	
	(2010-12-17) (#1857)		
25.	St. Rose of Lima - 2191 Townsend	Patrick Lucey	Cori Barraclough
	Road (Knott Creek) (2011-01-10)		
	(#1876)	D. I. I. I.	
26.	1585 W. Shawnigan Lake Road	Patrick Lucey	
	(Shawnigan Lake) (2011-01-13)		
07	(#1878)	Dataialalaaaaa	
27.	2585 Selwyn Road (Millstream Creek)	Patrick Lucey	
	(not submitted- Langford not		
20	registered in RAR database) 1609 Keating Cross Road (Graham	Patrick Lucov	Cori Barraclough
∠8.	Creek) (2010-12-03) (not submitted at	Patrick Lucey	CON DanaClough
	client request)		
20	2637 Savory Road (Florence Lake)	Patrick Lucey	
29.	(2011-05-3) (#LANGFORD- NOT	I allick Lucey	
	UPLOADED TO RARNS)		
30	Goodwin Farms-Munn Road (Fizzle	Patrick Lucey	Cori Barraclough
	Creek) (2011-06-06) (#2054)	. all on Edocy	5 511 Ballaolougii
31	2907 Phillip St Duncan (Holmes	Patrick Lucey	
	Creek) (2011-09-09) (#2131) (note:	Latitoric Edocoy	
	also submitted as #2112- should be		
	deleted, wrong regional district)		
32.	Sahtlam Lodge (Cowichan River)	Patrick Lucey	
	(2011-09-16) (#2145)		
33.	Lot 6, Shawnigan Lake Road (Van	Patrick Lucey	
	Horne Creek) (2011-09-16, updated		
	, , , , , , ,	<u> </u>	

	2011-10-03, updated 2012-02-06)		
	(#2147)		
34.	227 Meadowbrook Road, Saanich BC	Patrick Lucey	
	(OCP revision- not uploaded) (2012-		
0.5	01-25)	Databalalara	Ohana Maana D. Oaa
35.	Elkington Trailhead Creek #19 (2012-	Patrick Lucey	Shane Moore, P. Geo.
	06-19) (#2412)	D	
36.	Elkington Creek 17 and Lower	Patrick Lucey	
	Elkington Tributary (2012-08-08,		
0.7	revised 2018-09) (#2482)	Datable Lorens	
37.	288/290 Beecher Bay Road (2013-09-	Patrick Lucey	
	04) (#2877)	B	
38.	1591 W. Shawnigan Lake Road, Don	Patrick Lucey	
	Calveley (Shawnigan Lake) (#2478)		
39.	2054 Butler Avenue, Gary Henshaw	Patrick Lucey	
	(Shawnigan Lake)(2013-04-12) (#2749)		
40.	5080 Cowichan Lake Road, Deborah	Patrick Lucey	Justin Straker, P.Ag.
	Juch (2014-07-10)(Simple		
	Assessment Tributary to Cowichan		
	River) (#3181)		
41.	875 Whittaker Road, Spectacle Creek	Patrick Lucey	
	& Unnamed Tributary (2015-08-21)		
	(#3689)		
42.	820 Latoria Road, Unnamed Tributary	Patrick Lucey	
	to Pritchard Creek, JTC Investment		
	Group (2015-07-26) (#LANGFORD-		
	NOT UPLOADED TO RARNS)		
43.	Craigflower Creek, Fort Victoria RAR,	Patrick Lucey	
	Goodwill Investments Ltd. (2015-07-		
	21) (#3662)		
44.	6244 Rodolph Road, Central Saanich	Patrick Lucey	Don Skinner RP Bio.,
	Creek, Aplomado Developments		Arborist
	(2014-08-26) (#3226)		
45.	2000 Renfrew Road, Shawnigan Lake	Patrick Lucey	
	(2014-07-28) (#3182)		
46.	Pritchard Creek, TJBS Holdings (Aug.	Patrick Lucey	
	2012) (#LANGFORD- NOT		
	UPLOADED TO RARNS)		
47.	2219 London Road, Shawnigan Lake	Patrick Lucey	
	(2014-08-26) (#3227)		
48.	Dovedale Road; Lot 41, Tributary to	Patrick Lucey	
	Shawnigan Lake (2014-10-22) (#3293)		
49.	2010 Renfrew Road Shawnigan Lake	Patrick Lucey	
	(2014-11-05) (#3304)		

w	89 Kangaroo Road, Hewitt Creek Vetland & Unnamed Tributary (2015- 3-29) (#3461)	Patrick Lucey	
	999 Renfrew Road Koksilah River 2015-07-12) (#3476)	Patrick Lucey	
(2	74 Latoria Road, Pritchard Creek 2015-03-31) (# LANGFORD- NOT IPLOADED)	Patrick Lucey	
	660 Monterey Avenue (2015-05-26) #3562)	Cori Barraclough	Patrick Lucey
	590 Gilbert Drive (2016-04-27) #4015)	Patrick Lucey	
	319 Stevenson Road, Shawnigan ake, (2016-06-22) (#4085)	Patrick Lucey	
	ot 4, Ark Road. Roofmart. (2017-04- 6) (#4595)	Patrick Lucey	
W	939 and 1945 Sooke Road, Brookes Vestshore School, Colwood Creek. 2017-03-30) (#4605	Patrick Lucey	Cori Barraclough
H	60 Stebbings Road, Goldstream leights, Tributary to Van Horne creek. (2017-06-13) (#4637)	Patrick Lucey	
М	68,474 and 476 Millstream Rd., fillstream Creek, (2017-06-02) fXXXX). NOT UPLOADED TO RARNS	Patrick Lucey	Tracy Motyer, Richard Brimmel, P.Eng., (Geotechnical) Jan Hoel, P.Eng. (stormwater), Tom Talbot (arborist)
	105 Cypress Road, Tharratt Brook 2017-11-03) (#4879)	Patrick Lucey	Tracy Motyer
(2	lorizon Terrace, Pritchard Creek 2018-03-29) (# LANGFORD- NOT IPLOADED)	Patrick Lucey	
	140 Payne Road, Duncan (2018-06- 1) (#5215)	Steve Voller	Tracy Motyer
	MCA Camp Thunderbird, Glinz Lake, 1ark Dodd (2018-10-12) (#5425)	Cori Barraclough	Tracy Motyer
	Goldstream Heights, Tarras. (2018- 2-04) (# 2018)	Patrick Lucey	Cori Barraclough Tracy Motyer
	368 Renfrew Road, Dan Nikirk, hawnigan Lake (2018-12-13) (#5514)	Patrick Lucey	Cori Barraclough Tracy Motyer
C	393 Turner Lane, John Laurie, cobble Hill (2018-12-31; revised 019-04-26) (#5542)	Patrick Lucey	Tracy Motyer

67.	7069 East Saanich Road, Darleen	Cori	
	Taylor, Saanichton (2019-03-15)	Barraclough	
	(#5632)		
68.	2222 Renfrew Road, Len	Patrick Lucey	Steve Voller
	Wansbrough, Shawnigan Lake (2019-		
	03-25) (#5549)		
69.	2220 Renfrew Road, Tom Wilson,	Patrick Lucey	Cori Barraclough
	Shawnigan Lake (2019-04-12)		
	(#Noname 17 - Submitted by email to		
	Charlotte Billingham, FLNRORD)		
70.	PID 009-861-823, Millstream Road,	Patrick Lucey	Cori Barraclough
	District of Highlands (CRD Korene		
	Torney, P. Geo., PMP, Supervisor,		
	Geo-Environmental Programs (2019-		
	08-22) (#5868a)		
71.	PID 009-861-815 & 024-273-163,	Patrick Lucey	Cori Barraclough
	Millstream Road, District of Highlands		
	(CRD Korene Torney, P. Geo., PMP,		
	Supervisor, Geo-Environmental		
	Programs (2019-08-22) (#5869a)		
72.	2201 Clearihue Road, Shawnigan	Patrick Lucey	
	Lake (CVRD); Calvin Cook; (#5860)		
73.	2040 Cullin Road, Shawnigan Lake	Patrick Lucey	
	(CVRD); Glen MacDonald; (#5916)		
74.	4890 Munn Road, District of	Patrick Lucey	
	Highlands; Ethan and Natasha		
	Ghidoni; (#5934)		
75.	2054 Butler Avenue, Shawnigan Lake	Patrick Lucey	
	(CVRD); Gary Henshaw; (#6500)		
76.	2143 Fulford-Ganges Road, Salt	Cori	Tracy Motyer
	Spring Island (Islands Trust); Suzanne	Barraclough	
	Drzymala; (#6505)		

Appendix 2: Proper Functioning Condition Lotic Checklist and Report

Riparian Area/Stream Name: <u>Latoria Northeast Creek, City of Colwood, 3461 Veterans'</u> <u>Memorial Parkway (VMP)</u> Date: <u>2021-04-15</u>

Segment/Reach ID: <u>I, adjacent to 3461 VMP</u> _ID Team Observers: <u>Wm. Patrick Lucey, Tracy Motyer</u>

Rosgen channel type: Bc	GPS start:	GPS end:
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Yes	No	N/A	HYDROLOGY
		\checkmark	1) Floodplain is inundated in "relatively frequent" events.
		\checkmark	2) Beaver dams are stable.
\checkmark			3) Sinuosity, gradient, and width/depth ratio are in balance with the landscape setting (i.e. landform, geology, and bioclimatic region).
\checkmark	√		4) Riparian-wetland area is expanding or has achieved potential extent.
\checkmark			5) Riparian impairment from the upstream or upland watershed is absent (Old=Upland watershed is not contributing to riparian-wetland degradation).

Yes	No	N/A	VEGETATION
\checkmark			7)* There are adequate age classes of stabilizing riparian vegetation for recovery/maintenance.
\checkmark			6) There is adequate diversity of stabilizing riparian vegetation for recovery/maintenance (species present).
\checkmark			8) Species present indicate maintenance of riparian soil moisture characteristics.
✓			9) Stabilizing plant communities capable of withstanding moderately high streamflow events are present along the streambank (Old=Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (community types present)).
\checkmark			10) Riparian plants exhibit high vigour.
\checkmark			11) An adequate amount of stabilizing riparian vegetation is present to protect banks and dissipate energy during moderately high flows (enough).

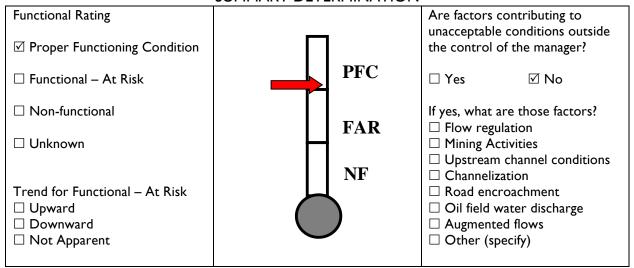
^{*}This is not a typo. The 2015 version of the checklist reverses questions 6 and 7. These are in the same order as earlier versions, but numbered to match the updated 2015 checklist.

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	\checkmark	12) Plant communities are an adequate source of woody material for maintenance/recovery.
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Yes	No	N/A	GEOMORPHOLOGY
\checkmark			13) Floodplain and channel characteristics (<i>i.e.</i> rocks, woody material, vegetation, floodplain size, overflow channels) are adequate to dissipate energy.
		\checkmark	14) Point bars are revegetating with stabilizing riparian plants.
\checkmark			15) Streambanks are laterally stable (Old = Lateral stream movement is associated with natural sinuosity)
\checkmark			16) Stream system is vertically stable (not downcutting/incising)
\checkmark			17) Stream is in balance with the water and sediment being supplied by the drainage basin (<i>i.e.</i> no excessive erosion or deposition)

SUMMARY DETERMINATION



Remarks

Potential Channel Type: Bc
Present Channel Type: Bc

Potential Riparian-Wetland Vegetation: Douglas fir, western redcedar, grand fir, dense deciduous understory of shrubs.

Constraints: The channelized stream lies within the road allowance of a major municipal connector road (Veterans' Memorial Parkway). This channel is constrained by the road to the west and private land development to the east. The streambed lies within a municipal road allowance, as does the western riparian area, while the eastern riparian area lies on private property. The historic stand of mature conifers has extensive root rot leaving the trees vulnerable to blowdown (Dunster Report, 2021). The clearing of the treed hillside to the east will further exacerbate the risk of blowdown of mature conifers within the riparian area. The Arborist's

report recommends the removal of mature conifers within the riparian zone (Dunster Report, 2021), or their conversion to wildlife trees. There is a natural regenerative understory of young conifers within the riparian zone. The risk of wildfire within the treed canopy in the riparian zone is moderate given the dense deciduous understory and the recommended removal or height reduction of the mature conifers. Fuel management loading within the riparian zone should be considered in the context of the adjacent treed Havenwood Park.

Potential Restoration: Planting of young conifers and deciduous trees within the riparian zone is recommended. Species of conifers recommended for replanting are grand fir, Douglas fir, western redcedar, and Sitka spruce. Deciduous trees for replanting include bigleaf maple, Pacific dogwood, black hawthorn, and crabapple. After the clearing of large conifers, the creek will be able to stay in PFC with a deciduous shrub understory, while the new tree plantings grow. Note: given the small catchment and low gradient, this headwater stream is capable of maintaining bank soil stability with healthy shrub root systems. It does not require large trees for stability.

The swale on the east side of VMP is currently overgrown with invasive blackberry and represents a potential replanting ribbon with shrubs that offer bird habitat. To avoid future Danger Tree concerns, this area should not be considered a future treed site. Replanting within this bioswale ribbon would require approval from the municipality and would need to conform to municipal road shoulder maintenance requirements.

Notes (#'s from checklist):

- 1) Stream channel has flat adjacent terraces which are frequently flooded; channel type shifts between a Rosgen B and short segments of Rosgen C channel type.
- 2) No beavers are present and there is no historical evidence beavers lived in this rocky outcrop area.
- 3) The slope of 4% results in a partially channelized stream bed, modified by minor quantities of down-cutting and scouring during construction of the VMP as a major connector roadway.
- 4) This answer is a 'tweener' (lies between both 'yes' and 'no'). Vegetation growth has begun to narrow the stream channel over the 7-year period this channel has been observed, albeit on a sporadic basis. See attached photographs of channel.
- 5) The catchment for this headwater reach is small with small wetlands upstream that attenuate storm flow and runoff from the small segment of adjacent highway. A vegetated swale lies between the roadway and the reach, further attenuating storm flow events.
- 6) There are mature and second growth trees, with a dense understory of deciduous shrubs.
- 7) Very numerous species within the stream banks and adjacent riparian soils. See Arborist report attached.
- 8) The riparian plant community is dominated by riparian species.
- 9) Numerous mature and second growth trees are present; the very small catchment contributing to the stream flow limit erosive flow velocities; this headwater reach has the potential to have its stream banks stabilized by small, young trees (conifers) as well as deciduous trees and shrubs.
- 10) There is a significant fungal infestation amongst the conifers but not present within the deciduous tree and shrub plant community.
- 11) Stream banks have <10% bare soil; there are dense understory shrubs lining the banks.

- 12) This headwater channel has a very small catchment and large wood is not required for channel / bank stability.
- 13) The very small catchment contributing to the stream flow limit erosive flow velocities; this headwater reach has the potential to have its stream banks stabilized by small, young trees (conifers) as well as deciduous trees and shrubs.
- 14) This is a Rosgen B channel type; C segments are short and reflect stepped terraces.
- 15) There is no evidence of the stream moving laterally as this stream channel is a modified historical channel / wetland system; the construction of the VMP roadway resulted in the stream channel being confined by adjacent raised roadbeds.
- 16) The low gradient and small catchment preclude head-cutting.

Additional Comments:

- Shared management of aquatic habitat. Stream lies primarily on VMP road allowance/ROW (municipal); eastern riparian land predominantly on 3461 VMP (private).
- There are currently extensive invasive species, especially Himalayan blackberry.

Stream Name: Latoria Northeast Creek, City of Colwood, 3461 Veterans' Memorial Parkway

(VMP) Reach #1 Date: 2021-04-15

Riogeoclimatic Zone: CDFmm Team: Wm. Patrick Lucey, Tracy Motyer

3iog	eocl		Zone: <u>CDFmm</u>	Team: Wn	<u>n. Patric</u>	k Luc	cey, Tr	acy M	<u>lotye</u>
		Sym-							
	✓	bol	Common Name	Scientific Name	AB	GS	WIC	SC	IN
Trees	✓		Douglas-fir	Pseudotsuga menziesii					
			western hemlock	Tsuga heterophylla					
	✓		western redcedar	Thuja plicata					
	✓		Grand fir	Abies grandis					
			amabilis fir	Abies amabilis					
			vine maple	Acer circinatum (7-9 lobes)					
			Douglas maple	Acer glabrum (3-4 lobes)					
	✓		big leaf maple	Acer macrophyllum					<u> </u>
			western white pine	Pinus monticola (5 needles)					
			shore pine	Pinus contorta (2 needles)					
	✓		red alder	Alnus rubra					
			Sitka spruce	Picea stichensis					
			yellow cedar	Chamaecyparis nootkatensis					
			black cottonwood	Populus balsamifera					
_	✓		salal	Gaultheria shallon					
Shrubs	√		dull Oregon grape	Mahonia nervosa					
	✓		salmonberry	Rubus spectabilis					
			creeping raspberry	Rubus pedatus					
			trailing blackberry	Rubus ursinus					
			false azalea	Menziesia ferruginia					
			Alaskan blueberry	Vaccinium alaskaense					
			oval-leaved blueberry	Vaccinium ovalifolium					
	√		red huckleberry	Vaccinium parvifolium					
			dwarf dogwood	Cornus canadensis					
			prince's pine	Chimaphila umbellata					
			devil's club	Oplopanax horridus					
			red-flowering currant	Ribes sanguineum					
	✓		sword fern	Polystichum munitum					
	√		bracken fern	Pteridium aquilinum					
Herbs			deer fern	Blechnum spicant					
			maidenhair fern	Adiantum pedatum					
	√		lady fern	Athyrium filix-femina					
			oak fern	Gymnocarpium dryopteris					
			licorice fern	Polypodium glycyrrhiza					
			twinflower	Linnaea borealis					
			broad-leaved starflower	Trientalis latifolia					
			vanilla leaf	Achlys triphylla					
	√		skunk cabbage	Symphocarpus foetidus					
			flat moss	Plagiothecium undulatum					
Mosses			lanky moss	Rhytidadelphus loreus					
10s			step moss	Hylocomium splendens					
2			Oregon beaked moss	Kindbergia oregana					
()	√		Daphne	Daphne laureola					
Exotic	√		Himalayan blackberry	Rubus discolor					
Ă	\checkmark		English holly	Ilex aquifolium					

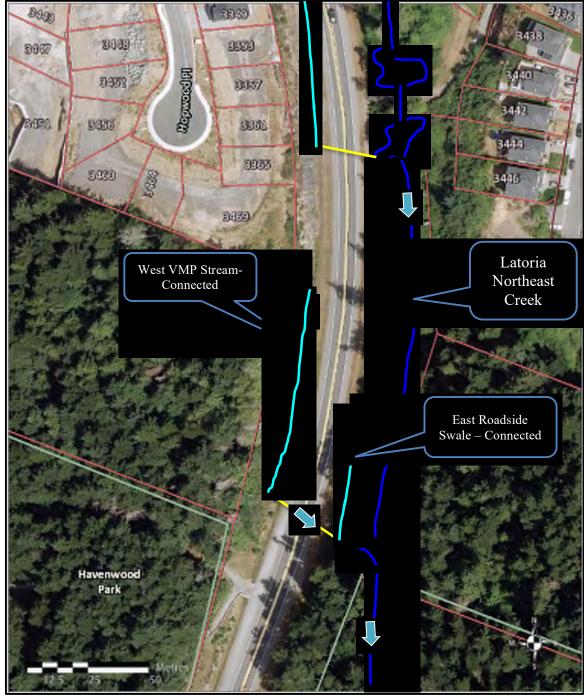


Figure 1. Sketch of Latoria Northeast Creek and the roadside swales along Veterans' Memorial Parkway. Solid lines (teal and dark blue) indicate channels directly connected to Latoria Northeast Creek, while the dashed teal line represents the roadside swale which is not directly connected to Latoria Northeast Creek; arrows denote the direction of flow. Sketch is approximate, this figure is intended for illustrative purposes only. The distance between the solid teal line (western side of VMP) and the property line is approximately 10-15 metres. Image Source: CRD Regional Community Atlas (2013 orthophoto).



Figure 2. Looking downstream along Latoria Northeast Creek Reach 1 just south of the southern property boundary of the east parcel. Photograph taken in Havenwood Park on May 28th 2020.



Figure 3. Latoria Northeast Creek Reach 1 looking upstream. The creek makes its way through a dense shrub canopy along the eastern edge of Veterans' Memorial Parkway. (Photograph taken 2014)



Figure 4. New culvert and trail crossing. Photograph taken May 28th 2020.



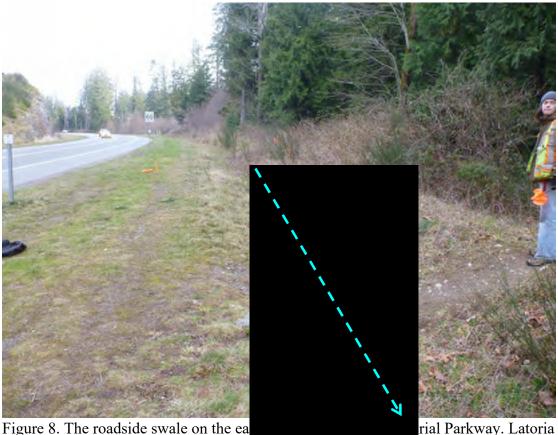
Figure 5. Himalayan blackberry brambles in Latoria Northeast Creek are well-established likely as a result of the construction of Veterans' Memorial Parkway, which left disturbed landscapes adjacent to the new road. (Photograph taken 2014)



Figure 6. Mature second growth trees with root rot that are proposed to be removed or topped and left as wildlife trees (Dunster & Associates Windthrow and Tree Health Report, 2021). Large wood from the trees shall be left within the riparian zone but shall not create blockages in the stream channel which could result in avulsions or stream braiding. Note the dense shrub understory. Photograph taken May 28th 2020.



Figure 7. Image looking NE across VMP at the treed canopy within the east parcel's SPEA zone. Note the understory growth that has extended west across the grassy landscape shown in Figure 8. Yellow arrow = a large snag. Photo taken May 28th 2020.



Northeeast Creek Reach 1 is located on the east side (right) of the swale in the treed canopy to the right of the photograph. The swale and its east banks are a potential replanting ribbon for shrubs. Photograph taken 2020.

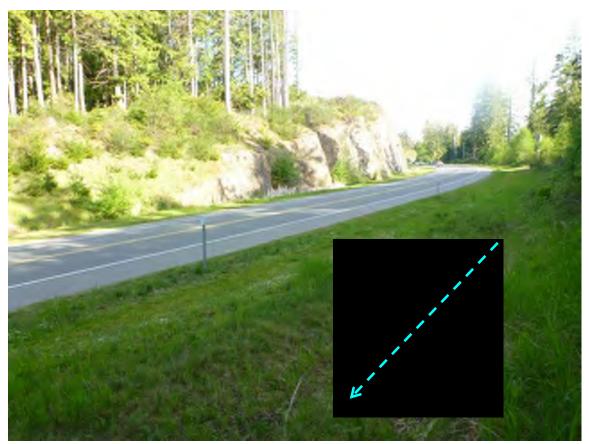


Figure 9. Roadside swale on the east side of VMP. Note there is no evidence of soil or particulate partitioning that would meet the definition of a stream channel within any portion of the bioswale; runoff from VMP appears to consist solely of sheet flow. Dashed line = runoff flow direction. (Photograph taken 2014)



Figure 10. Dry stream bed during the late spring, 2020, showing scouring of bed soils; the stream has a wide terraced braided width. Photograph taken June 22nd 2020.



Figure 11. Dry stream bed showing moderate slope angle, dense understory vegetation, mosaic light into riparian understory and adjacent treed canopy. Photograph taken June 22nd 2020.



Figure 12. Large mature conifer snag, with top broken and heartwood decay. Note the dense shrub understory. Photograph taken June 22nd 2020.

Statement of Limitations

Aqua-Tex has provided this report for the client, BC-ALTA Developments, solely for the purpose noted above.

Aqua-Tex has exercised reasonable professional skill, care and diligence to assess the information acquired during the preparation of this report but makes no guarantees or warranties as to the accuracy or completeness of this information. The information contained in this report is based upon, and limited by, the circumstances and conditions acknowledged herein, and upon information available at the time of its preparation. The information provided by others is believed to be accurate but cannot be guaranteed.

Copying or distribution of this report, in whole or in part, is not permitted without the express permission of the clients. Use or reliance on the information contained in the report, other than by the client or City of Colwood, is not permitted without the written permission of Aqua-Tex. This report remains the property of Aqua-Tex Scientific and may not be relied upon by any other agency, until Aqua-Tex has been compensated for their work by the client.

This PFC report <u>remains valid for two years</u> only if the site conditions remain unaltered and the proposed development remains the same. If the development plans change, or if site conditions change, the report may no longer be valid.

Appendix 3: Arborist and Forester's Report	

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http://www.env.gov.bc.ca/epd/epdpa/mpp/stormwater/stormwater.html

ⁱ U.S. Department of the Interior. 2015. Riparian area management: Proper functioning condition assessment for lotic areas. Technical Reference 1737-15. Bureau of Land Management, National Operations Center, Denver, CO.

ⁱⁱ Dickard, M., M. Gonzalez, W. Elmore, S. Leonard, D. Smith, S. Smith, J. Staats, P. Summers, D.Weixelman, S. Wyman. 2015. Riparian area management: Proper functioning conditionassessment for lotic areas. Technical Reference 1737-15.U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO.

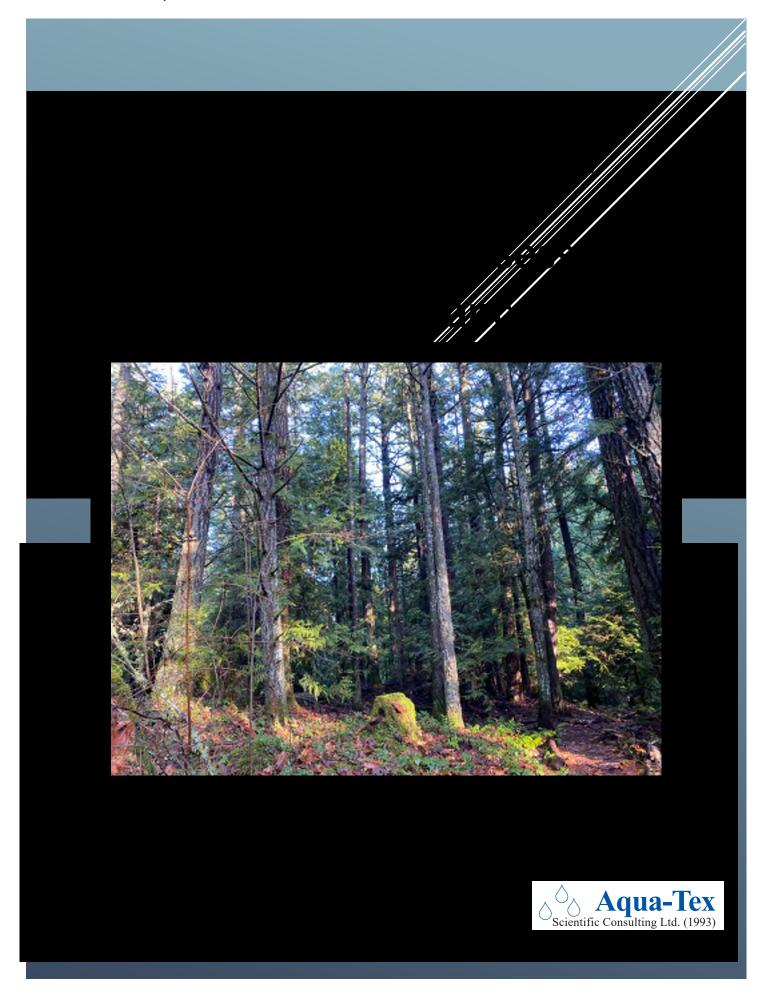
ⁱⁱⁱ British Columbia Ministry of Environment. 2002. Stormwater Planning: a Guidebook for British Columbia.

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^v United States Environmental Protection Agency (EPA). 2007. Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites. EPA 833-R-06-004.

vi Hall, F.C., 2001. Ground-based photographic monitoring. Gen. Tech. Rep. PNW-GTR-503. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 340 p. http://www.fs.fed.us/pnw/pubs/gtr503/

SCHEDULE 5, HILLSIDE ECOLOGICAL ASSESSMENT



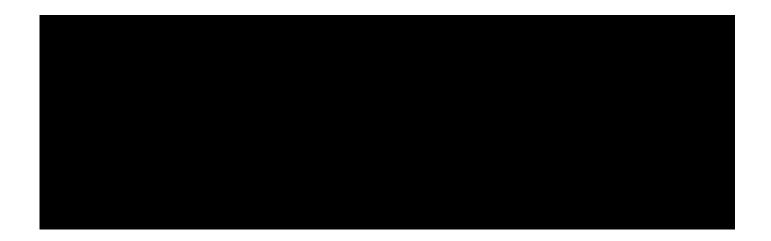


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Veterans' Memorial Parkway 3460 & 3461 VMP Ecological Assessment

Project Overview

The subject property is bisected by Veterans' Memorial Parkway (VMP) splitting the property into two parcels – one on the west side of VMP and one on the east side of VMP. The property has the civic addresses of 3460 VMP for the parcel west of VMP, and 3461 VMP for the parcel east of VMP. The parcels are bounded to the south by Havenwood Park, and to the north, east and west by residential development (Figure 1). A park parcel has been dedicated on the east side of 3461 VMP and a second park parcel will be dedicated for the west side of 3460 VMP.

The City of Colwood's Official Community Plan indicates that the entire subject property lies within an Environmental Development Permit Area for Hillside - Figure 3 (City of Colwood Official Community Plan 2019 Bylaw No. 1700; Map Figure 18: Environmental Protection Development Permit Area; Page 122).

Multiple site visits were conducted by Aqua-Tex staff throughout the winter of 2020 and spring 2021 to walk the terrestrial and aquatic landscape elements of the property. The parcels on the east side of VMP and the west side of VMP were both investigated. Additional experts were engaged to assess the habitat conditions for birds, reptiles, and rare plants. These surveys were conducted on March 26 and 27 (birds), April 13 (reptiles) and April 5 (preliminary plant survey). Due to the unseasonably cold spring, a complete plant survey will be undertaken on April 23, 2021. Those reports are included in the appendices. In addition, a detailed tree survey was completed by Talbot MacKenzie and Associates (arborist) and a tree health (windthrow) assessment was completed by Dunster and Associates Environmental Consulting. The tree reports will be submitted directly to Colwood by the consulting engineer.

The property has distinct landscape elements characterized by differences in vegetation and landform. Broadly speaking they can be described as:

- 1. Riparian On the west side of VMP this area includes the large wetland which forms the headwaters of Latoria Northwest Creek. On the east side of VMP it includes the stream corridor for Latoria Northeast Creek.
- 2. Coniferous-dominated forest Douglas-fir/dull Oregon-grape community. The majority of the property on both sides of VMP is a second-growth conifer landscape dominated by Douglas-fir with western redcedar and a few Grand fir trees. Lower elevation areas, along the toe of rock outcrops and approaching riparian areas also support bigleaf maple. The canopy is relatively dense which results in a shaded understory that is dominated by dull Oregon-grape.

3. Rocky outcrops – Garry oak/arbutus/oceanspray community. These areas have sparse tree cover and support deciduous Garry oak trees and arbutus with oceanspray and a high density of mosses and lichens. They are also key habitat for reptiles, particularly snakes.

This report will focus on the conifer-dominated forest and the rocky outcrops. The riparian areas are described in greater detail in the Riparian Area Protection Regulation (RAPR) report for the west side of VMP and the Riparian Alternative Approval Assessment report for the east side of VMP.

Note: As *per* the "Summary of Comments Received for RZ-20-010 in Response to City of Colwood Referrals Sent December 15, 2020" document dated February 19th, 2021, both the stream west of VMP and the stream east of VMP have been requested to be named "Latoria North Creek." To ensure there is no confusion throughout this report, the tributaries to Latoria Creek shall be referred to by the authors as follows (Figure 2):

- The tributary arm that flows from the headwater wetland on the west parcel of the subject property, through the west parcel of Havenwood Park, and under VMP shall be referred to as Latoria Northwest Creek.
- The tributary arm that flows parallel to VMP adjacent to the east parcel of the property shall be referred to as Latoria Northeast Creek.
- The section of the tributary downstream of the confluence of the above two arms and until it flows into Latoria Creek shall be referred to as Latoria North Creek.



Figure 1. Aerial photograph of the subject property (outlined in red) and adjacent lands. Image Source: CRD Regional Community Atlas (2019 orthophoto).

Latoria Creek Watershed

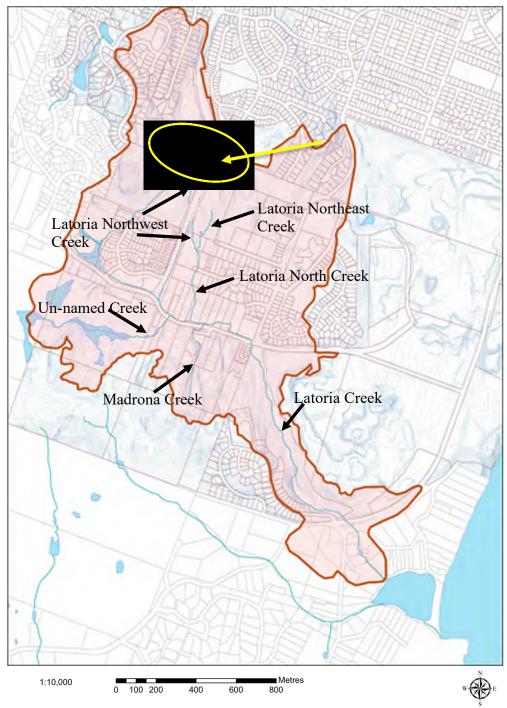
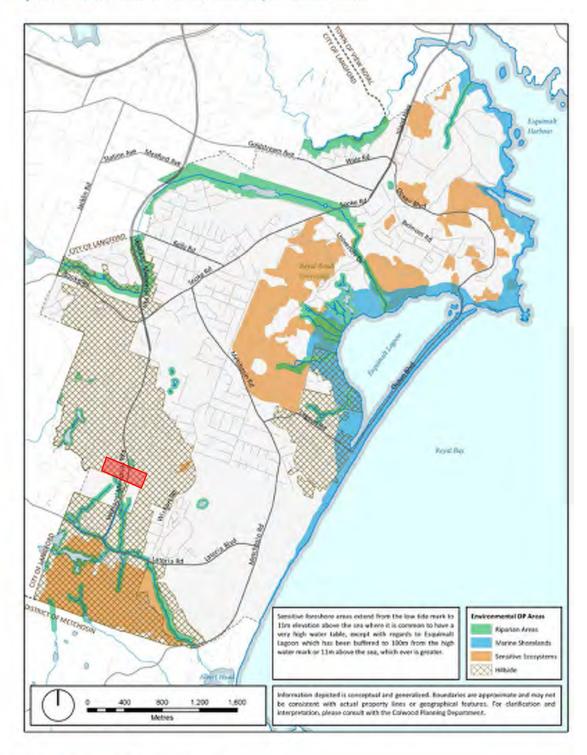


Figure 2. Latoria Creek Watershed showing the entire catchment, as well as the sub-catchment streams and riparian-wetland areas. The subject property is marked with the yellow circle and arrow. Note this watershed map is a general drainage catchment.

Figure 18: Environmental Protection Development Permit Area Riparian Area and Marine Shoreline Protection, Sensitive Ecosystem Protection, Hillsides



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Figure 3: Hillside Development Permit Area Map from Colwood Official Community Plan. Approximate boundary of subject property is highlighted in red.

Background Information

Prior to conducting the field assessments, current environmental data and information available from provincial and regional sources was reviewed. This included the Capital Regional District (CRD) Regional Community Atlas, the BC Conservation Data Center (CDC) records for rare species and ecosystem occurrences, the Sensitive Ecosystem Inventory (SEI) of East Vancouver Island and Gulf Islands, and Wildlife Tree Stewardship Program (WiTS) mapped raptor nests. The results of the background search and some figures are presented in this report. The field assessments provided ground-truthed observations and site-specific clarification of the high-level mapping undertaken by other provincial and local agencies.

Terrestrial Ecological/Plant Community

The site is within the Coastal Douglas Fir (CDF) Biogeoclimatic zone. The BC CDC maps the majority of the western parcel as "Douglas-fir / Dull Oregon-grape", a red-listed ecological community with the conservation status of S1 (critically imperiled). Red-listed ecosystems are at the highest risk of being lost (extirpated, endangered or threatened)(Figure 4).

Reptiles

iMap BC also maps the entire western parcel and a small portion of the eastern parcel as proposed Critical Habitat for the Western Painted turtle – pacific coast population (Chrysemys picta bellii). The Western painted turtle is a federally listed endangered species (Species at Risk Act). Provincially it is red-listed and has a conservation status of S2 (imperiled). The potential critical habitat areas for the Western painted turtle follows the mapped riparian corridor (Figure 5). Western painted turtles are typically found within 150 m of water. The CRD also maps the western third of the west parcel as potential sharp-tailed snake (Contia tenuis) habitat, this area is largely proposed as park. The sharp-tailed snake is a federally listed endangered species. Provincially it is red-listed and has a conservation status of S1/S2 (critically imperiled, imperiled). Potential sharp-tailed snake habitat mapping encompasses the rocky outcrops (Figure 6). The western third of the west parcel is proposed as park. For these reasons, an expert herpetologist (Christian Englestoft, M.Sc.) was engaged to complete a reptile survey (including western painted turtle and sharp-tailed snake) for both parcels. Mr. Englestoft has 12 years of experience of survey and habitat restoration experience with the Western Painted Turtle on Vancouver Island and has been a member of the Western painted Turtle Working Group and Recovery Team since its inception. He also has 25 years of survey and research experience with the Sharp-tailed Snake and been the scientific advisor to the Sharp-tailed Snake Recovery Team since its inception. He is the individual that mapped the potential sharp-tailed snake polygons for the CRD.

Birds

Wildlife Tree Survey (WiTS) mapping did not show any mapped eagle or osprey nest sites on the subject property or in the immediate vacuity of the property (Figure 7). A detailed bird survey was undertaken by experts from the Rocky Point Bird Observatory in late March 2021.

Other Species or Ecosystems of Concern

The CDC also noted that there is secured data in the project area that is not available on public databases. The CDC was contacted on November 9, 2020 to inquire about these data. Katrina Stipec from the CDC responded on November 19, 2020. She reiterated the presence of the Douglas-fir / dull Oregon-grape community and western painted turtle critical habitat, but indicated that there were no other CDC data pertaining to the project site. Katrina has informed Monica Mather, the Regional Biologist for the West Coast Region, of the project, should any further details or follow-up be required. The SEI of East Vancouver Island and Gulf Islands did not map any sensitive ecosystems on the subject property.

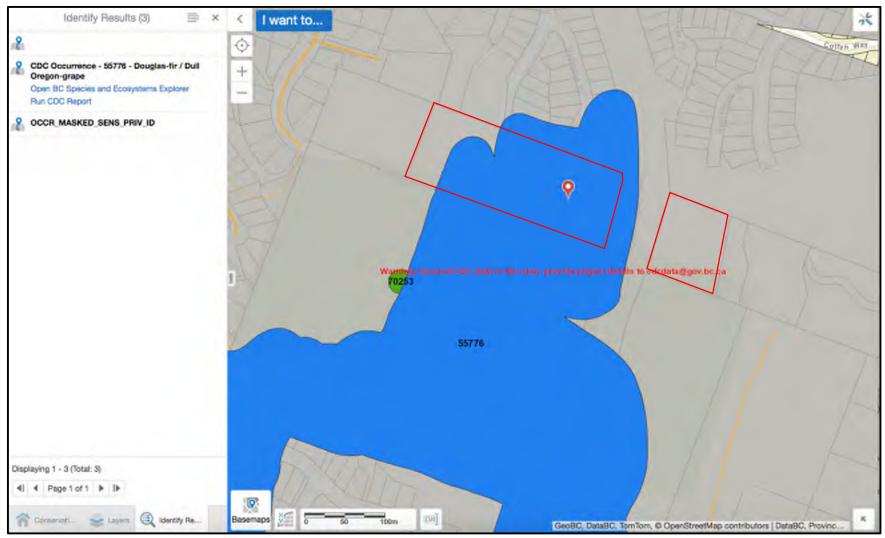


Figure 4. BC Conservation Data Center (CDC) map of the subject property (red polygons) showing the presence of a red-listed Douglas-fir / Dull Oregon-grape ecosystem covering most of the western parcel and a large portion of Havenwood Park to the south. Image Source: CDC iMap.

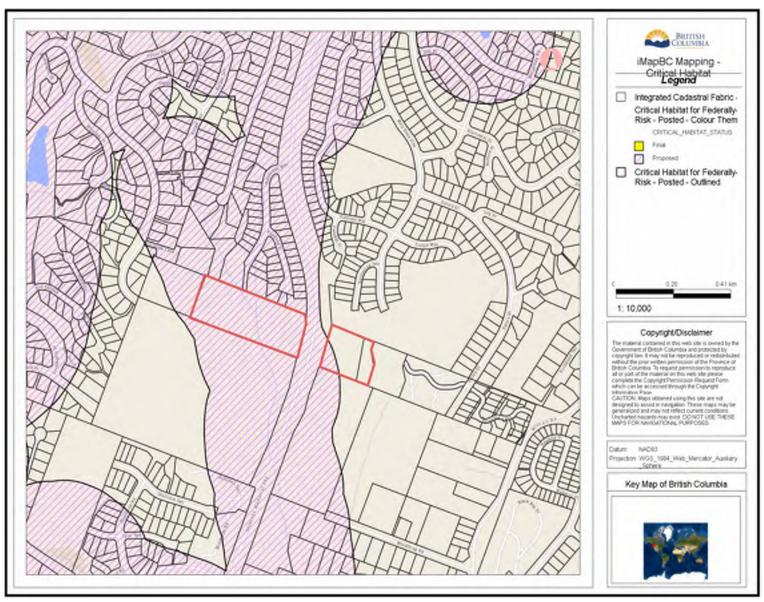


Figure 5. Critical Habitat for Federally Listed Species map of the subject property (red polygons) showing the presence of potential critical habitat for Western painted turtle (*Chrysemys picta bellii*) covering the entire western parcel and a large portion of Havenwood Park to the south. Image Source: iMap BC.

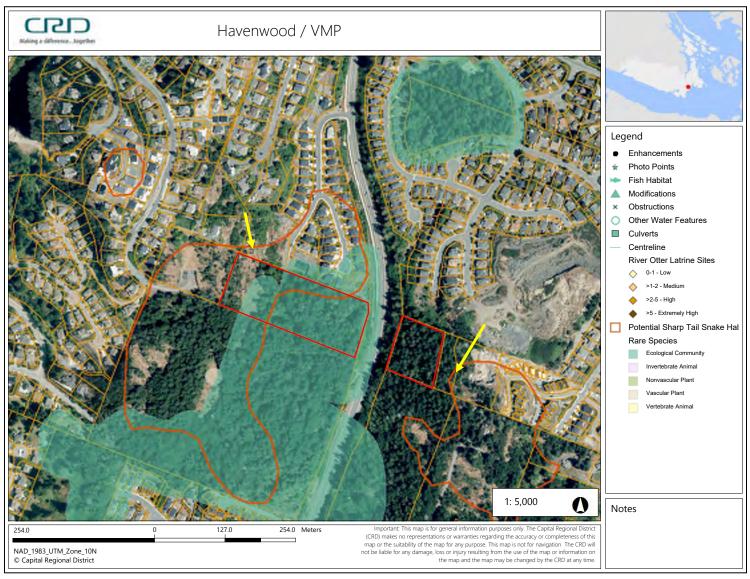


Figure 6. CRD map of the subject property (red polygons) and sensitive species data. The green polygon is the CDC Douglas-fir / Dull Oregon-grape ecological community (Figure 4). The orange polygons (yellow arrows) outline potential sharp-tail snake habitat, which covers much of the western parcel as well as Havenwood Park to the south. Image Source: CRD Regional Community Atlas (2019 orthophoto).



Figure 7. A map of the subject property (red polygons) from the Wildlife Tree Stewardship Atlas. As shown, there are no mapped bald eagle or osprey nest locations on the subject property or immediately adjacent lands.

Vegetation

The majority of the property is vegetated with a second growth conifer-dominated forest. There is a large rocky outcrop on the far west side of the western parcel which is sparsely vegetated and supports deciduous trees (Figure 8).

West Parcel Overview

The conifer forest has an overstory dominated by second growth Douglas-fir (*Pseudotsuga menziesii*) with western redcedar (*Thuja plicata*), bigleaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), and grand fir (*Abies grandis*). A few arbutus (*Arbutus menziesii*) trees are present in higher elevation areas (particularly on the east side of the east parcel). The understory is dominated by dull Oregon-grape (*Mahonia nervosa*), with oceanspray (*Holodiscus discolor*), sword fern (*Polystichum munitum*), salal (*Gaultheria shallon*), bracken fern (*Pteridium aquilinum*), trailing blackberry (*Rubus ursinus*), licorice fern (*Polypodium glycyrrhiza*), vanilla leaf (*Achlys triphylla*), red huckleberry (*Vaccinium parvifolium*), kinnikinnick (*Arctostaphylos uvaursi*), broad-leaved starflower (*Trientalis latifolia*), honeysuckle (*Lonicera ciliosa*), rattlesnake plantain (*Goodyera oblongifolia*) and a well-established, diverse moss layer. Where the canopy is dense and the forest floor shaded, understory density is limited to dull Oregon-grape, but openings in the canopy where light is increased and areas around the perimeter of the site enable establishment of a more diverse understory community. Field assessment confirmed that the conifer forest areas of the site are a Douglas-fir / dull Oregon-grape ecological community as noted in background information (Figure 9).

A large rocky outcrop exists on the far west side of the western parcel (Figure 10). Land on the west side of the large wetland rises steeply with some areas of near-vertical rock. The vegetation in this area is distinctly different than the rest of the site. Vegetation on the east face of the rock outcrop is quite sparse and limited to small Garry oak (*Quercus garryana*) trees, a few arbutus trees, oceanspray and many Scotch broom (*Cytisus scoparius*) plants (Figure 11). A few goldenback fern (*Pityrogramma triangularis*) were also observed. The rest of the area is covered in a dense layer of moss and lichens with some grasses. The top of the rock outcrop supports smaller diameter Douglas-fir and arbutus trees with baldhip rose (*Rosa gymnocarpa*), oceanspray, kinnikinnick, and trailing blackberry (Figure 12). There is a small rocky outcrop in the northeast corner of the western parcel, which supports a few Garry oak and arbutus trees. The rocky outcrop is mapped by the CRD as potential sharp-tailed snake habitat. See "Reptiles" below.

Minor amounts of Himalayan blackberry (*Rubus discolor*), English ivy (*Hedera helix*), and daphne (*Daphne laureola*) were present but they are concentrated around the edges of the site, particularly along the northern boundary. Scotch broom (*Cytisus scoparius*) is also concentrated around the perimeter of the site with the exception of the large rocky outcrop, where it is significantly more numerous and is the dominant shrub in that area. English holly (*Ilex aquifolium*) is present in low densities scattered throughout the site. This is typical invasive species distribution where they are introduced from adjacent disturbed landscapes and proliferate in areas with little shade or competition (*i.e.* the sparsely vegetated rocky knoll). Holly is easily spread by birds and therefore found scattered throughout the property.

East Parcel Overview

The east parcel supports a similar conifer-dominated Douglas-fir / dull Oregon-grape community as the west parcel. Arbutus trees are more numerous, particularly near the eastern boundary of the east parcel. Western redcedar trees are concentrated near the toe of slope and riparian area for Latoria Northeast Creek. The trees are largely second-growth, but a few large, fire-scarred veterans exist as snags. The east parcel has similar understory characteristics as well with relatively sparse understory vegetation except where openings in the canopy exist (Figure 13).

The east parcel is fairly steeply sloped and rises up from the riparian area of Latoria Northeast Creek towards the height of land which is beyond the eastern property boundary.

There is a significant amount of windthrow on the east parcel, particularly near the boundary with VMP and the eastern edge of the riparian area for Latoria Northeast Creek (Figure 14). (See the windthrow report prepared by Dunster and Associates).

Invasive species are also generally low density and concentrated around the north and western property boundaries. The highest density invasive species on the east parcel is Himalayan blackberry along the frontage with VMP.

Rare Plants

A preliminary site survey was undertaken by Mr. Thomas Munson, P.Ag., on April 5, 2021. Due to the cold spring weather, many plants are late to emerge or flower. A follow-up survey was completed on April 17 and April 18, 2021.

The field assessment confirmed that the conifer forest areas of the site area a Douglas-fir / dull Oregon-grape ecological community (a red-listed community with a provincial status of S1). No rare of endangered plant species were noted in the lowland forested areas of the site or the riparian areas.

Field assessment of the rock outcrop on the west side of the western parcel found fairyslipper (*Calypso bulbosa*) and Goldenback fern (*PityrogrammaTriangularis*). Both goldenback fern and fairyslipper are classified 'yellow' on the BC species at risk list. A complete list of the plant species observed can be found in the rare plant survey in Appendix 3.

The upper rock outcrop and surrounding forest, where the majority of rarer plants are found, is proposed for park dedication and will be protected from development.

General Observations

There are a large number of standing dead trees and quite a few existing snags. While most of the snags are second-growth trees, there are a few very large veteran tree snags on the east parcel (Figure 15). Every snag appeared to be heavily utilized by wildlife – they contained numerous woodpecker holes as well as some larger tree cavities (Figure 16). This observation was supported by the bird inventory (Appendix 2).

The tree stand is dominated by trees of a single age-class of second-growth trees; however, there are a few larger veterans and smaller new trees present so there is a moderate diversity

of age-classes present. Where openings in the canopy exist, there are young trees coming up to fill the gap.

There is a significant amount of windthrow present on both parcels, but most notably on the east parcel. The windthrow is concentrated along the edge of the parcels that front VMP (Figure 14).

The forest floor has a significant amount of wood, most very old and well-rotted (Figure 17). This is a high value for amphibian habitat, especially when contiguous with the wetland area which is likely breeding habitat for amphibians with aquatic life stages. The eastern parcel has a significant amount of blowdown present and wind-snapped trees.

There is a very well-established trail on the west side of the large wetland (Figure 18), that runs along the base of the rocky outcrop. This trail connects the adjacent development to the north through the subject property to Havenwood Park to the south. As part of the development program, this trail is slated for decommissioning and replanting. It will be relocated further away from the wetland in a less sensitive area. Numerous small informal trails and wildlife trails (deer trails) exist throughout the property. Very few wildlife sightings were made during the site assessments, other than birds.

Reptiles

Though no sharp-tailed snakes were observed during any site visit, habitat features which would be suitable for sharp-tailed snakes and other reptiles were present including sunning rocks, rock cervices, talus slides and woody debris. The reptile survey (Appendix 1) concluded that, while the nearest known sharp-tailed snakes are 5 km away, there is "a small possibility that the snake occurs on the property." The best potential area for snake habitat is on the west parcel, west of the wetland, along the rock outcrop. This area will be fully protected by the proposed parkland dedication which will adjoin Havenwood Park. There is a small finger of land along the northern property boundary where the rock outcrop and decayed woody debris may be potential habitat. No buildings are proposed for this area. This finger of land is contained within Area 5 and Area 4 of the site as shown in the tree management plan. These conservation areas will be managed to protect the forest floor and leave downed wood intact. This will support sharp-tailed snake habitat, if in fact, snakes are present.

With regard to western painted turtles, again, no suitable habitat was observed on the east parcel. The wetland on the west parcel was considered "poor" western painted turtle habitat because the water is too shallow, the site is too shaded and no significant basking sites are available, but there are turtles in the watershed. Turtles could use the wetland as "stepping stone" habitat on route to other sites. As part of the park dedication, the wetland will be fully fenced, the riparian area replanted, and the existing trail decommissioned and relocated to better protect the wetland and potential reptile and amphibian habitat.

Birds

A detailed bird survey was conducted on March 26 and 27th, 2021 by four experts from the Rocky Point Bird Observatory (Appendix 2). The survey concluded that "With ample water,

good cover, and a variety of trees, both living and dead, this property has considerable wildlife value, especially during the bird breeding season." However, it also noted that "this site suffers from high ambient noise levels, due to traffic which will undoubtedly increase in lockstep with local population. It remains to be seen how attractive this site will be to resident and migrant breeding birds over time."

Two large unidentified (and apparently unoccupied) nests were observed on the east parcel. Thirty-two species of birds were observed, including a mating pair of American kestrels near the western boundary of the site. "The American Kestrel has been in serious decline across North America and is a candidate for assessment by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). There are several attractive snags in the immediate area with appropriately sized holes which would seem to offer potential nesting sites." Hairy, downy and pileated woodpeckers were all observed, likely due to the abundance of dead and downed trees on both sites. Numerous song birds were also observed.

The poor state of forest health is contributing to the abundance of birds that seek out tree cavities or decaying wood. Havenwood Park itself has an abundance of dead and downed trees, with more coming all the time. As per the recommendations in the Tree Assessment Reports, only those trees which are considered danger trees will be removed. Wherever possible, dead trees will be retained or converted into wildlife trees to continue to support cavity nesting species and woodpeckers that rely on dead trees.

The Landscape Plan and, in particular, the riparian planting plan, is designed to include native understory plants that support smaller birds such as wrens, sparrows and thrushes. Table 1 below details some of the native plant-bird pairings that promote ecological function and support bird populations. Those currently included in the planting plan are marked with an asterisk (*). Some plants, such as fringecup and fawn lilies, are hard to source from nurseries but may be available through future plant salvage programs. Planting details can be found on the consolidated Landscape Plan, provided by the Landscape Architect.

Table 1. Table of plant species which support bird diversity

Plant	Attracts	Notes
Riparian Plants		
Sword Fern*	Sparrows, wrens, thrushes	Primarily for shelter and maintaining moist soil for invertebrates
Deer Fern	Sparrows, wrens, thrushes	Primarily for shelter and maintaining moist soil for invertebrates
False Lily of the Valley	Sparrows, wrens, thrushes	Primarily for shelter and maintaining moist soil for invertebrates
Vanilla Leaf	Sparrows, wrens, thrushes	Ground cover; primarily for shelter and maintaining moist soil for invertebrates
Red Columbine	Hummingbirds, sparrows, finches	Showy flowers; High attraction for hummingbirds
Skunk Cabbage*	Common Yellowthroat	Only in wettest areas; showy large yellow flowers; impressive annual leaves.

Plant	Attracts	Notes
Sedges and rushes*	Wrens, sparrows,	Good for the wettest areas; wide variety of
	thrushes	area; creek edge stabilizer
Black Twinberry	Thrushes, finches,	Ground cover; small flowers; Maintaining
	sparrows	moist soil for invertebrates; fruit for birds
Fawn Lily	Hummingbirds	Showy white flowers
Water Parsley	Sparrows, wrens,	Ground cover; grows in very wet areas
	thrushes	
Fringecup	Wrens, sparrows	Ground cover; maintaining moist soil for
		invertebrates
Pacific Bleeding Heart	American Robin,	Showy pink flowers
	hummingbirds	
Salal*	Hummingbirds,	Evergreen shrub; showy white flowers; fruit
	thrushes, sparrows	for birds
Upslope Plants		
Hardhack*	Small birds and bees	Attractive to pollinators
Salmonberry*		Berries for birds
Red-Flowering	hummingbirds	Berries for birds
Currant*		
Elderberry		Berries for birds
Oregon Grape*		Berries for birds
Indian Plum		Berries for birds

Of note: If vegetation removal is to occur during the regular breeding season (mid-March to mid-August), active nest searches must be conducted to comply with Section 34 of the BC Wildlife Act.

Amphibians

The wetland on the west side is good potential amphibian habitat. Tree frogs, rough-skinned newts and potentially red-legged frogs are the most likely species to be present, based on other local surveys. Most amphibians breed in or near water and then move into the forest and live on the forest floor in moist or damp soils, particularly under dead wood and bark. As noted above, the wetland will be protected by fencing, relocation of the existing trail and replanting of the riparian buffer (SPEA). The remaining surrounding forest, outside the building and trail footprints, will be managed to protect the forest floor, retain the rotting, moist wood, and protect moist soils. A detailed amphibian survey was therefore not conducted, since the findings would not alter the plan to protect and enhance the wetland.

The riparian area on the east side, along Latoria Northeast Creek, has limited potential for amphibians, but is a water source. **The riparian buffer will also be replanted to enhance stream protection and protect soils which, in turn, will protect any existing amphibian habitat.**

Wildlife Corridors

Wildlife corridors are typically taken to mean relatively protected or intact forest/cover that will allow small mammals, deer, reptiles and amphibians to travel between breeding, foraging, and nesting/resting sites in safety, in such a way as to not disturb their natural habits or patterns. They decrease human-animal conflict, and provide safety to both wildlife and people. In the case of Colwood, the species most likely to use such corridors are deer, raccoons, and other urban-adapted species as well as less-often observed reptiles (western painted turtles, snakes) and amphibians (frogs, newts and salamanders). Cougars may use such corridors in search of prey, but there are no other large carnivores that routinely inhabit this part of Southern Vancouver Island. Birds are able to use less- contiguous patch habitats as they fly between them, as long as they are not so far apart that they expend excessive energy moving from feeding to nesting areas to feed their young.

This site is at the northern edge of Havenwood Park and is bordered by extensive residential development to the north and east. To the west, it connects to a parcel owned by the CRD which is largely undeveloped. A wooded area between Sun Hills and Fulton Road provides a relatively protected connection to Lookout Lake Park.

To the south, Havenwood Park connects to Latoria Road through an undeveloped parcel of land west of Latoria Walk. Across Latoria Road, Olympic View Golf Course connects through to Latoria Creek Park and ultimately through several large wooded properties to Albert Head Lagoon, across Metchosin Road. The lands surrounding Olympic View Golf Course are currently under development.

Though the wildlife corridors are discontinuous, and likely to become more so with increased development of both homes and roads, and traffic in the vicinity of Veterans' Memorial Parkway and Latoria Road, the parcel of land dedicated for park is a natural extension of Havenwood Park, and is furthest from the traffic and noise on VMP. It is therefore an important "stepping stone" for animal migration between Havenwood Park and sites to the northwest.

Measures To Protect, Enhance, And Restore Ecosystem Values

The measures prescribed are derived from the assessments of the riparian, reptile, and bird assessments as well as the presumed amphibian habitat value. As noted elsewhere in the report, they include:

- Dedicating the wetland, upslope rock outcrop and surrounding riparian buffer on the west parcel as parkland. This is intended to protect sharp-tailed snake habitat, amphibian habitat, and bird habitat.
- 2. Not "cleaning up" the riparian area around the wetland. The area will be left intact, except for disturbance necessarily caused by planting new riparian plants.

- 3. Decommissioning the informal, but well-used, trail within the 15 m riparian buffer around the wetland, as much as possible. There is a short section that will remain inside the riparian buffer as there is no safe place to relocate it to without significant ground disturbance. This will be a significant benefit to the ecological function of the riparian buffer.
- 4. **Relocating the trail outside the 15 m riparian buffer** and building it to a standard that will protect the roots of the existing trees (see arborists' recommendations).
- 5. Creating an elevated boardwalk near the north end of the wetland, inside the 15 m, but outside the wetted area, on an existing rock slope made of blast rock where no harm can be done to the wetland. This will provide a trail connection that is isolated from the wetland to discourage users from creating rogue trails through the sensitive wetland soils.
- 6. **Replanting the trail and interplanting the riparian buffer** with species that will serve the dual purposes of enhancing the riparian ecological function (litterfall, insect drop) and providing bird food sources and habitat. They will also help to maintain moist soils for amphibians.
- 7. Choosing plants for the riparian plantings that are specifically targeted to support birds.
- 8. **Fencing the entire riparian buffer** around the wetland to prevent encroachment by people and dogs.
- 9. **Providing a viewing platform** to facilitate observation of the wetland from a distance, without harming it.
- 10. **Enhancing the plantings** within 30 m of the wetland ("special measures zone"/ Area 5) to enhance the understory and protect soils.
- 11. **Removing overstory danger trees** with special care to protect the forest floor and soils, including decaying large wood, as habitat for insects to support foraging birds and as shelter for amphibians. Large downed wood also helps to maintain soil moisture and can be an important source of water for plants in summer.
- 12. Working with Friends of Havenwood Park to salvage plants in the area of the development footprint to salvage and relocate native plants that would otherwise be lost, to suitable areas within Havenwood Park.
- 13. Working with Friends of Havenwood Park and professionals as required, to remove invasive species on the site and control their spread to the Park and neighbouring parcels.

- 14. **Fencing the riparian area on the east parcel**, along Latoria Northeast Creek, to protect the riparian area and discourage people and dogs.
- 15. Interplanting the riparian buffer along Latoria Northeast Creek with species that will serve the dual purposes of enhancing the riparian ecological function (litterfall, insect drop) and providing bird food sources and habitat.
- 16. Under the direction of the arborists, **replant tree species throughout the site** that will regenerate the forest health and shift the status from a dying, decadent forest stand to a younger, healthier forest stand that is better able to resist the stresses of changing climate patterns and wind patterns.

Conclusion

This report provides a summary of background conditions and recommendations to protect and enhance the ecological function of the site, both riparian and terrestrial. Additional details can be found in the appended reptile and bird survey reports and botanical surveys, the Riparian Area Protection Regulation Report, the Riparian Alternative Approval Assessment, as well as within the arborists' reports; however, effort has been made to summarize the key elements here. Planting details are shown on the Landscape Plan.



Figure 8. Map of the subject property showing the three distinct landscape elements: Conifer-Dominated forest, Riparian and Rocky Outcrops. Note this map is intended for illustrative purposes, no boundaries have been surveyed with the exception of the Stream/Wetland edge.



Figure 9. Douglas-fir/dull Oregon-Grape community in the conifer-dominated forest on the west side of VMP.



Figure 10. Large rocky outcrop on the far west side of the western parcel. Potential Sharp-Tailed snake habitat. This area will be protected as park.



Figure 11. Large rocky outcrop on the far west side of the western parcel. Note the high density of Scotch Broom.



Figure 12. Conifer-dominated forest near the height of land in the far west side of the western parcel. Note the smaller diameter of fir trees and presence of arbutus.



Figure 13. Conifer-dominated forest on the east side of VMP.



Figure 14. A significant amount of windthrow is present on the east parcel.



Figure 15. Fire-scarred veteran snag on the east parcel.



Figure 16. Cluster of snags with heavy wildlife use on the western parcel.

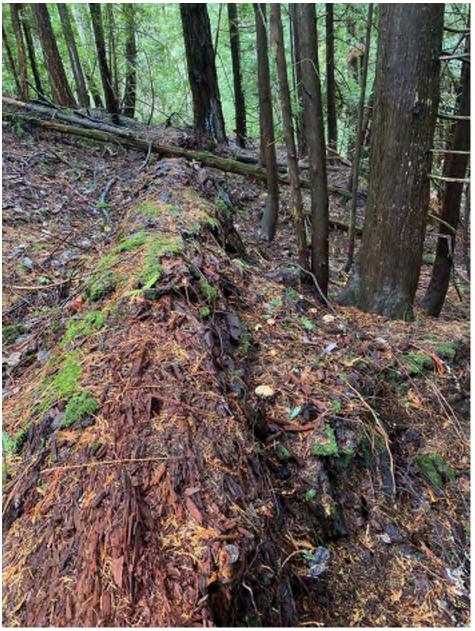


Figure 17. Large woody debris is abundant in the conifer-dominated forest and riparian area. This wood is generally old and very well-rotted. It likely supports amphibians and is an important source of moisture in summer.



Figure 18. Well-established trail on the west side of the wetland in the western parcel along the wetland.

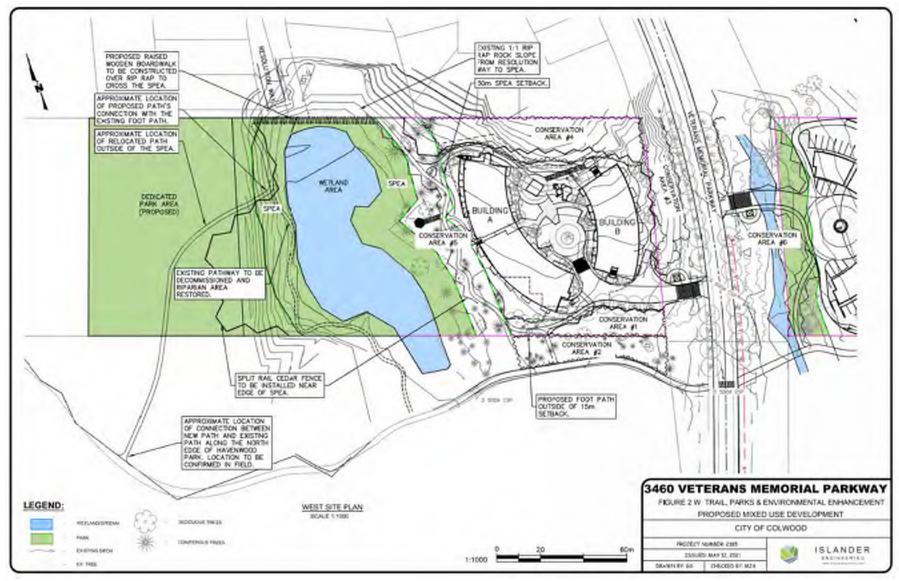


Figure 19. Site Plan for the proposed development - west parcel showing the proposed park dedication area as well as the proposed trail decommissioning and relocation plan.



Figure 20. Tree Enhancement Plan for the west development.



Figure 21. Site Plan for the east development.

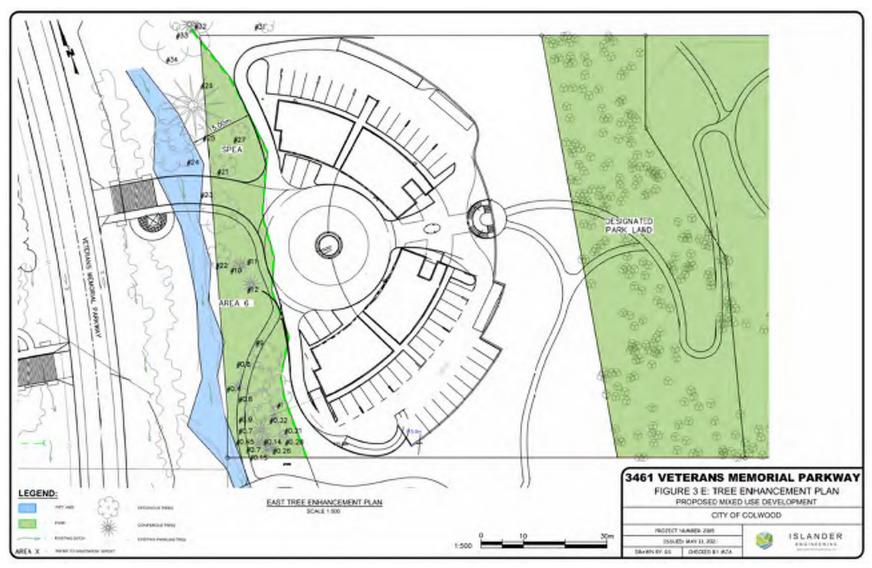


Figure 22. Tree Enhancement Plan for the east development.

Appendix 1- Reptile Survey and Recommendations

Western Painted Turtle and Sharp-tailed Snake habitat assessment on the 3476 Wishart Road property

Prepared for

Islander Engineering 623 Discovery Street, Victoria, BC, V8T 5G4 250-590-1200

Prepared by

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Date: 15 April 2021

This summary report outlines the findings of a field assessment of the 3476 Wishart Road (Figure 1) that took place on 13 Apr 2021. The focus of this habitat assessment was the Endangered (SARA 2003) Sharptailed Snake (*Contia tenuis*) and the Western Painted Turtle (*Chrysemys picta*), which is currently listed as Endangered (SARA 2007) but assessed as Threatened by COSEWIC (2016).

My qualifications include 25 years of survey and research experience with the Sharp-tailed Snake and 12 years of experience of survey and habitat restoration experience with the Western Painted Turtle on Vancouver Island. I have been the scientific advisor to the Sharp-tailed Snake Recovery Team and member of the Western painted Turtle Working Group and Recovery Team since their inceptions.

Western Painted Turtle habitat assessment

- There is a known population of the Western Painted Turtled in the watershed. The presence of the species increases the possibility that turtles might be using the wetlands located on the property.
- The shallow ponds that bisect the property provided poor turtle habitat (Figure 1). It is suboptimal because:
 - Basking sites are limited to a few logs in the wetland,
 - The shallow water in all of the ponds does not provide good escape habitat (turtles tend to hide in deeper water when disturbed or encountered by a threat), and
 - o the canopy is a too closed in to allow extensive basking.
- Turtles could use this habitat as a stepping stone during dispersal or seasonal movements.

Sharp-tailed Snake habitat assessment

- The three nearest known observations of the Sharp-tailed Snake are more than 5 km away from the property, and the intermediate areas are highly urbanized. It is not likely that there is any gene exchange between these sites.
- The property is partly intersected by the potential Sharp-tailed Snake polygon (I delineated in 2010) on the CRD Community Map (Figure 1).
- The terraced rocky outcrop at the west end of the property in the potential habitat polygon includes several microhabitats that fulfill the habitat requirements (hibernation, estivation, foraging, and thermoregulation) of the Sharp-tailed Snake (Figure 1). Sharp-tailed Snakes are semi-fossorial (live underground) so they require habitat where they can burrow into the ground. This kind of habitat was found
 - o below the small bluffs where there are boulder fields and rock piles, and
 - o in the sparsely wooded patches with decayed woody debris where the snakes can access sub-terranean habitat.
 - The site has a southerly aspect, which is another essential habitat requirement.
- Because the site is connected to the adjacent Havenwood Park that has similar habitat, there is
 a small possibility that the snake occurs on the property. Unfortunately, determining whether
 the snake is present or not can take a long time and unless you find a snake, even after 3 years
 of searching without finding a snake, it is not possible to rules out they might be present. It is
 even more difficult is to determine their absence.

Other observations and notes

- There was at least one hollow snag that bats could potentially use. I did not see evidence of use (guano deposits), which suggests that if it is used would be by single bats rather than a maternity roost. The approximate Lat/long coordinates are 48.415386574 -123.5066617002.
- One seepage area on the rocky outcrop is a potential site for rare mosses and vascular plants that should be surveyed by a botanical expert. This seepage is located approximately at the following Lat/long coordinates: 48.415830564 -123.5078055785
- There are a few big leaf maple trees and associated debris that should be assessed for the presence of the Blue-gray Taildroppper (*Prophysaon coeruleum*). For example, at Lat/long: 48.415575125 -123.5073204340
- The introduced Common Wall Lizard (*Podarcis muralis*) is abundant both along Veterans Memorial Parkway and on the rocky out crop.

In conclusion, the wetlands in their present state do not provide great Western Painted Turtle habitat, but the Sharp-tailed Snake habitat along the rocky outcrop is of reasonable quality. With careful planning, the snakes could co-exist with the development of this property. Since the rocky outcrops are susceptible to pedestrian and mountain bike traffic, I suggest that areas on the rocky outcrop be protected.



Figure 1.Approximate location of Sharp-tailed Snake and Western Painted Turtle habitat on the 3476 Wishart Road property.

Christian Engelstoft, MSc.

19 April 2021



Bird Survey 3460 and 3461 Veteran's Memorial Parkway, Colwood, BC

Rocky Point Bird Observatory 170-1581H Hillside Rd Victoria, BC, V8T 2C1

31 March 2021





Bird Survey at 3460 and 3461 Veteran's Memorial Parkway (VMP), Colwood

Conduct:

Surveys were conducted at the site on Friday 26 March, and Saturday 27 March 2021 between the hours of 07:00 and 10:00.

Surveyors: Kim Beardmore, Ann Nightingale, Mark Byrne, Daniel Donnecke

The survey was carried out by both stationary observation and walking the area, noting all avian species seen and heard, to identify species that are using this site.

Summary:

Observations were made by two teams of two surveyors over a period of three hours on each of two consecutive days. The area was covered as shown on the map below (Fig. 1). The dark blue indicates Friday's effort, and the lighter shades show the route followed on Saturday.



Fig. 1. Map of survey area

Conditions for aural detection of birds were less than ideal, with heavy traffic noise on Friday and slightly less on Saturday. Visibility was good with generally sunny skies on Friday and overcast on Saturday. Despite the noisy conditions the area was covered well.

The portion of the property to the east of the VMP is very steep, as is that part farthest to the west of the VMP. Both sides are well treed with coniferous and deciduous trees, principally fir, cedar, alder, and maple. Undergrowth is relatively light, and predominantly native species, except around the edges along the VMP and on the north and west sides where Himalayan blackberry, and other invasives are abundant. This vegetation, both native and non-native, provides habitat for a wide range of bird species. With ample water, good cover, and a variety of trees, both living and dead, this property has considerable wildlife value, especially during the bird breeding season.

Findings:

On Friday, 219 individuals of 29 species were encountered, and on Saturday, 139 of 25 species. Over the two days, 32 species of birds were observed, but many individuals would be the same on both days so the totals cannot be added. The counts of birds by species detected in the survey area are listed below (Table 1), separated by day of the survey.

Table 1. Birds detected at the 3460 & 3461 Veteran's Memorial Parkway site

	East West		Total			
* Indicates flyover ** number reduced as same individuals likely counted for both east and west	Eriday	Caturday	Eriday	Saturday	Friday	Saturday
Canada Goose*	Friday	Saturday	Friday	Saturday	•	Saturday
California Quail	4	1	1		1	1
	2			4		0
Anna's Hummingbird	3	5	7	4	10	9
Double-crested Cormorant*	1		2	1	2	1
Downy Woodpecker	1		2		3	
Hairy Woodpecker	2	2	2	4	2	2**
Pileated Woodpecker	2	2	2	1	2**	2**
Northern Flicker	3	3	6	7	9	10
American Kestrel			2	2	2	2
Hutton's Vireo			1		1	
Steller's Jay		1	2	2	2**	2**
Common Raven	2	3	2	2	2**	3**
Chestnut-backed Chickadee	25	12	15	11	40	23
Violet-green Swallow	2				2	
Ruby-crowned Kinglet		1	2		2	1
Golden-crowned Kinglet			14	2	14	2
Red-breasted Nuthatch	2	3	5	5	7	8
Brown Creeper	5	5	6	3	11	8
Pacific Wren	5	6	6	3	11	9
Bewick's Wren		1	2		2	1
Varied Thrush	7	4	5	4	12	8
Hermit Thrush		1				1
American Robin	6	7	30	14	36	21
House Finch			1		1	
Red Crossbill	2	7	5		7	7
Pine Siskin	6	2	10	1	16	3
Fox Sparrow		1	1		1	1
Dark-eyed Junco		2	1		1	2
White-crowned Sparrow		1				1
Song Sparrow	2	2	3	2	5	4
Spotted Towhee	4	7	8	2	12	9
Yellow-rumped Warbler			1		1	
Total	83	77	140	66	219	139

Significant breeding season behaviour such as courtship displays, singing, nest site searching, and territorial displays were observed. Additionally, two large nests were seen on the property to the east of the VMP. These were unoccupied and we could not determine which species may

have constructed/used them. A Red-breasted Nuthatch was observed excavating a nest on the west side (Fig.2.).



Fig. 2. Red-breasted Nuthatch excavating a nest cavity

One Annas hummingbird nest was found 2 m outside the yellow rope at the boundary of the parcel to the east of the VMP. The female was occupying the nest which is in position 48° 24'53" N, 123° 30'14" W in the fir next to a very large double-trunk cedar (Fig.3.).



Fig.3. Anna's Hummingbird on her nest

Several robins were observed collecting nesting material and singing males and territorial fights were evident.

Both east and west portions of the site have populations of at least six Pacific Wrens, four of which were seen in close proximity, travelling/foraging together. The males were observed singing on territory (Fig.4.)



Fig.4. Pacific Wren singing on territory

The property (east and west) attracts many woodpeckers. A pair of pileated woodpeckers were observed foraging together at the base of a mature Douglas fir (Fig.5.) and there is evidence of much activity throughout. Northern Flickers were exhibiting courtship behaviour, and both Hairy and Downy Woodpeckers were observed.



Fig. 5. Pileated Woodpeckers foraging & some of the results

A pair of juncos were observed foraging together and the female visited and examined a small, hidden depression in the soil – a potential nesting site.

At least 11 Brown Creepers were observed on the site and there are numerous trees with nest site potential for these birds. The older Western red cedar and large Douglas-fir offer ample loose bark, behind which creepers build their nests.

Finally, and of particular note, two American Kestrels were observed copulating (Fig.6.) and pair bonding at the western boundary of the site. The American Kestrel has been in serious decline across North America^{1,2}, and is a candidate for assessment by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC)¹. There are several attractive snags in the immediate area with appropriately sized holes which would seem to offer potential nesting sites. We were unable to locate the nest which, if not yet occupied, will be within days.

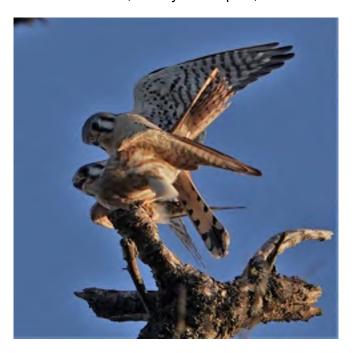


Fig.6. American Kestrels copulating

Recommendations:

Bird communities can change quite dramatically throughout the year. While this survey provides a good snapshot of what was on site at the end of March, migration is underway, and birds are arriving and leaving daily. The nesting season has commenced and will run from now until mid August, with the peak period being May and June. Some species, such as American Robins, will have two, and in some cases three, broods each season. Therefore, if vegetation removal is to occur during the regular breeding season (mid-March to mid-August), active nest searches should be conducted to comply with Section 34 of the BC Wildlife Act.

This site suffers from high ambient noise levels, due to traffic which will undoubtedly increase in lockstep with local population. It remains to be seen how attractive this site will be to resident and migrant breeding birds over time.

^{1.} Government of Canada https://wildlife-species.canada.ca/bird-status/oiseau-bird-eng.aspx?sY=2014&sL=e&sM=a&sB=AMKE Accessed 31Mar2021

^{2.} Chambliss, Lauren. America's smallest falcon is getting smaller. Living Bird, Spring 2019. https://www.allaboutbirds.org/news/americas-smallest-falcon-is-getting-smaller/ Accessed 31 Mar 2021

Annex

Scientific names of bird species detected

Canada Goose	Branta canadensis
California Quail	Callipepla californica
Anna's Hummingbird	Calypte anna
Double-crested Cormorant	Phalacrocorax auritus
Downy Woodpecker	Dryobates pubescens
Hairy Woodpecker	Dryobates villosus
Pileated Woodpecker	Dryocopus pileatus
Northern Flicker	Colaptes auratus
American Kestrel	Falco sparverius
Hutton's Vireo	Vireo huttoni
Steller's Jay	Cyanocitta stelleri
Common Raven	Corvus corax
Chestnut-backed Chickadee	Poecile rufescens
Violet-green Swallow	Tachycineta thalassina
Ruby-crowned Kinglet	Regulus calendula
Golden-crowned Kinglet	Regulus satrapa
Red-breasted Nuthatch	Sitta canadensis
Brown Creeper	Certhi americana
Pacific Wren	Troglodytes pacificus
Bewick's Wren	Thryomanes bewickii
Varied Thrush	Ixoreus naevius
Hermit Thrush	Catharus guttatus
American Robin	Turdus migratorius
House Finch	Haemorhous mexicanus
Red Crossbill	Loxia curvirostra
Pine Siskin	Spinus pinus
Fox Sparrow	Passerella iliaca
Dark-eyed Junco	Junco hyemalis
White-crowned Sparrow	Zonotrichia leucophrys
Song Sparrow	Melospiza melodia
Spotted Towhee	Pipilo maculatus
Yellow-rumped Warbler	Setophaga coronata



Veterans' Memorial Parkway 3476 Wishart Road Property Botanical Survey – West Side



April 22, 2021

Prepared by:

Thomas Munson, MSc., P.Ag.

Munson Ecological Services

Project Overview

The subject property has a civic address of 3476 Wishart Road, in the Municipality of Colwood. The property is bisected by Veteran's Memorial Parkway (VMP), splitting the property into two parcels – one large parcel on the west side and one small parcel on the east side of VMP. The parcels are bounded to the south by Havenwood Park, and to the north, east and west by residential development (Figure 1).

The City of Colwood's Official Community Plan (OCP) indicates that the entire subject property lies within an Environmental Development Permit Area for Hillside – Figure 2 (City of Colwood, OCP 2019 Bylaw No. 1700; Map Figure 18: Environmental Development Permit Area, Page 122).

A site visit was conducted by staff of Aqua-Tex Scientific Consulting in November of 2020, to walk the terrestrial landscape of both sides of the property. A report was produced (Aqua-Tex, November 20, 2020), as an overview summary of the terrestrial ecological features of the two sites. As the timing of this assessment was outside the ideal assessment window for observation of many species, especially plants, an additional botanical survey was recommended during the flowering season, to determine whether rare or endangered plant species were present. The author conducted a preliminary site reconnaissance of both properties on April 5, 2021, to determine the seasonal stage of the flowering plants, and a full reconnaissance of both properties on April 17 and April 18, 2021.

Site Description (from Aqua-Tex Report, November 20, 2020)

"The majority of the property is vegetated with a second growth conifer-dominated forest. There is a large rocky outcrop on the far west side of the western parcel which is sparsely vegetated and supports deciduous trees (Figure 2)."

1. West Parcel (from Aqua-Tex Report, November 20, 2020)

(i) Lowland Forest Section

"The lower conifer forest has an overstory dominated by second growth Douglas-fir (*Pseudotsuga menziesii*) with western redcedar (*Thuja plicata*), bigleaf maple (*Acer macrophyllum*), and grand fir (*Abies grandis*). The understory is dominated by dull Oregon-grape (*Mahonia nervosa*), with oceanspray (*Holodiscus discolor*), sword fern (*Polystichum munitum*), salal (*Gaultheria shallon*), bracken fern (*Pteridium aquilinum*), trailing blackberry (*Rubus ursinus*), licorice fern (*Polypodium glycyrrhiza*), vanilla leaf (*Achlys triphylla*), red huckleberry (*Vaccinium parvifolium*), kinnikinnick (*Arctostaphylos uva-ursi*), broad-leaved starflower (*Trientalis latifolia*), honeysuckle (*Lonicera ciliosa*), rattlesnake plantain (*Goodyera oblongifolia*) and a well-established, diverse moss layer (Figure 3). Where the tree canopy is dense and the forest floor shaded, understory density is limited to dull Oregon-grape and sword fern, but there are openings in the canopy where light is increased and areas around the perimeter of the site enable establishment of a more diverse understory community."

Field assessment in November of 2020 and in April of 2021 confirmed that the conifer forest areas of the site are a **Douglas-fir / dull Oregon-grape** ecological community as noted in background information from the BC Conservation Data Center (CDC) (Appendix 1). This ecological community is Red-listed, with Provincial Status S1. Long-term trends show a significant decline in areas of mature and old forest of this type. Conversion to urban and rural developments remains the biggest threat to this ecological community. Fragmentation, fire suppression,

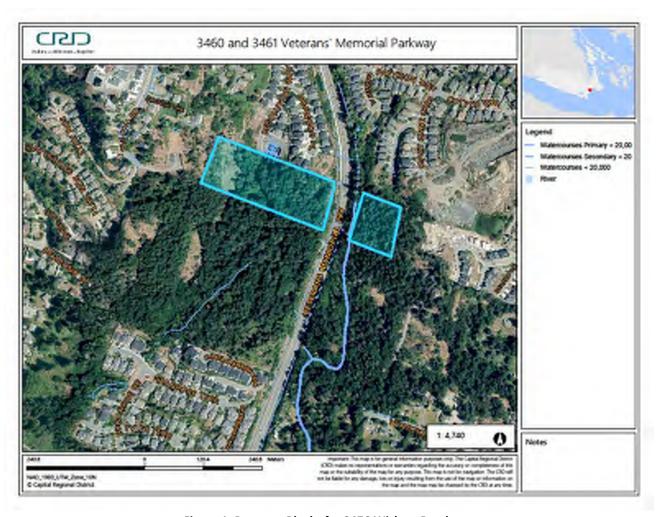


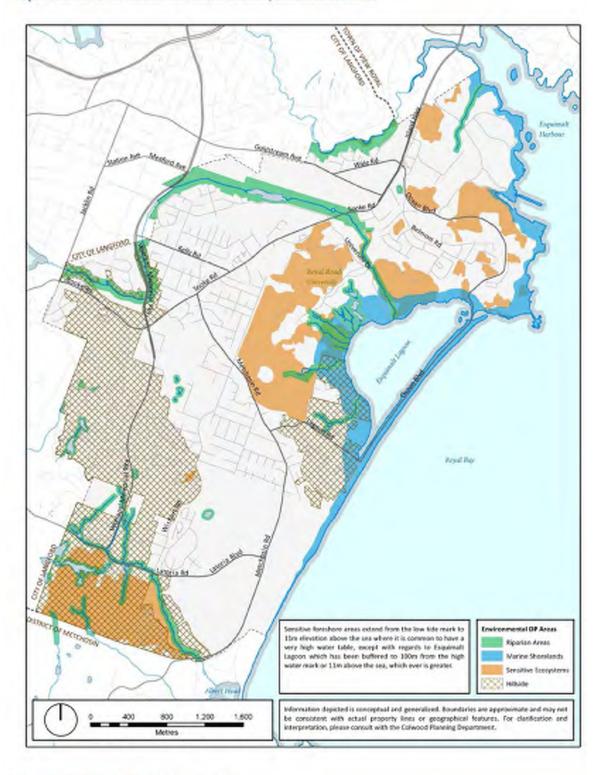
Figure 1: Property Blocks for 3476 Wishart Road

invasive alien plants, and significant deer browse also impact the ecological integrity of this community (CDC report, April 2021).

The lower conifer forest is in relatively good condition, with few invasive species present except on the perimeters near Veteran's Memorial Highway and the housing development to the north of the parcel. Minor amounts of Himalayan blackberry (*Rubus discolor*), English ivy (*Hedera helix*), daphne (*Daphne laureola*) and Scotch broom (*Cytisus scoparius*) were present. English holly (*Ilex aquifolium*) is present in low densities scattered throughout the site. There was evidence of human disturbance as well – a man-made shelter (Figure 4), a burned patch of vegetation, and numerous trails used by humans and deer.

There are a number of old veteran Douglas-fir and western redcedar trees on the site, scattered throughout the parcel. Wildlife use is evidenced by trees marked by woodpeckers, and deer trails crossing the parcel. A BC Conservation Evaluation Form summarizes the condition of the lowland forest on the western parcel (Figure 5). No rare or endangered plant species were noted on the lowland forest site. A complete list of the lowland forest plant species observed is found in Appendix 1.

Figure 18: Environmental Protection Development Permit Area Riparian Area and Marine Shoreline Protection, Sensitive Ecosystem Protection, Hillsides



122 CITY OF COLWOOD OFFICIAL COMMUNITY PLAN

Figure 2: Hillside Development Permit Area Map from Colwood Official Community Plan



Figure 3: Lowland Forest Section of West Block



Figure 4: Man Made Shelter in Lowland Forest Section

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Figure 5: Conservation Evaluation Form – Lowland Forest – West Block

(ii) Wetland Site

A small wetland complex runs up the middle of the parcel, between the lowland forest to the east and the rocky outcrop to the west. This wetland contains a suite of plants suited to the site – salmonberry (*Rubus spectabilis*), Pacific crab apple (*Malus fusca*), big-leaf maple (*Acer macrophyllum*), hardhack (*Spiraea douglasii*), skunk cabbage (*Lysichiton americanum*, Pacific water-parsley (*Oenanthe sarmentosa*), sword fern (*Polystichum munitum*), lady fern (*Athyrium felix-femina*), dog nettle (*Urtica dioica*), common rush (*Juncus effusus*), and slough sedge (*Carex obnupta*) (Figure 6). There is a well-established trail which skirts the western side of this wetland through the parcel, connecting Havenwood Park to the south, to the housing development to the north. No rare or endangered wetland species were noted in the wetland site. A complete list of the lowland forest plant species observed is found in Appendix 1.



Figure 6: Wetland Site in West Block

(iii) Rock Outcrop (description from Aqua-Tex report, November 20, 2020)

"A large rocky outcrop exists on the far west side of the western parcel (Figure 7). Land on the west side of the large wetland rises steeply with some areas of near-vertical rock. The vegetation in this area is distinctly different than the rest of the site. Vegetation on the east face of the rock outcrop is quite sparse and limited to small Garry oak (*Quercus garryana*) trees, a few big-leaf maple trees, oceanspray and many Scotch broom (*Cytisus scoparius*) plants. A few goldenback fern (*Pityrogramma triangularis*) were also observed. The rest of the area is covered in a

dense layer of moss and lichens with some grasses. The top of the rock outcrop supports smaller diameter Douglas-fir and arbutus trees with baldhip rose (*Rosa gymnocarpa*), oceanspray, kinnikinnick, and trailing blackberry (Figure 8). There is a small rocky outcrop in the northeast corner of the western parcel, which supports a few Garry oak and arbutus trees."



Figure 7: Lower Section of Rock Outcrop on West Side of West Block

Field observations in April of 2021 found the following plant species in flower on the slope and on the top of this rocky outcrop: chickweed monkeyflower (*Mimulus alsinoides*), great camas (*Camassia leichtlinii*), seablush (*Plectritis congesta*), blue-eyed Mary (*Collinsia parviflora*), broad-leaved shooting star (*Dodecatheon pulchellum*), small-flowered woodland star (*Lithophragma parviflorum*), and whole-leaved saxifrage (*Micranthes integrifolia*). Further west of the open rock outcrop and into a younger forested section with Douglas-fir overstory were seen fawn lily (*Erythronium oregonum*), miner's lettuce (*Claytonia perfoliata*) and the largest population of fairyslipper (*Calypso bulbosa*) that the author has seen in the wild (Figure 9). "This beautiful (and deliciously perfumed) little orchid, although widespread, is rapidly being exterminated in populated areas due to trampling and especially picking" (Pojar and Mackinnon, 1994). Both goldenback fern and fairyslipper are classified 'yellow' on the BC species at risk list. A BC Conservation Evaluation Form summarizes the condition of the rock outcrop on the western parcel (Figure 10). A complete list of the rock outcrop plant species observed is found in Appendix 1.



Figure 8: Forested Section to West of Rock Outcrop on West Block



Figure 9: Calypso bulbosa population in Forested Section, West Side of West Block

CONSERVATION EVALUATION FORM
PROJECT IDENTIFICATION DATE: ZD 21 - 04-18
PROJECT ID: 3476 W Shart PLOT #: West- 02
POLY#: D2 SEICLASS:SUBCLASS: Woodland G. Ook
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CONSERVATION INFORMATION
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DISTURBANCE: TOWARD WE SEE KNOWN THREATS: TO
human use, become parkland
ADJACENT LAND USE: OTHER FACTORS:
Housing day to north
ALIENSPPE Scotch broom, Daphne
SUCCESS, STATUS: DC. EST, SIZE COMM: (ha)
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EVALUATION SUMMARY
LANDSCAPE CONTEXT: EXCELLENT C GOOD # FAIR C POOR C
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Figure 10: Conservation Evaluation Form – Rock Outcrop – West Block

(iv) Development Impacts

The proposed housing development for the west parcel of 3476 Wishart Road is shown in Figure 11. The construction is proposed for the lowland forest section of the site, fronting on Veteran's Memorial Parkway. The majority of trees in the lowland forest will be removed, but the wetland site is flagged off from development at the edge of the Streamside Protection and Enhancement Area (SPEA) (Figure 12). The upper rock outcrop and surrounding forest, where the majority of rarer plants are found, is proposed for an addition to Havenwood Park to the south. Removal of the majority of the trees for the proposed development in the lowland forest will affect the drainage into the wetland site. The following recommendations are provided to minimize development impacts:

- Requirement for proper stormwater management plans;
- Requirement of erosion and sediment control plans during construction;
- Monitoring of all construction by a Qualified Environmental Professional (QEP) to prevent unforeseen impacts to the wetland site;
- Monitoring of tree windthrow post construction, as removal of trees on the outer side of the SPEA will make remaining trees in the SPEA more vulnerable to windthrow.

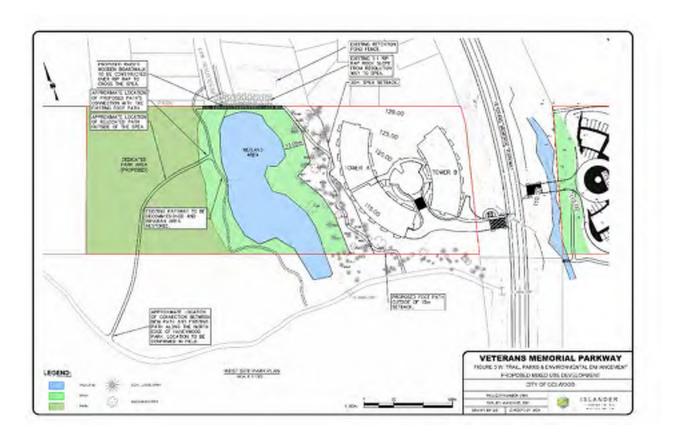


Figure 11: Proposed Housing Development – 3476 Wishart Road West Block



Figure 12: Wetland Streamside Protection and Enhancement Area (SPEA) Protected Zone

References

Aqua-Tex Scientific Consulting Ltd. (2020). Veteran's Memorial Parkway (3476 Wishart Road) Hillside Ecological Assessment Report. 23 pgs.

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Pojar, J. and A. Mackinnon. (1994). Plants of Coastal British Columbia. BC Ministry of Forests and Lone Pine Publishing, Victoria, BC.

Report prepared by:

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Email: loscinco@telus.net

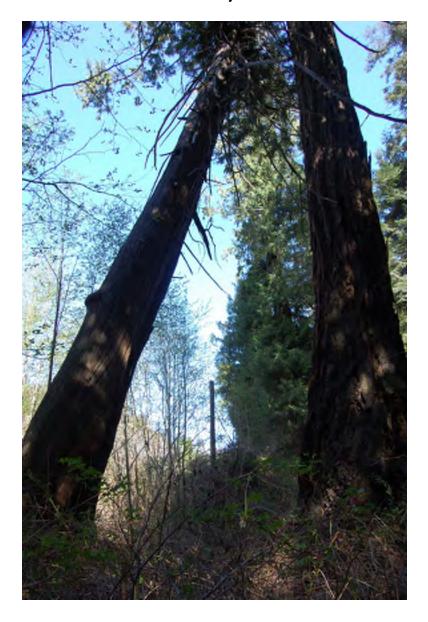
Appendix 1 – Plant List for West Block of 3476 Wishart Road

Scientific Name	Common Name	Wetland	Upland	Rocky	Lowland
		Site	Forest	Outcrop	Forest
Trees					
Abies grandis	Grand Fir	Х			Χ
Psuedotsuga menziesii	Douglas-fir	Х	Х		Χ
Acer macrophyllum	Big-leaf Maple	Χ	Х		Χ
Arbutus menziesii	Arbutus		Х	Х	Χ
Thuja plicata	Western Red Cedar	Χ			Χ
Malus fusca	Pacific Crab Apple	Х			
Shrubs					
Gualtheria shallon	Salal	Х	Х		Х
Vaccinium parvifolium	Red Huckleberry	Х	Х		Х
Rosa nutkana	Nootka Rose		Х		Х
Rosa gymnocarpa	Baldhip Rose		Х		
Rubus ursinus	Trailing Blackberry	Χ	Х		Χ
Rubus spectabilis	Salmonberry	Χ			
Holodiscus discolor	Ocean Spray		Х	Х	
Berberis nervosa	Dull Oregon Grape		Х	Х	Х
Symphoricarpos albus	Snowberry		Х		Χ
Lonicera ciliosa	Western Honeysuckle		Х		Χ
Spiraea douglasii	Hardhack	Х			
Arctostaphylos uva-ursi	Kinnikinnick				Χ
Cytisus scoparius	Scotch Broom		Х	Х	Χ
Daphne laureola	Daphne		Х		
Ilex aquifolium	Holly	Х	Х		
Rubus discolor	Himalayan Blackberry				Χ
Forbs					
Lysichiton americanum	Skunk Cabbage	Х			
Oenanthe sarmentosa	Pacific Water-Parsley	Х			
Achlys triphylla	Vanilla Leaf		Х		Х
Trientalis latifolia	Broad-leaved Starflower		Х		Х
Calypso bulbosa	Fairyslipper		Х		
Mimulus alsinoides	Chickweed Monkeyflower			Х	

Sedum spathulifolium	Broad-leaved Stonecrop			Х	
Brodiaea hyacinthina	Fool's Onion			Х	
Camassia leichtlinii	Great Camas		Х	Х	
Plectritis congesta	Seablush			Х	
Collinsia parviflora	Blue-eyed Mary			Х	
Dodecatheon pulchellum	Broad-leaved Shooting			Х	
,	Star				
Lithophragma	Small-flowered Woodland			Х	
parviflorum	Star				
Goodyera oblongifolia	Rattlesnake Plantain				Х
Achillea millefolium	Yarrow			X	
Micranthes integrifolia	Wholeleaf Saxifrage			Х	
Erythronium oregonum	Fawn Lily		Х		
Urtica dioica	Dog Nettle	Х			
Cardamine hirsuta	Hairy Bittercress		Х	Х	Х
Galium aparine	Bedstraw		Х		Х
Lactuca muralis	Wall Lettuce		Х		Х
Hypochaeris radicata	Hairy Cat's Ear			Х	Х
Vicia americana	American Vetch		Х		
Geum macrophyllum	Large Leaved Avens		Х	Х	Х
Pyrola asarifolia	Pink Wintergreen				Х
Claytonia perfoliata	Miner's Lettuce		Х	Х	
Nemophila parviflora	Small-flowered			Х	
	Nemophila				
Ranunculus occidentalis	Western Buttercup			Х	
Ferns / Grasses / Mosses	/ Others	Ш	u.	•	•
Polystichum munitum	Sword Fern	Х	Х		Х
Pteridium aquilinum	Bracken Fern	Х	Х		
Athyrium felix-femina	Lady Fern	Х			
Pityrogramma	Goldenback Fern			X	
triangularis					
Polypodium glycorrhiza	Licorice Fern			X	
Cynosurus echinatus	Hedgehog Dog Tail Grass			Х	
Anthoxanthum	Sweet Vernal Grass			Х	
odoratum					
Bromus spp.	Brome Grass			X	
Dactylis glomerata	Orchard Grass		X		X
Melica subulata	Alaska Oniongrass		X		X
Bryum miniatum	Red Bryum Moss			X	
Claopodium crispifolium	Rough Moss	Х			X
Isothecium myosuroides	Cat Tail Moss	Х			
Kindbergia oregana	Oregon Beaked Moss		Х		
Dicranum scoparium	Broom Moss			Х	
Atrichum selwynii	Crane's Bill Moss	Х			
Carex obnupta	Slough Sedge	Х			
Juncus effusus	Common Rush	Х			

Equisetum arvense	Field Horsetail	Χ		

Veterans' Memorial Parkway 3476 Wishart Road Property Botanical Survey – East Side



April 22, 2021

Prepared by:

Thomas Munson, MSc., P.Ag.

Munson Ecological Services

Project Overview

The subject property has a civic address of 3476 Wishart Road, in the Municipality of Colwood. The property is bisected by Veteran's Memorial Parkway (VMP), splitting the property into two parcels – one large parcel on the west side and one small parcel on the east side of VMP. The parcels are bounded to the south by Havenwood Park, and to the north, east and west by residential development (Figure 1).

The City of Colwood's Official Community Plan (OCP) indicates that the entire subject property lies within an Environmental Development Permit Area for Hillside – Figure 2 (City of Colwood, OCP 2019 Bylaw No. 1700; Map Figure 18: Environmental Development Permit Area, Page 122).

A site visit was conducted by staff of Aqua-Tex Scientific Consulting in November of 2020, to walk the terrestrial landscape of both sides of the property. A report was produced (Aqua-Tex, November 20, 2020), as an overview summary of the terrestrial ecological features of the two sites. As the timing of this assessment was outside the ideal assessment window for observation of many species, especially plants, an additional botanical survey was recommended during the flowering season, to determine whether rare or endangered plant species were present. The author conducted a preliminary site reconnaissance of both properties on April 5, 2021, to determine the seasonal stage of the flowering plants, and a full reconnaissance of both properties on April 17 and April 18, 2021.

Site Description (from Aqua-Tex Report, November 20, 2020)

"The majority of the property is vegetated with a second growth conifer-dominated forest.

1. East Parcel (from Aqua-Tex Report, November 20, 2020)

"The conifer forest has an overstory dominated by second growth Douglas-fir (*Pseudotsuga menziesii*) with western redcedar (*Thuja plicata*), bigleaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), and grand fir (*Abies grandis*). A few arbutus (*Arbutus menziesii*) trees are present in higher elevation areas (particularly on the east side of the east parcel). The understory is dominated by dull Oregon-grape (*Mahonia nervosa*), with oceanspray (*Holodiscus discolor*), sword fern (*Polystichum munitum*), salal (*Gaultheria shallon*), bracken fern (*Pteridium aquilinum*), trailing blackberry (*Rubus ursinus*), licorice fern (*Polypodium glycyrrhiza*), vanilla leaf (*Achlys triphylla*), red huckleberry (*Vaccinium parvifolium*), broad-leaved starflower (*Trientalis latifolia*), honeysuckle (*Lonicera ciliosa*), rattlesnakeplantain (*Goodyera oblongifolia*) and a well-established, diverse moss layer."

Field assessment in November of 2020 and in April of 2021 confirmed that the conifer forest areas of the site are a **Douglas-fir / dull Oregon-grape** ecological community as noted in background information from the BC Conservation Data Center (CDC) (Appendix 1). This ecological community is Red-listed, with Provincial Status S1. Long-term trends show a significant decline in areas of mature and old forest of this type. Conversion to urban and rural developments remains the biggest threat to this ecological community. Fragmentation, fire suppression, invasive alien plants, and significant deer browse also impact the ecological integrity of this community (CDC report, April 2021).

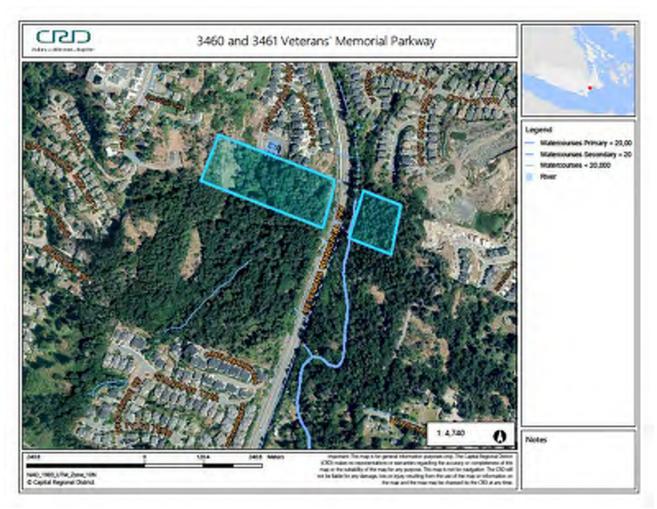
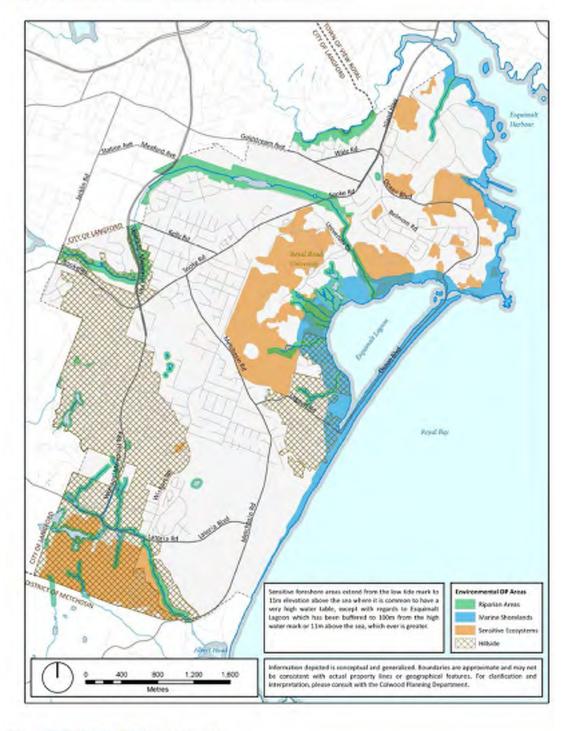


Figure 1: Property Blocks for 3476 Wishart Road

Figure 18: Environmental Protection Development Permit Area
Ripartan Area and Marine Shoreline Protection, Sensitive Ecosystem Protection, Hillsides



122 CITY OF COLWOOD OFFICIAL COMMUNITY PLAN

Figure 2: Hillside Development Permit Area Map from Colwood Official Community Plan

(i) Wetland Site

Immediately adjacent and to the east of Veteran's Memorial Parkway lies a tributary of Havenwood Creek, which flows through the east block of the property and south into Havenwood Park. A small wetland pond is present close to the VMP. Plant species noted in the field include: red alder (*Alnus rubra*), big-leaved maple (*Acer macrophyllum*), salmonberry (*Rubus spectabilis*), Nootka rose (*Rosa nutkana*), red elderberry (*Sambucus racemosa*), dog nettle (*Urtica dioica*), sword fern (*Polystichum munitum*), bracken fern (*Pteridium aquilinum*) and a large concentration of invasive Himalayan blackberry (*Rubus discolor*) (Figure 3). No rare or endangered plant species were recorded at the wetland site. A complete list of plant species recorded at the wetland site is found in Appendix 1.



Figure 3: Wetland Pond on East Block

(ii) Upland Forest site (from Aqua-Tex Report, November 20, 2020)

"The east parcel supports a similar conifer-dominated Douglas-fir / dull Oregon-grape community as the west parcel. Arbutus trees are more numerous, particularly near the eastern boundary of the east parcel. Western redcedar trees are concentrated near the toe of slope and riparian area for Havenwood Creek. The trees are largely second-growth, but a few large, fire-scarred veterans exist as snags. The east parcel has similar understory characteristics as well with relatively sparse understory vegetation except where openings in the canopy exist (Figure 4).



Figure 4: Upland Forest Understory Vegetation

The east parcel is fairly steeply sloped and rises up from the riparian area of Havenwood Creek towards the height of land which is beyond the eastern property boundary. There is a significant amount of windthrow on the east parcel, particularly near the boundary with VMP and the eastern edge of the riparian area for Havenwood Creek (Figure 5). Invasive species are also generally low density and concentrated around the north and western property boundaries. Plant species recorded in the understory include: salal (*Gaultheria shallon*), red huckleberry (*Vaccinium parvifolium*), Nootka rose (*Rosa nutkana*), trailing blackberry (*Rubus ursinus*), broad-leaved starflower (*Trientalis latifolia*), and large-leaved avens (Geum macrophyllum). No rare or endangered plant species were recorded in the upland forest section. A BC Conservation Evaluation Form summarizes the condition of the lowland forest on the western parcel (Figure 6). A complete list of plant species recorded in the upland forest is found in Appendix 1.



Figure 5: Tree Blowdown in Upland Forest, East Block

CONSERVATION EVALUATION FORM
PROJECT IDENTIFICATION DATE: 2021-04-17
PROJECTIO: 3476 Wishart R. Mott. Past -01
ECOLOGICAL COMMUNITY Down-Fix/Dull Oran, Gr
CONSERVATION INFORMATION
OWNER/JURISDICTION: Private - BC Alta Dout
DISTURBANCE: Thank I a sp. KNOWN THREATS:
Windthrow trails Housing devit
THOUSE TRAILS TOUSING GOVT
ADJACENT LAND USE: OTHER FACTORS:
Havenyused Arrivishith Fronts on major
Housing Jost - N. E Ponduren - VMP
AUEN SPRING A STORE BLOCK PRING HOLLE
SUCCESS, STATUS: MS EST, SIZE COMM: 12 (198)
FRAGMENTATION OF ECOLOGICAL COMMUNITY
□ < 5% FRAGMENTED 35,5 - 25 % FRAGMENTED □ > 25% FRAGMENTED
EVALUATION SUMMARY
UNDSCAPE CONTEXT: EXCELLENT CI GOOD CI FAR OF POOR CI
ECOLOGICAL INTEGRITY: EXCELLENT II GOOD II FARATI POOR II
CONDITION: EXCELLENT II GOOD II FAR II FOOR III
NOTES(AT-REX SPECIES, HILDLIFE OBSY., ACCURACY INFO, ETC.)
The state of the s
bounded by Levelopment-(3) sides
Appropriate TI - III
ACCURATE THE PARTY OF THE PARTY
ACORESS 107-2 Gerda Road Victoria
SUBMIT DATA
B.C. Conservation Data Centre
P.O. Box 9358, Stn. Prov. Gov't, Victoria, BC. V8W 9M2 Include: FS882 or GIF or VENUS file □ air photos with
polygon marked □ map product(s) □ ground photos □

Figure 6: Conservation Evaluation Form – East Block of 3476 Wishart Road

(iii) Development Impacts

The proposed housing development for the East parcel of 3476 Wishart Road is shown in Figure 7. The construction is proposed for the upland forest section of the site, fronting on Veteran's Memorial Parkway. The majority of trees in the upland forest will be removed, but the wetland site is flagged off from development at the edge of the Streamside Protection and Enhancement Area (SPEA) (Figure 8). Removal of the majority of the trees for the proposed development in the upland forest will affect the drainage into the wetland site. The following recommendations are provided to minimize development impacts:

- Requirement for proper stormwater management plans;
- Requirement of erosion and sediment control plans during construction;
- Monitoring of all construction by a Qualified Environmental Professional (QEP) to prevent unforeseen impacts to the wetland site;
- Monitoring of tree windthrow post construction, as removal of trees on the outer side of the SPEA will make remaining trees in the SPEA more vulnerable to windthrow.

References

Aqua-Tex Scientific Consulting Ltd. (2020). Veteran's Memorial Parkway (3476 Wishart Road) Hillside Ecological Assessment Report. 23 pgs.

British Columbia Conservation Data Centre: Conservation Status Report/Summary (2006). Psuedotsuga menziesii / Berberis nervosa – Douglas-fir / Dull Oregon Grape.

City of Colwood, Official Community Plan 2019 Bylaw No. 1700 (2019).

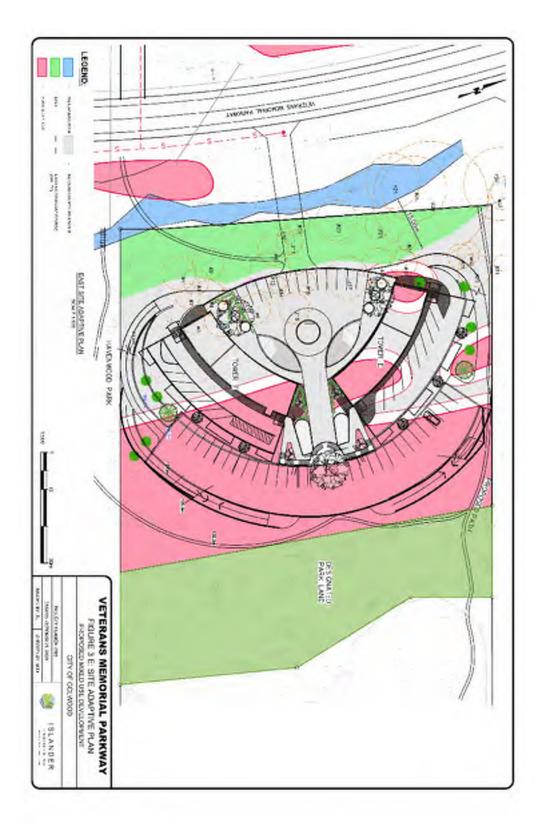


Figure 7: Proposed Housing Development for East Block, 3476 Wishart Road



Figure 8: Wetland Site Streamside Protection and Enhancement Area – East Block

Report prepared by:

Thomas Munson, MSc., P.Ag. (#2459)

Munson Ecological Services

1072 Gerda Road, Victoria, BC

Email: loscinco@telus.net

Appendix 1 - Plant List - 3476 Wishart Road - East Block

Scientific Name	Common Name	Wetland Site	Upland Site
Trees		•	
Abies grandis	Grand Fir	X	Х
Psuedotsuga menziesii	Douglas-fir	Х	Х
Acer macrophyllum	Big-leaf Maple	X	
Arbutus menziesii	Arbutus		X
Thuja plicata	Western Red Cedar	X	
Alnus rubra	Red Alder	X	
Shrubs			
Gualtheria shallon	Salal	X	X
Vaccinium parvifolium	Red Huckleberry	Х	Х
Rosa nutkana	Nootka Rose	Х	Х
Rubus ursinus	Trailing Blackberry	Х	Х
Rubus spectabilis	Salmonberry	Х	
Holodiscus discolor	Ocean Spray		Х
Sambucus racemosa	Red Elderberry	Х	
Berberis nervosa	Dull Oregon Grape	Х	Х
Symphoricarpos albus	Snowberry		Х
Daphne laureola	Daphne		Х
Ilex aquifolium	Holly	Х	Х
Rubus discolor	Himalayan Blackberry	Х	
Forbs			
Trientalis latifolia	Broad-leaved Starflower		Х
Urtica dioica	Dog Nettle	Х	
Cardamine hirsuta	Hairy Bittercress		Х
Galium aparine	Bedstraw		Х
Lactuca muralis	Wall Lettuce		Х
Vicia americana	American Vetch		Х
Geum macrophyllum	Large Leaved Avens		X
Ferns / Grasses / Mosses			
Polystichum munitum	Sword Fern	X	X
Pteridium aquilinum	Bracken Fern	X	
Dactylis glomerata	Orchard Grass		X
Melica subulata	Alaska Oniongrass		Х
Claopodium crispifolium	Rough Moss	X	X
Isothecium myosuroides	Cat Tail Moss	X	
Kindbergia oregana	Oregon Beaked Moss		Х

SCHEDULE 6, MEMO TO PROVIDE MORE INFORMATION



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201-3690 Shelbourne St Victoria, B.C. V8R 4H2 Tel: (250) 598-0266 Fax: (250) 598-0263

To: Yazmin Hernandez, Development Services Planner, Development Services | City of

Colwood

Cc: Deane Strongitharm, MCIP, RPP, CitySpaces Consulting Ltd., Strongitharm Consulting

Ltd.

Mike Achtem, P. Eng., Islander Engineering Ltd.

Aqua-Tex staff

From: Wm. Patrick Lucey, M.Sc., R.P. Bio., CBiol., MRSB, Sr. Aquatic Ecologist

Date: October 10th, 2021

Re: Veterans Memorial Parkway (West / East Side) - Applicant to Provide More Information:

September 21, 2021, Committee of the Whole Meeting, Council discussed the rezoning application

RZ-20-010 for 3460 Veterans Memorial Parkway (West Side)

File: /Users/Patrick/Documents/Projects/Islander Engineering Projects/Havenwood VMP/2021 Supplemental Information

Rezoning/Memo Supplemental Information Yazmin Hernandez_2021-10-08.docx

Dear Yazmin:

This Memorandum is intended to provide you with the supplemental information that Council requested to assist in the preparation of amendments to the Land Use Bylaw to rezone 3460 Veterans Memorial Parkway from a 21-single family dwelling to 180 apartment dwellings within two 6-storey buildings (COW Meeting, September 21, 2021, rezoning application RZ-20-010 for 3460 Veterans Memorial Parkway (West Side).

The specific information requested was to address the following questions.

- 1. A report to assess the riparian requirements to complete frontage improvements.
- 2. A rehabilitation and restoration plan for Restoration Areas 3. (NB. This planting plan shall be prepared by the Landscape Architect, in consultation with the QEP)
- 3. An assessment of the impact of constructing the proposed trail connection to Resolution Way, the boardwalk and viewing platform.

I have reviewed our previous reports to the City, regarding the VMP East and VMP West RAR reports, and I have revisited the two properties (east and west), as well as the VMP to address the likely effects of the proposed 5-lane widening of VMP roadway on the two RAR streams that lie adjacent and parallel to the VMP. The following are our recommendations to ensure the streams and wetland riparian management zones are conserved and protected.

1. A report to assess the riparian requirements to complete frontage improvements

The information required to address this question was provided in our April 18th, 2021 Report – 3461 Veterans' Memorial Parkway Havenwood Creek: Riparian Alternative Approval Assessment – which provided a rationale for a riparian management process for the long-term conservation of the eastern land parcel. This parcel could not be managed under the RAPR process as the Provincial process does not provide for riparian tree management based upon partial tree removal and replanting – the RAPR process only permits the removal of danger trees, not trees that are in poor health and which should be converted to wildlife trees, with a replanting of the treed understory.

The proposed 5-lane upgrade of VMP (Figure 12) requires that the disturbance footprint of the roadway be wider than the existing roadway. The addition of sidewalks and dedicated bike lanes results in a doubling of the roadway. The following comments are our recommendations for minimizing the ecological disturbance footprint of the expanded roadway.

- The riparian plant community and stream channels on either side of VMP (Figure 1), within the property frontage under the rezoning application, are different in terms of their ecological contribution to the health of the Havenwood Creek watershed.
- The eastern riparian community contains a stream channel, a treed over story and shrub understory, a moderate mix of invasive blackberry, and a channel with morphological complexity (*i.e.*, variable widths, small pools, rock and wood weirs, mixed soils of organics, sand, gravels, cobbles, and tree roots stabilizing the banks) (Figure 2 and Figure 5). The riparian plant community has a width of ~20 25 m along the reach on the subject property.
- The existing roadway has a narrow gravel shoulder (Figure 3) that ends at the drip line of the treed canopy.
- There is a broad grassy verge that lies adjacent to the gravel shoulder (Figure 3 and Figure 4), in which there is a bioswale that intercepts road runoff. The runoff discharges into Havenwood Creek. This bioswale would be classified as a connected ditch and would be subject to the RAPR, acknowledging that the VMP is a municipal facility and may be exempt from the RAPR. It would be subject to the DFO Regulations (Figure 13).
- The grassy verge is proposed to be used for the widening of VMP. The Sidewalk edge would not intrude beyond the drip line of the treed canopy (Figure 3).
- The existing bioswale would be replaced with a buried culvert in the existing bioswale alignment. This replacement would require a *WSA* Section 11 Application.
- As part of the management of the east riparian management zone a replanting plan will be part of the large tree management, i.e. topping large trees suffering from root rot (making them wildlife trees) and planting a new understory of conifers. This planting program has been developed and discussed in the Arborist's Report.
- The west side of VMP also has a stream channel that was installed as part of the VMP construction (Figure 1). This drainage channel is classified as a stream under the WSA and under the RAPR.
- The channel is buried north of the subject property (Figure 6) which then discharges into an open channel (Figure 8 and Figure 9).
- The stream channel on the west side of VMP is narrow and dominated by rushes, cattails, and agronomic grasses. Young red alder has begun to grow on the edge of the channel banks.
- The west side of the channel, north of the subject property, is largely a bed rock vertical face (Figure 7 and Figure 11) with the channel lying at the toe-of-slope.
- The proposed alignment of the 5-lane VMP, with sidewalks and dedicated bike lanes, would extend west to toe-of-slope along the bed rock vertical wall north of the subject property (Figure 14).
- It is our recommendation that the alignment of the proposed widening of VMP would not intrude east beyond the drip line of the treed riparian zone on the east side of VMP. No disturbance of the existing east side riparian plant community would be permitted under this alignment.
- The roadside grassy verge and bioswale on the east side of Veterans' Memorial Parkway will be replaced with a widened VMP, to the edge of the treed canopy drip line. The existing grassy verge and bioswale treat and detain road runoff, enhancing runoff water quality entering Havenwood Creek. Under a WSA Section 11 Approval there will be a requirement to compensate for the loss of the grassy verge and bioswale to ensure road runoff is treated and detained to pre-construction conditions to prevent degradation of Havenwood Creek.
- The stream on the west side of VMP would be realigned to the west to maintain the existing riparian vegetation which treats and detains road runoff, protecting the water quality in West Havenwood Creek (Figure 11, Figure 12, and Figure 13).

- The proposed widening of VMP will require a WSA Section 11 Approval, acknowledging that while the works will be constructed on municipal property (VMP ROW) the works are being conducted by a private developer.
- Figure 11 shows a proposed planting zone along the west side of VMP ROW that would re-establish a treed canopy, with a shrub understory. Within the ROW many of the existing conifers are dead or dying, likely a consequence of the construction of VMP and a loss of the water table. The planting plan would be based upon the existing soil moisture characteristics, as well as the Climate Change models forecasting longer, drier summers, and shorter, wetter winter rain events.
- The planting plan would require soil amendments and should reflect the long-term forecast for a dry upslope terrain. Invasive species management would be required to establish the replanted community as a viable dry slope plant association.
- The detailed planting plan would be designed following the WSA Section 11 Approval being awarded.
- The detailed planting plan shall be prepared by the Landscape Architect, in consultation with the QEP.

3. An assessment of the impact of constructing the proposed trail connection to Resolution Way, the boardwalk and viewing platform.

A detailed survey of the habitat associated with the western wetland was provided in an earlier report – *Veterans' Memorial Parkway (3476 Wishart Road): Hillside Ecological Assessment and Habitat Enhancement (2021)* – a precis of which is provided below.

The property has distinct landscape elements characterized by differences in vegetation and landform. Broadly speaking they can be described as:

- 1. Riparian On the west side of VMP this area includes the large wetland which forms the headwaters of North Latoria Creek.
- 2. Coniferous-dominated forest Douglas-fir/dull Oregon-grape community. The majority of the property on both sides of VMP is a second-growth conifer landscape dominated by Douglas-fir with western redcedar and a few Grand fir trees. Lower elevation areas, along the toe of rock outcrops and approaching riparian areas also support bigleaf maple. The canopy is relatively dense which results in a shaded understory that is dominated by dull Oregon-grape. The western wetland has a secondary plant community of sedges, western red cedar, and clusters of invasive blackberry.
- 3. Rocky outcrops Garry oak/arbutus/oceanspray community. These areas have sparse tree cover and support deciduous Garry oak trees and arbutus with oceanspray and a high density of mosses and lichens. They are also key habitat for reptiles, particularly snakes. The western wetland lies at the base of a steeply sloped bed rock ridge.

A large rocky outcrop exists on the far west side of the western parcel (). Land on the west side of the large wetland rises steeply with some areas of near-vertical rock. The vegetation in this area is distinctly different than the rest of the site. Vegetation on the east face of the rock outcrop is quite sparse and limited to small Garry oak (*Quercus garryana*) trees, a few arbutus trees, oceanspray and many Scotch broom (*Cytisus scoparius*) plants (). A few goldenback fern (*Pityrogramma triangularis*) were also observed. The rest of the area is covered in a dense layer of moss and lichens with some grasses. The top of the rock outcrop supports smaller diameter Douglas-fir and arbutus trees with baldhip rose (*Rosa gymnocarpa*), oceanspray, kinnikinnick, and trailing blackberry (). There is a small rocky outcrop in the northeast corner of the western parcel, which supports a few Garry oak and arbutus trees. The rocky outcrop is mapped by the CRD as potential sharp-tailed snake habitat. See "Reptiles" below.

Minor amounts of Himalayan blackberry (*Rubus discolor*), English ivy (*Hedera helix*), and daphne (*Daphne laureola*) were present but they are concentrated around the edges of the site, particularly along the northern boundary. Scotch broom (*Cytisus scoparius*) is also concentrated around the perimeter of the site with the exception of the large rocky outcrop, where it is significantly more numerous and is the

dominant shrub in that area. English holly (*Ilex aquifolium*) is present in low densities scattered throughout the site. This is typical invasive species distribution where they are introduced from adjacent disturbed landscapes and proliferate in areas with little shade or competition (*i.e.* the sparsely vegetated rocky knoll). Holly is easily spread by birds and therefore found scattered throughout the property.

Rare plants are typically found in uncommon habitats such as around seeps or springs, on rock outcrops or on undisturbed soils. This site has been logged at least once, and is heavily used by residents. If rare plants are found, they are likely to be within the portion of land dedicated for park which contains the wetland and rock outcrops, including Garry oaks, on the west side. This information will be updated following the final assessment.

There is a very well-established trail on the west side of the large wetland (), that runs along the base of the rocky outcrop. This trail connects the adjacent development to the north through the subject property to Havenwood Park to the south.

- As part of the development program, this trail is slated for decommissioning and replanting.
- It will be relocated further away from the wetland in a less sensitive area.
- Numerous small informal trails and wildlife trails (deer trails) exist throughout the property.
- Very few wildlife sightings were made during the site assessments, other than birds.
- The best potential area for snake habitat is on the west parcel, west of the wetland, along the rock outcrop. This area will be fully protected by the proposed parkland dedication which will adjoin Havenwood Park. These conservation areas will be managed to protect the forest floor and leave downed wood intact. This will support sharp-tailed snake habitat, if in fact, snakes are present.
- The poor state of forest health is contributing to the abundance of birds that seek out tree cavities or decaying wood. Havenwood Park itself has an abundance of dead and downed trees, with more coming all the time. As per the recommendations in the Tree Assessment Reports, only those trees which are considered danger trees will be removed. Wherever possible, dead trees will be retained or converted into wildlife trees to continue to support cavity nesting species and woodpeckers that rely on dead trees.
- The Landscape Plan and, in particular, the riparian planting plan, is designed to include native understory plants that support smaller birds such as wrens, sparrows and thrushes.
- Some plants, such as fringecup and fawn lilies, are hard to source from nurseries but may be available through future plant salvage programs.
- If vegetation removal is to occur during the regular breeding season (mid-March to mid-August), active nest searches must be conducted to comply with Section 34 of the BC Wildlife Act
- The wetland on the west side is good potential amphibian habitat. The wetland will be protected by fencing, relocation of the existing trail and replanting of the riparian buffer (SPEA). The remaining surrounding forest, outside the building and trail footprints, will be managed to protect the forest floor, retain the rotting, moist wood, and protect moist soils.
- Though the wildlife corridors are discontinuous, and likely to become more so with increased development of both homes and roads, and traffic in the vicinity of Veterans' Memorial Parkway and Latoria Road, the parcel of land dedicated for park is a natural extension of Havenwood Park, and is furthest from the traffic and noise on VMP. It is therefore an important "stepping stone" for animal migration between Havenwood Park and sites to the northwest.

The measures prescribed are derived from the assessments of the riparian, reptile, and bird assessments as well as the presumed amphibian habitat value. As noted elsewhere in the Professional Reports prepared in support of the Rezoning, they include:

1. Dedicating the wetland, upslope rock outcrop and surrounding riparian buffer on the west parcel as parkland. This is intended to protect sharp-tailed snake habitat, amphibian habitat, and bird habitat.

- 2. Not "cleaning up" the riparian area around the wetland. The area will be left intact, except for disturbance necessarily caused by planting new riparian plants.
- 3. Decommissioning the informal, but well-used, trail within the 15 m riparian buffer around the wetland, as much as possible. There is a short section that will remain inside the riparian buffer as there is no safe place to relocate it to without significant ground disturbance.
- 4. Relocating the trail outside the 15 m riparian buffer and building it to a standard that will protect the roots of the existing trees (see arborists' recommendations).
- 5. Creating an elevated boardwalk near the north end of the wetland, inside the 15 m, but outside the wetted area, on an existing rock slope made of blast rock where no harm can be done to the wetland. This will provide a trail connection that is isolated from the wetland to discourage users from creating rogue trails through the sensitive wetland soils.
- 6. Replanting the trail and inter-planting the riparian buffer with species that will serve the dual purposes of enhancing the riparian ecological function (litterfall, insect drop) and providing bird food sources and habitat. They will also help to maintain moist soils for amphibians.
- 7. Choosing plants for the riparian plantings that are specifically targeted to support birds.
- 8. Fencing the entire riparian buffer around the wetland to prevent encroachment by people and dogs.
- 9. Providing a viewing platform to facilitate observation of the wetland from a distance, without harming it.
- 10. Enhancing the plantings within 30 m of the wetland ("special measures zone"/ Area 5) to enhance the understory and protect soils.
- 11. Removing over-story danger trees with special care to protect the forest floor and soils, including decaying large wood, as habitat for insects to support foraging birds and as shelter for amphibians. Large downed wood also helps to maintain soil moisture and can be an important source of water for plants in summer.
- 12. Working with Friends of Havenwood Park to salvage plants in the area of the development footprint to salvage and relocate native plants that would otherwise be lost, to suitable areas within Havenwood Park.
- 13. Working with Friends of Havenwood Park, and professionals as required, to remove invasive species on the site and control their spread to the Park and neighbouring parcels.
- 14. Inter-planting the riparian buffer along Havenwood Creek with species that will serve the dual purposes of enhancing the riparian ecological function (litterfall, insect drop) and providing bird food sources and habitat.
- 15. Under the direction of the arborists, replant tree species throughout the site that will regenerate the forest health and shift the status from a dying, decadent forest stand to a younger, healthier forest stand that is better able to resist the stresses of changing climate patterns and wind patterns.

Figures

Question #1

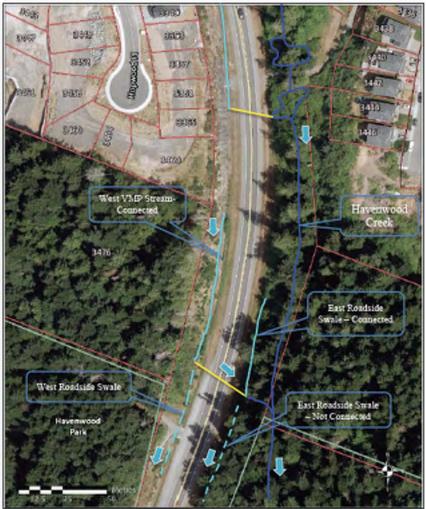


Figure 1. Sketch of Havenwood Creek and the roadside swales along Veterans' Memorial Parkway. Solid lines (teal and dark blue) indicate channels directly connected to Havenwood Creek, while the dashed teal line represents the roadside swale which is not directly connected to Havenwood Creek; arrows denote the direction of flow. Sketch is approximate, this figure is intended for illustrative purposes only. The distance between the solid teal line (western side of VMP) and the property line is approximately 10 - 15 metres. Image Source: CRD Regional Community Atlas (2013 orthophoto).



Figure 2. Image looking NE across VMP at the treed canopy within the east parcel's SPEA zone. Note the understory growth that has extended west across the grassy landscape shown. Yellow arrow = a large snag. Photo taken May 28^{th} 2020.



Figure 3. The roadside swale on the east side of Veterans' Memorial Parkway. Havenwood Creek Reach 1 is located on the east side (right) of the swale in the treed canopy to the right of the photograph. The swale and its east banks will be replaced with a widened VMP, to the edge of the drip line. The existing grassy verge and bioswale treat and detain road runoff, enhancing water quality of runoff entering Havenwood Creek. Under a WSA Section 11 Approval there will be a requirement to compensate for the loss of the grassy verge and bioswale to ensure road runoff is treated and detained to pre-construction conditions to prevent degradation of Havenwood Creek. Photograph taken 2020.



Figure 4. Roadside swale on the east side of VMP. Note there is no evidence of soil or particulate partitioning that would meet the definition of a stream channel within any portion of the bioswale; runoff from VMP appears to consist solely of sheet flow. Dashed line = runoff flow direction. (Photograph taken 2014)



Figure 5. Large mature conifer snag, with top broken and heartwood decay. Note the dense shrub understory. Photograph taken June 22nd 2020.



Figure 6. Looking upstream of the subject property along the west side of VMP. Along this section of VMP, the roadside drainage on the west side is buried. Just downstream of this photo (Figure 7 and Figure 8), the drainage is day-lighted and is classified a stream (*i.e.* not a ditch) in the WSA.



Figure 7. Looking downstream, the yellow arrow points to the drainage flow emerging from the buried drainage channel (dashed yellow arrow). The inlet of this open channel lies within the VMP road ROW adjacent to the northeast corner of the western parcel of the subject property.



Figure 8. Looking downstream along the west side of VMP; note the riparian vegetation along the channel (rushes, cattails) indicating that this channel has year-round soil moisture adequate to support riparian vegetation. Blue arrow shows direction of flow. The vegetation treat and detain road runoff, enhancing water quality of runoff entering Havenwood Creek. Under a WSA Section 11 Approval there will be a requirement to compensate for the loss of the grassy verge and bioswale to ensure road runoff is treated and detained to pre-construction conditions to prevent degradation of Havenwood Creek.



Figure 9. CSP culvert under VMP routing stream flows from the open channel (Figure 8), discharging into Havenwood Creek (Figure 1). Note the clarity of the drainage flow, indicating an absence of sediment transport.



Figure 10. Looking downstream along the west side of VMP, just south of the culvert under VMP (Figure 9). The flow upstream of this photo flows into the culvert under VMP, which drains into Havenwood Creek east of VMP. Note this section of the channel has minimal surface flow and is overgrown with agronomic grasses. This drainage channel would be classified as a ditch, under the RAPR, as this drainage eventually flows into West Havenwood Creek, which is routed under VMP to join East Havenwood Creek. This bioswale treats and detains road runoff and will require compensation to ensure protection of Havenwood Creek water quality.

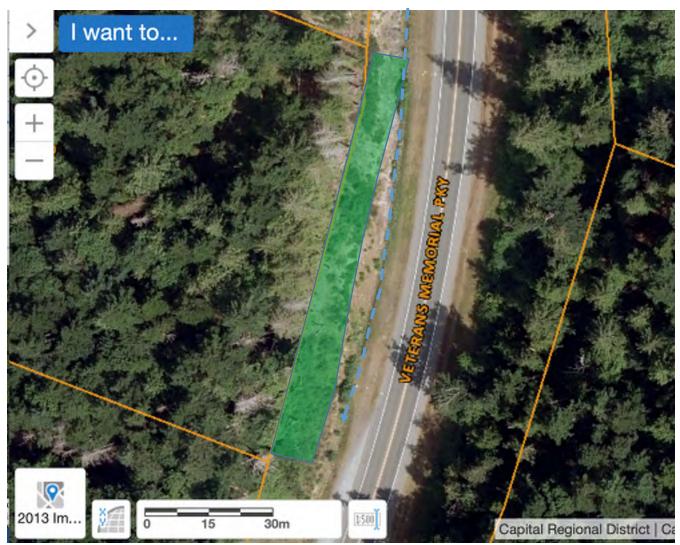


Figure 11. 2013 air photograph of the subject property showing the bed rock forming along the NE VMP ROW. Image from the CRD NAA. The light green polygon is a proposed planting zone that would reestablish a treed canopy, with a shrub understory. Many of the existing conifers are dead or dying likely a consequence of the construction of VMP and a loss of the water table. The planting plan would be based upon the existing soil moisture characteristics, as well as Climate Change models forecasting longer, drier summers, and shorter, wetter winter rain events. The dashed blue line is the approximate alignment of the existing open drainage stream.

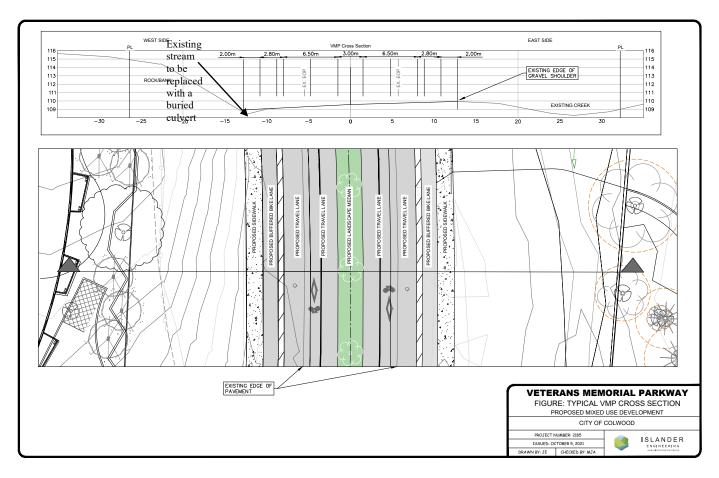


Figure 12. Islander Engineering drawing showing the proposed 5-lane improvement to VMP. The cross section shows the edge of the proposed disturbance footprint. It is assumed that there will be a gravel shoulder extending ~0.5 m beyond the outside border of the sidewalks. Note that the existing stream on the west side of VMP is shown as being buried. This stream will be required to be moved laterally to the west ~2.5 m or be culverted. A WSA Section 11 Approval will be required to realign this existing stream. FLNRORD will determine the realignment option and compensation for the loss of the existing open stream channel. Water quality and quantity of road runoff will also be required to be compensated.

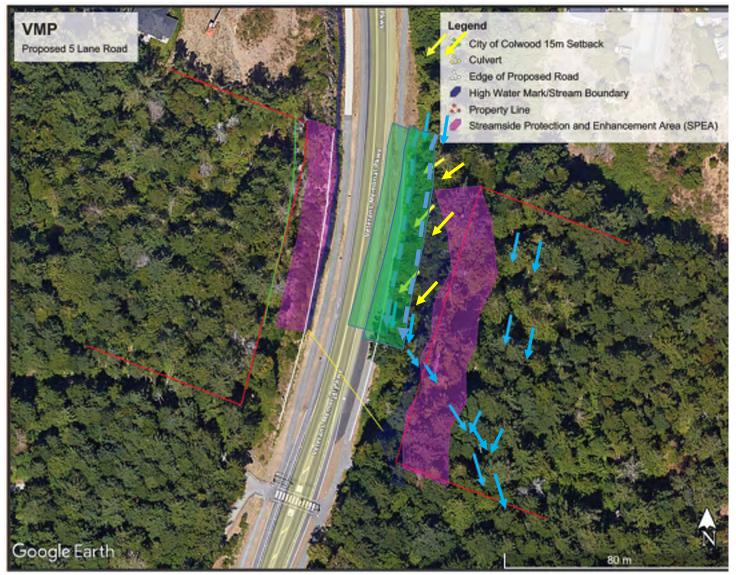


Figure 13. Overlay of the RAR SPEAs for the two stream channels (west and east) that lie adjacent to VMP. The yellow arrows indicate the alignment of the existing stream channel on the west side of VMP; the solid yellow arrow is the culvert under VMP; the blue arrows indicate direction of stream flow; the magenta polygon is the SPEA on private property (there are no SPEAs associated with the VMP ROW). The orange polygon (west side) is the approximate replanting zone (Figure 11). The stream could be relocated to the west, within the replanting zone (dashed blue line). A WSA Section 11 is required to realign the stream channel and provide compensation for the loss of treatment and detention of runoff.

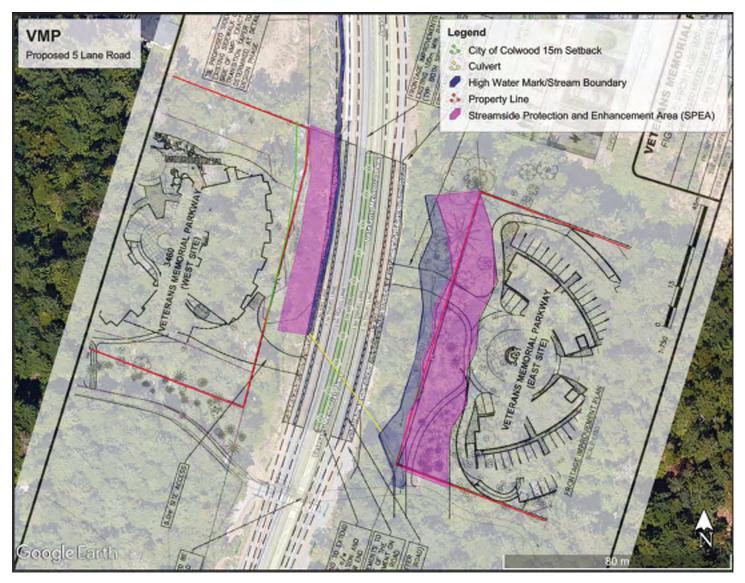


Figure 14. Overlay of the proposed 5-lane upgrade of VMP relative to the existing streams and SPEAs showing that the west stream would be buried under the sidewalk. The west stream could be moved laterally west by ~2.5 m as an open stream channel. This decision will require a discussion with FLNRORD staff and the realignment option will require a WSA Section 11 Approval. Note that the proposed upgrade does not intrude into the vegetated riparian zone on the east side of VMP.

Question #3



Figure 15. Site Plan showing the west wetland, the existing trail that lies close to the western edge of the wetland, which will be relocated higher up the steep slope, and the decommissioning of one section of trail, with riparian replanting to enhance wildlife habitat (dashed red line). The raised boardwalk is shown crossing the north edge of the wetland.

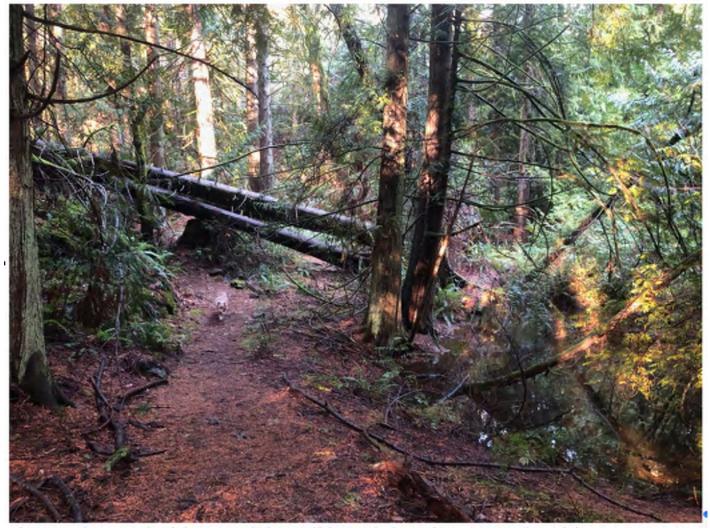


Figure 16. Well-established trail on the west side of the wetland in the western parcel along the wetland. This section of trail will be decommissioned and replanted. Note the copse of mature western red cedar that have been blown down in a wind storm. These trees will be left intact to provide future habitat for a broad range of species that use dead and dying trees.

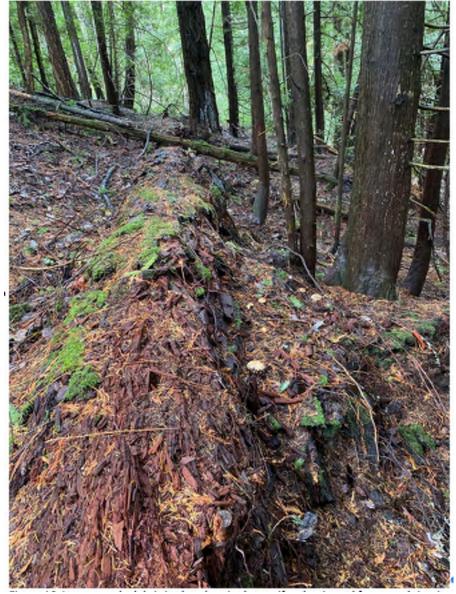


Figure 17. An example of large wood lying on the forest floor in an advanced state of decay, providing valuable habitat for a broad range of wildlife, functioning as a water reservoir during dry summer periods, and enhancing the micro-flora and fauna essential to maintaining the forest's proper functioning condition.

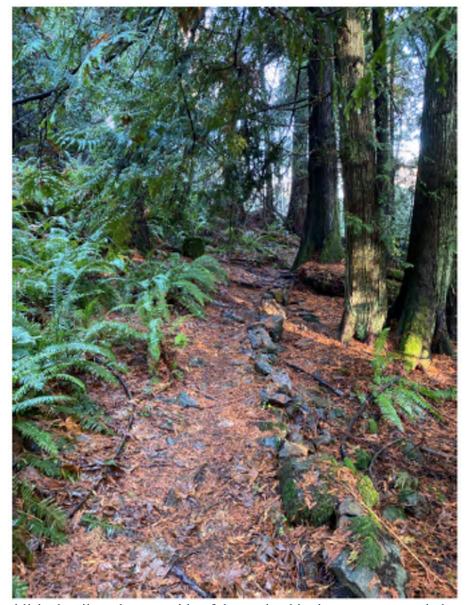


Figure 18. Well-established trail on the west side of the wetland in the western parcel along the wetland. This section of trail will be decommissioned and replanted.



Figure 19. This trail which crosses the outlet stream channel, at the south end of the wetland, will be decommissioned and replanted. Signage will be erected along the fencing enclosing the wetland to inform the public of the need to avoid entering the wetland's riparian zone to protect the habitat. Trampling of understory and tree roots is a serious risk to riparian functional condition; the presence of people and dogs increase noise levels and frequently disturb wildlife, often resulting in failed breeding and nesting behavior.



Figure 20. The base of the rock rubble wall at the north end of the wetland will be the location for a raised boardwalk, to eliminate the trampling of the riparian plant community. The small rocky base provides valuable habitat for a range of small mammals, reptiles, and amphibians.



Figure 21. Looking across the stormwater management pond at the south end of Resolution Way at the proposed raised boardwalk (solid black lines) alignment adjacent to the existing mortared rock wall. The boardwalk/bridge (*i.e.*, Figure 22) would be elevated above the vegetation and connected to trails at either end. The boardwalk might be two bridge sections linked with a middle pier, to minimize the length of clear spans.



Figure 22. Example of a public walking trail bridge spanning a stream in Mount Douglas Park, Saanich. The bridge is light weight, meets municipal public access, construction standards, minimal maintenance, all-weather, and easily installed (Figure 23). It would be necessary to have a walking surface on the bridge that would be dog-friendly, *i.e.*, not an expanded mesh which could injure the dog's feet.

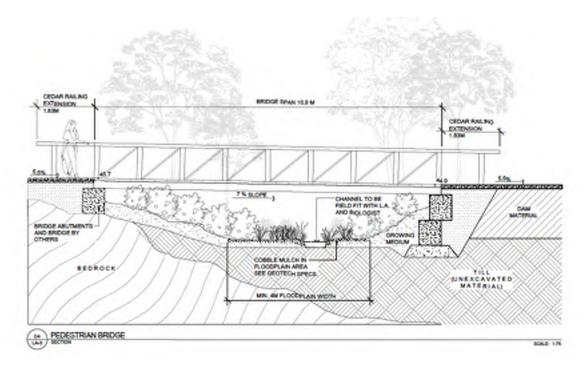


Figure 23. Cross section of the bridge in Figure 22 (Paul de Greeff Landscape Architect, 2021), showing a simple abutment design, with a stream/wetland beneath the structure. This type of structure would provide a viewing platform looking over the wetland.

APPENDIX 7, RESTORATION WORKS COST ESTIMATES



Planning Division The City of Colwood 3300 Wishart Road Victoria, BC V9C 1R1

Attn: Ms. Yasmin Hernandez

c/c Mr. Peri Saroya and Mr. Jason Saroya (BC Alta Dev.)

August 3, 2022

Re: Landscape Bond for VMP West-Restoration Area #1 (South Boundary)

Dear Ms. Hernandez,

At the request of my client, BC ALTA Developments (Mr. Pari Saroya), please find the attached cost estimate for Landscape Restoration Area #1 as per the Development Permit plan presented. This estimate is based on the provision of juvenile size native species trees that were selected in consultation with our project Arbourist and local Nursery suppliers. It is not the intention of the Developer to remove any healthy non-invasive native vegetation from the Restoration Area. The new tree plantings are intended to enhance and bolster the existing vegetation as well as provide for a succession of new trees for the future. ForSite Landscape Architecture will provide individual estimates for each of the proposed Restoration areas. This scope of work does not include formal landscaping for the proposed buildings.

The cost for Restoration Area #1 is \$6,000,00.

If you wish to know the status of this work or if you have any questions please contact me at (250) 508-7885.

Yours very truly.

Brad Forth BCSLA, CSLA.

#408-1581h Millside Avenue + Victoria, BC VST 2C1 + Phone: 250-508-7885 forsiteland@hotmail.com



Planning Division
The City of Colwood
3300 Wishart Road
Victoria, BC
V9C 1R1
Attn: Ms. Yasmin Hernandez

c/c Mr. Peri Saroya and Mr. Jason Saroya (BC Alta Dev.)

August 3, 2022

Re: Landscape Bond for VMP West-Restoration Area #3 (East Boundary-Frontage on VMP)

Dear Ms. Hernandez,

At the request of my client, BC ALTA Developments (Mr. Pari Saroya), please find the attached cost estimate for Landscape Restoration Area #3 as per the Development Permit plan presented. This estimate is based on the provision of juvenile size native species trees that were selected in consultation with our project Arbourist and local Nursery suppliers. It is not the intention of the Developer to remove any healthy non-invasive native vegetation from the Restoration Area. The new tree plantings are intended to enhance and bolster the existing vegetation as well as provide for a succession of new trees for the future. ForSite Landscape Architecture will provide individual estimates for each of the proposed Restoration areas. This scope of work does not include formal landscaping for the proposed buildings.

The cost for Restoration Area #3 is \$14,500.00.

If you wish to know the status of this work or if you have any questions please contact me at (250) 508-7885.

Yours very truly,

Brad Forth BCSLA, CSLA.



Planning Division The City of Colwood 3300 Wishart Road Victoria, BC V9C 1R1

Attn: Ms. Yasmin Hernandez

c/c Mr. Peri Saroya and Mr. Jason Saroya (BC Alta Dev.)

August 3, 2022

Re: Landscape Bond for VMP West-Restoration Area #4 (North Boundary)

Dear Ms. Hernandez.

At the request of my client, BC ALTA Developments (Mr. Pari Saroya), please find the attached cost estimate for Landscape Restoration Area #4 as per the Development Permit plan presented. This estimate is based on the provision of juvenile size native species trees that were selected in consultation with our project Arbourist and local Nursery suppliers. It is not the intention of the Developer to remove any healthy non-invasive native vegetation from the Restoration Area. The new tree plantings are intended to enhance and bolster the existing vegetation as well as provide for a succession of new trees for the future. ForSite Landscape Architecture will provide individual estimates for each of the proposed Restoration areas. This scope of work does not include formal landscaping for the proposed buildings.

The cost for Restoration Area #4 is \$13,100.00.

If you wish to know the status of this work or if you have any questions please contact me at (250) 508-7885.

Yours very truly,

Brad Forth BCSLA, CSLA.



Planning Division The City of Colwood 3300 Wishart Road Victoria, BC V9C 1R1

Attn: Ms. Yasmin Hernandez

c/c Mr. Peri Saroya and Mr. Jason Saroya (BC Alta Dev.)

August 3, 2022

Re: Landscape Bond for VMP West-Restoration Area #5 (Wetland SPEA 15m and Additional 15m Wrapper)

Dear Ms. Hernandez,

At the request of my client, BC ALTA Developments (Mr. Pari Saroya), please find the attached cost estimate for Landscape Restoration Area #5 as per the Development Permit plan presented. This estimate is based on the provision of juvenile size native species trees that were selected in consultation with project Arbourist, local Nursery suppliers, as well as with Aquatex Environmental Consulting. It is not the intention of the Developer to remove any healthy non-invasive native vegetation from the Restoration Area. The new plantings are intended to enhance and bolster the existing vegetation as well as provide for a succession of new trees for the future and improve the habitat values for this Restoration Area. ForSite Landscape Architecture will provide individual estimates for each of the proposed Restoration areas. This scope of work does not include formal landscaping for the proposed buildings.

The cost for Restoration Area #5 is \$13,600,00.

If you wish to know the status of this work or if you have any questions please contact me at (250) 508-7885.

Yours very truly.

Brad Forth BCSLA, CSLA.

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Planning Division
The City of Colwood
3300 Wishart Road
Victoria, BC
V9C 1R1
Attn: Ms. Yasmin Hernandez
c/c Mr. Peri Saroya and Mr. Jason Saroya (BC Alta Dev.)

August 3, 2022

<u>Re: Landscape Bond for VMP East-</u> Restoration Area #6 (SPEA on East VMP Frontage)

Dear Ms. Hernandez,

At the request of my client, BC ALTA Developments (Mr. Pari Saroya), please find the attached cost estimate for Landscape Restoration Area #6 as per the Development Permit plan presented. ForSite Landscape Architecture will provide individual estimates for each of the proposed Restoration areas. This estimate is based on the provision of juvenile size native species trees that were selected in consultation with our project Arbourist, local Nursery suppliers, as well as with Aquatex Environmental Consulting.

Most of Restoration Area #6 will remain undisturbed. It is not the intention of the Developer to remove any healthy non-invasive native vegetation from the Restoration Area. The new trees, understory plantings, and riparian plantings are intended to enhance and bolster the existing vegetation, provide for a succession of new trees for the future, and improve the habitat values for this Restoration Area.

The cost for Restoration Area #6 is \$8,200.00.

If you wish to know the status of this work or if you have any questions please contact me at (250) 508-7885.

Yours very truly,

Brad Forth BCSLA, CSLA.

#408-1581h Hillside Avenue + Victoria, BC VST 2C1 + Phone: 250-508-7885 forsiteland@hotmail.com



Planning Division The City of Colwood 3300 Wishart Road Victoria, BC V9C 1R1

Attn: Ms. Yasmin Hernandez

c/c Mr. Peri Saroya and Mr. Jason Saroya (BC Alta Dev.)

August 3, 2022

Re: Landscape Bond for VMP West-Restoration Area #7 (West side of Wetland SPEA 15m and Trail Relocation Area)

Dear Ms. Hernandez,

At the request of my client, BC ALTA Developments (Mr. Pari Saroya), please find the attached cost estimate for Landscape Restoration Area #7 as per the Development Permit plan presented. This estimate is based on the provision of juvenile size native species trees that were selected in consultation with project Arbourist, local Nursery suppliers, as well as with Aquatex Environmental Consulting. It is not the intention of the Developer to remove any healthy non-invasive native vegetation from the Restoration Area. The new plantings are intended to enhance and bolster the existing vegetation as well as provide for a succession of new trees for the future and improve the habitat values for this Restoration Area. ForSite Landscape Architecture will provide individual estimates for each of the proposed Restoration areas. This scope of work does not include formal landscaping for the proposed buildings.

The cost for Restoration Area #7 is \$7,200.00.

If you wish to know the status of this work or if you have any questions please contact me at (250) 508-7885.

Yours very truly,

Brad Forth BCSLA, CSLA.

#408-1581h Hillside Avenue + Victoria, BC VST 2C1 + Phone: 250-508-7885 forsiteland/hotmail.com

SCHEDULE 8, TREE MANAGEMENT PLAN



Veterans Memorial Parkway, Colwood

Development Impact Assessment & Tree Management Plan

PREPARED FOR: Islander Engineering Ltd.

623 Discovery Street Victoria, BC V8T 5G4

PREPARED BY: Talbot, Mackenzie & Associates

 $Graham\ Mackenzie-Consulting\ Arborist$

ISA Certified # PN-0428A

Tree Risk Assessment Qualified

DATE OF ISSUANCE: May 13, 2021

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APPENDICES

Appendix A Tree Management Plan West(T1)

Appendix B Tree Management Plan East (T2)

Appendix C Proposed replanting guidelines (T3)

Appendix D Windthrow Study – Dunster and Associates Environmental consulting Ltd.

1. INTRODUCTION

Talbot Mackenzie & Associates was asked to complete a tree inventory, construction impact assessment and management plan for the trees at the following proposed project:

Site: Veterans Memorial Parkway, connected to 3476 Wishart Road,

north of Havenwood Park (see attached site plans)

Municipality City of Colwood

Client Name: Islander Engineering Ltd.

Dates of Site Visit: Various

Site Conditions: The two parcels of land examined are relatively undisturbed and

treed, other than some impacts from the development of

surrounding properties. There is a history of existing tree disease

and windthrow on both parcels.

The purpose of this report is to review the tree resource and the existing site conditions on the property and comment on the general health and species distribution of the trees. After reviewing the proposed development concept, that has been created after several revisions, we have identified areas that we feel offer the best opportunity for retaining existing trees that have a good potential for retention. In areas where we feel it will not be suitable to retain any of the larger existing trees due to existing health or structural concerns or due to the new environment that is going to be introduced, we have identified conservation areas for the retention of native soils, small trees, and native understory as well as to provide viable planting areas for new trees to be introduced. The Development impact assessment section of this report (section 6), is based on plans reviewed to date, including the Architectural concept plans (May 12, 2021) - Prepared by MJM Architect Inc. as well as a Windthrow Assessment prepared by Dunster and Associates Environmental Consultants Ltd. (May 13, 2021). At this time, we have not reviewed a civil servicing plan or plans that show proposed finished grades in all areas of the property, but these items have been discussed during site meetings.

2. TREE INVENTORY METHODOLOGY

Over the last year, we have inventoried areas of trees on several portions of the properties for the purpose of this report and the windthrow study. For ease of identification in the field, numbered metal or plastic tags were attached to the lower trunks of many of the onsite trees. In areas where we anticipated significant impacts due to the proposed design and determined there would not be an opportunity for tree retention, the trees were not inventoried. For the purpose of this study, we have identified the potential tree retention areas and proposed conservation areas on the tree management plans and proposed replanting plan.

3. EXECUTIVE SUMMARY

Based on review of the plans provided and the Windthrow study completed along with our own site observations, we feel that best opportunity for retention on the West portion of the proposed development will be in the Park dedication and the 30-meter buffer area that is proposed. The proposed conservation areas numbered 1-4 have many small native trees regenerating that will also make excellent candidates for retention provided tree removal can be completed as recommended in the windthrow assessment. Within the 4 conservation areas, we are recommending keeping the native soils and understory intact as well as leaving some woody debris for nature habitat. The area can then be replanted as recommended so that it will ultimately develop into conservation areas with well-structured native trees that can adapt to the new conditions that are being introduced. The portion of the development that is located on the East side of Veterans Memorial Parkway has an area identified as Area 1 that may be a potential area to retain smaller tree and replant as we have recommended for the West side. The size of this area has not been determined yet, as it will depend on the extent of excavation and blasting required to prepare the land for the proposed new building and required cut slopes. It should be noted that as identified in the windthrow assessment, after initial site clearing has taken place, a comprehensive tree review will be required to address any new wind exposure that will result from the clearing. During this review, there may be additional tree removals or tree modifications recommended in areas surrounding the clearings. Specific areas that must be examined by the project arborists after initial clearing include the area identified as area 5 on the West side site plan and the new forest edges that will be created on the Havenwood Park boundary.

4. SITE INFORMATION & PROJECT UNDERSTANDING

The development site consists of two different areas and proposals. The portion of the property on the West side of the Veterans memorial is approximately 2.6 hectares and two residential multi-level buildings with below grade parking are proposed. The portion of the property on the East side of Veterans memorial is approximately 0.9 hectare and there are two multi-level buildings proposed with a mixture of residential and commercial use and below grade parking.

Below is a general observation of the tree resource, as it appeared at the time of our site visit:

5. FIELD OBSERVATIONS

The two sites examined consist of second growth forest, made up primarily of a mixture of Douglas fir, Grand fir, Western Red cedar Big Leaf maple and Red alder with some Arbutus. Existing parkland within Havenwood Park borders the south property lines of both the east and west blocks. Review of the site conditions found several commonly occurring wood decay pathogens and a history of windthrow and tree failures identified in the windthrow assessment prepared by Dunster and Associates.



figure 1: Site context air photo: The boundary of the subject site is outlined in Yellow.

6. DEVELOPMENT IMPACT ASSESSMENT

Given the condition of the existing trees and the site along with the potential impacts from the proposed development, we anticipate that most of the trees in the portions of the properties that are being developed will require removal to mitigate the risk associated with them. The area that has the greatest potential for tree retention is area 5 in the attached tree management plan. As indicated in the windthrow assessment, the removal of these trees will have an impact on the ability to retain trees surrounding the cleared areas. It is likely that all of the larger, taller trees that will be located in high target areas will have to be removed or modified to mitigate the risk associated with them.

6.1. TREE REPLACEMENT

We recommend replanting within the conservation zones amongst the undisturbed understory and small trees that are possible to retain. We feel it should be a mixture of deciduous and coniferous species, roughly in the following ratios: 25% Red alder, 25% Big Leaf Maple, 35% Douglas fir and 15% Grand fir. There may be some opportunity for planting Western red cedar on the edges of the riparian areas where soil moisture content may be higher, but that will have to be better assessed once initial clearing is completed. Conifers should be no large than 1 meter in height and deciduous trees should be no larger than 2 meters in height. Provisions will have to be made for soil amendment in areas that have less than 60 cm of soil depth and irrigation, invasive species control and deer protection will need to be provided for the first few years after planting until the trees become established.

Depending on the amount of existing small trees that can be retained, we have provided a rough estimate of the replacement tree numbers that may be required. Ideally when young well structured established native trees can be retained, it is more desirable and will reduce the number of trees to be planted. The numbers below are calculated based on 880 trees per acre and the numbers are reduced to assume that existing small trees are to be retained in 50% of the areas. This will still be a dense planting that will allow for mortality. Actual numbers will have to be determined after clearing has been completed, so the area is not over or under planted.

Table 1 – Replacement strategy

Conservation Area	Area in Sq m	880 trees per acre, reduced by 50% to allow for existing small tree retention	Potential number of trees to be planted	Species breakdown			
				Douglas Fir (35%)	Grand Fir (15%)	Red Alder (25%)	Big Leaf Maple (25%)
Area 1	732.42	(0.1087)	80	28	12	20	20
Area 2	615.69	(0.1087)	68	24	10	17	17
Area 3	1765.93	(0.1087)	192	68	28	48	48
Area 4	1597.63	(0.1087)	175	61	26	44	44

7. IMPACT MITIGATION

Tree Protection Barrier: The areas, surrounding the trees to be retained should be isolated from the construction activity by erecting protective barrier fencing. Where possible, the fencing should be erected at the perimeter of the critical root zone. The barrier fencing to be erected must be a minimum of 4 feet in height, of solid frame construction that is attached to wooden or metal posts. A solid board or rail must run between the posts at the top and the bottom of the fencing. This solid frame can then be covered with flexible snow fencing. The fencing must be erected prior to the start of any construction activity on site (i.e. demolition, excavation, construction), and remain in place through completion of the project. Signs should be posted around the protection zone to declare it off limits to all construction related activity. The project arborist must be consulted before this fencing is removed or moved for any purpose.

Arborist Supervision: All excavation occurring within the critical root zones of protected trees should be completed under supervision by the project arborist. Any severed or severely damaged roots must be pruned back to sound tissue to reduce wound surface area and encourage rapid compartmentalization of the wound. In particular, the following activities should be completed under the direction of the project arborist:

• Excavation for the underground parking area that is adjacent to area 5.

- Any excavation for proposed underground services that encroach into the critical root zones of trees to be retained.
- The construction of the proposed foot path that will be located within the critical root zones of trees to be retained.
- Any excavation for proposed new planting areas that are within the critical root zones of trees to be retained.

Methods to Avoid Soil Compaction: In areas where construction traffic must encroach into the critical root zones of trees to be retained, efforts must be made to reduce soil compaction where possible by displacing the weight of machinery and foot traffic. This can be achieved by one of the following methods:

- Installing a layer of hog fuel or coarse wood chips at least 20 cm in depth and maintaining it in good condition until construction is complete.
- Placing medium weight geotextile cloth over the area to be used and installing a layer of crushed rock to a depth of 15 cm over top.
- Placing two layers of 19mm plywood.
- Placing steel plates.

Paved Surfaces Above Tree Roots:

If the new paved surfaces within the CRZ of tree to be retained require excavation down to bearing soil and roots are encountered in this area, this could impact their health and structural stability. If tree retention is desired, a raised and permeable paved surface should be constructed in the areas within the critical root zone of the trees. The "paved surfaces above root systems" diagram and specifications is attached.

The objective is to avoid root loss and to instead raise the paved surface and its base layer above the roots. This may result in the grade of the paved surface being raised above the existing grade (the amount depending on how close roots are to the surface and the depth of the paving material and base layers). Final grading plans should take this potential change into account. This may also result in soils which are high in organic content being left intact below the paved area.

To allow water to drain into the root systems below, we also recommend that the surface be made of a permeable material (instead of conventional asphalt or concrete) such as permeable asphalt, paving stones, or other porous paving materials and designs such as those utilized by Grasspave, Gravelpave, Grasscrete and open-grid systems.

Mulching: Mulching can be an important proactive step in maintaining the health of trees and mitigating construction related impacts and overall stress. Mulch should be made from a natural material such as wood chips or bark pieces and be 5-8cm deep. No mulch should be touching the trunk of the tree. See "methods to avoid soil compaction" if the area is to have heavy traffic.

Blasting: Care must be taken to ensure that the area of blasting does not extend beyond the necessary footprints and into the critical root zones of surrounding trees. The use of small low-concussion charges and multiple small charges designed to pre-shear the rock face will reduce fracturing, ground vibration, and overall impact on the surrounding environment. Only explosives of low phytotoxicity and techniques that minimize tree damage should

be used. Provisions must be made to ensure that blasted rock and debris are stored away from the critical root zones of trees.

Scaffolding: This assessment has not included impacts from potential scaffolding including canopy clearance pruning requirements. If scaffolding is necessary and this will require clearance pruning of retained trees, the project arborist should be consulted. Depending on the extent of pruning required, the project arborist may recommend that alternatives to full scaffolding be considered such as hydraulic lifts, ladders or platforms. Methods to avoid soil compaction may also be recommended (see "Minimizing Soil Compaction" section).

Landscaping and Irrigation Systems: The planting of new trees and shrubs should not damage the roots of retained trees. The installation of any in-ground irrigation system must take into account the critical root zones of the trees to be retained. Prior to installation, we recommend the irrigation technician consult with the project arborist about the most suitable locations for the irrigation lines and how best to mitigate the impacts on the trees to be retained. This may require the project arborist supervise the excavations associated with installing the irrigation system. Excessive frequent irrigation and irrigation which wets the trunks of trees can have a detrimental impact on tree health and can lead to root and trunk decay.

Windthrow: Where forest edge trees are proposed to be removed, we recommend that trees that may experience an increase in wind exposure be re-examined, once tree clearing has taken place, to ensure that they are structurally stable, and suitable for retention as leading-edge trees. Specific areas that must be examined by the project arborists after initial clearing include the area identified as area 5 on the West side site plan and the new forest edges that will be created on the Havenwood Park boundary. In both of these areas, we anticipate that additional tree removal or tree modification will be necessary to mitigate the risk associated with these new edge trees.

Arborist Role: It is the responsibility of the client or his/her representative to contact the project arborist for the purpose of:

- Locating the barrier fencing
- Reviewing the report with the project foreman or site supervisor
- Locating work zones, where required
- Supervising any excavation within the critical root zones of trees to be retained
- Reviewing and advising of any pruning requirements for machine clearances

Review and site meeting: Once the project receives approval, it is important that the project arborist meet with the principals involved in the project to review the information contained herein. It is also important that the arborist meet with the site foreman or supervisor before any site clearing, tree removal, demolition, or other construction activity occurs and to confirm the locations of the tree protection barrier fencing.

8. DISCLOSURE STATEMENT

This arboricultural field review report was prepared by Talbot Mackenzie & Associates for the exclusive use of the Client and may not be reproduced, used or relied upon, in whole or in part, by a party other than the Client without the prior written consent of Talbot Mackenzie & Associates. Any unauthorized use of this report, or any part hereof, by a third party, or any reliance on or decisions to be made based on it, are at the sole risk of such third parties. Talbot Mackenzie & Associates accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report, in whole or in part.

Arborists are professionals who examine trees and use their training, knowledge, and experience to recommend techniques and procedures that will improve a tree's health and structure or to mitigate associated risks. Trees are living organisms whose health and structure change and are influenced by age, continued growth, climate, weather conditions, and insect and disease pathogens. Indicators of structural weakness and disease are often hidden within the tree structure or beneath the ground. The arborist's review is limited to a visual examination of tree health and structural condition, without excavation, probing, resistance drilling, increment coring, or aerial examination. There are inherent limitations to this type of investigation, including, without limitation, that some tree conditions will inadvertently go undetected. The arborist's review followed the standard of care expected of arborists undertaking similar work in British Columbia under similar conditions. No warranties, either express or implied, are made as to the services provided and included in this report.

The findings and opinions expressed in this report are based on the conditions that were observed on the noted date of the field review only. The Client recognizes that passage of time, natural occurrences, and direct or indirect human intervention at or near the trees may substantially alter discovered conditions and that Talbot Mackenzie & Associates cannot report on, or accurately predict, events that may change the condition of trees after the described investigation was completed.

It is not possible for an Arborist to identify every flaw or condition that could result in failure nor can he/she guarantee that the tree will remain healthy and free of risk. The only way to eliminate tree risk entirely is to remove the entire tree. All trees retained should be monitored on a regular basis. Remedial care and mitigation measures recommended are based on the visible and detectable indicators present at the time of the examination and cannot be guaranteed to alleviate all symptoms or to mitigate all risk posed.

Immediately following land clearing, grade changes or severe weather events, all trees retained should be reviewed for any evidence of soil heaving, cracking, lifting or other indicators of root plate instability. If new information is discovered in the future during such events or other activities, Talbot Mackenzie & Associates should be requested to re-evaluate the conclusions of this report and to provide amendments as required prior to any reliance upon the information presented herein.

9. IN CLOSING

We trust that this report meets your needs. Should there be any questions regarding the information within this report, please do not hesitate to contact the undersigned.

Yours truly,

Talbot Mackenzie & Associates

Prepared by:

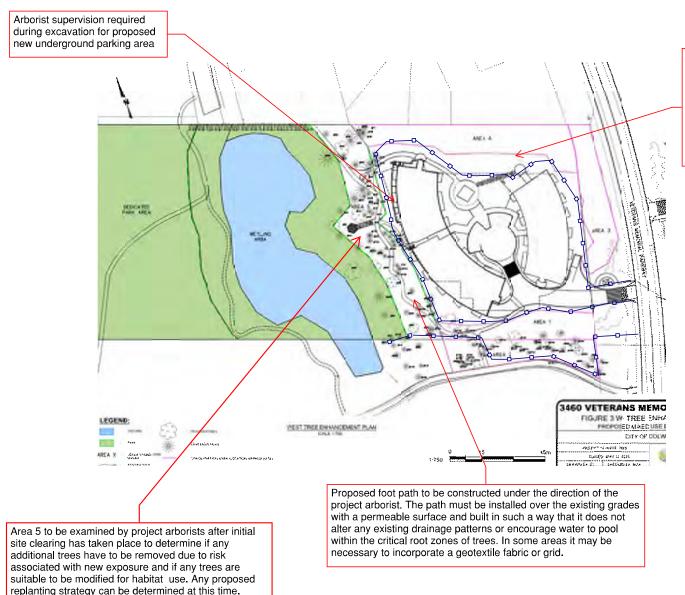
Graham Mackenzie

ISA Certified Arborist PN – 0428A Tree Risk Assessment Qualification

Email: tmtreehelp@gmail.com

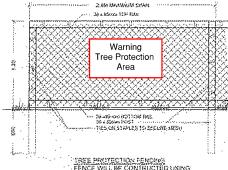
APPENDIX A - TREE MANAGEMENT PLAN West (T1)

Tree Management Plan Veterans Memorial Parkway (West) 05.13.21



Areas 1-4 - Directionally fall the tall trees into the already cleared area. If necessary have these trees climbed and use a rope to assist the direction of fall. Once these trees are on the ground have a machine reach into the area and lift the downed tree up and out of the park. There should be no need for machinery to enter the conservation areas and no need to drag the logs on the ground. They are only to be removed by lifting them up and out by a machine outside the conservation area. In some areas, it may be possible to leave wildlife trees (tall stumps). The height of the stump should be 2 metres less than the distance to the nearest target of concern.

Proposed barrier fencing to be installed after tree clearing has been completed to protect conservation areas and new plantings when planted.



TIREE PROTECTION FERCING
FENCE WILL BE CONTRUCTED USING
18 X 99 man (2 X41) WOOD FRAME.
10 P. GOTTOM AND POSTS.
USE GRANGE SHOW-FERCING MESH AND
SECURE TO THE WOOD FRAME WITH
21P THES OR GRA WANTED STAFFES

18N ROCKY AREAS, METAL POSTS (1-BAR OR REBAR) ORILLED INTO ROCK WILL BE ACCEPTED.

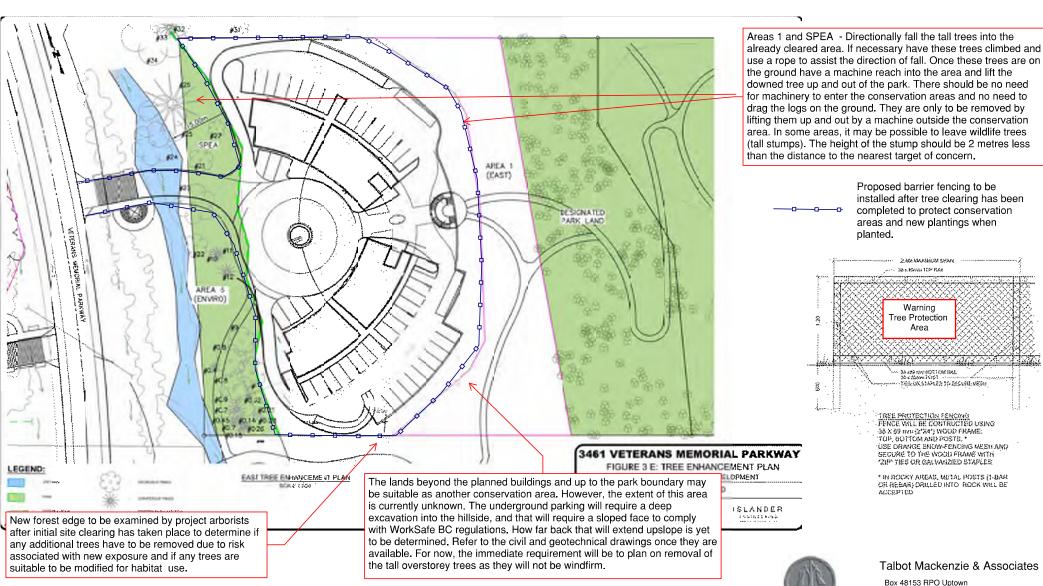


Talbot Mackenzie & Associates

Box 48153 RPO Uptown Victoria, BC V8Z 7H6 Ph: (250) 479-8733 ~ Fax: (250) 479-7050 Email: tmtreehelp@armail.com

APPENDIX B - TREE MANAGEMENT PLAN East (T2)

Tree Management Plan Veterans Memorial Parkway (East) 05.13.21



Victoria, BC V8Z 7H6

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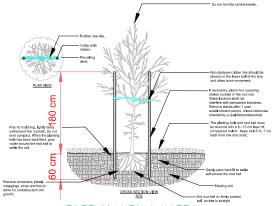
APPENDIX C- Proposed replanting guidelines West (T1)

Proposed replanting guidelines Veterans Memorial Parkway (West) 05.13.21



Conservation Area	Area in Sq m	880 trees per acre,	Potential number of trees to be	Species breakdown			'n
		reduced by 50% to allow for existing small tree retention	planted	Douglas Fir (35%)	Grand Fir (15%)	Red Alder (25%)	Big Leaf Maple (25%)
Area 1	732.42	(0.1087)	80	28	12	20	20
Area 2	615.69	(0.1087)	68	24	10	17	17
Area 3	1765.93	(0.1087)	192	68	28	48	48
Area 4	1597.63	(0.1087)	175	61	26	44	44

Area 5 - to be re-evaluated after initial clearing has taken place. There may be additional tree removal required in this area due to new exposure and the replanting plan will be determined after any additional high risk trees have been removed or modified.



TREE PLANTING NOTES

Watering: Most tree species and most landscape conditions will not require permanent irrigation after establishment. However; interim watering of the root balls will be required for at least one growing season after planting. This should be completed by hand watering (from an on-site hose bib) or by; truck delivery, watering bag device, or a temporary interim irrigation system. The watering schedule should be adapted to suit the weather conditions as they change, and in response to monitoring the root ball soil hydrology. On a conceptual basis, we recommend watering intervals as follows:

Immediately after planting: Day of and then 3 days later

February 1 to March 15: Every two weeks

March 16 to June 30: Once per week (may reduce to once every 2 weeks in sustained heavy rainfall conditions)

July 1 to Aug 30: Once per week (may increase to twice per week in drought conditions)

Sep 1 to Sep 30: Every two week

Based on the above, we normally expect approximately 30 to 35 watering events to be required during an average growing season.

Species selection: The species choices are for consideration only. If alternate species are desired by the owner, the species must conform to the municipal standards, and should conform to a comparable size and form of the tree species that was conceptually specified for that location (i.e. small, medium or large at maturity and/or columnar, pyramidal or normal (wide) spreading crown).

Site préparation: On disturbed sites or construction sites the sub-soil and planting soils in proximity to the planting sites may be damaged such that the soils are overly compacted, poorly drained, and/or of inferior composition from the site preparation and construction activities. In those cases, sub-soil renovation and amendment, and/or re-placement of existing soil with suitable growing medium to at least 600mm depth within a suitable radius of the planting site for each tree will be required.





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APPENDIX D – Windthrow Assessment

Windthrow Assessment for the Proposed Development to the North of Havenwood Park, Veterans Memorial Parkway, Colwood, BC

Prepared for Talbot Mackenzie & Associates.

May 13, 2021

Windthrow Assessment for the Proposed Development to the North of Havenwood Park, Veterans Memorial Parkway, Colwood, BC

Background

The land parcels to the north of Havenwood Park span the Veterans Memorial Parkway. The site is currently covered in second growth coniferous forest. The site is being proposed for new development, and that will require removal of many trees. However, there is a possibility to retain some trees, especially next to the wetland at the west end of the property, and the riparian area along the east side of the Parkway. This report reviews the stability of trees being considered for retention, and reviews past windthrow patterns. The results of the windthrow assessment have been used to inform the design and layout of the development proposal.

The site was first visited on September 2, 2020 with Graham MacKenzie. We walked through the west and east parcels of land, discussed the planned development, and reviewed areas where trees might be retained. Subsequent visits have been made to verify existing windthrow patterns in Havenwood Park and on the lands to the north. Figure 1 shows the area and the two parcels (east and west block) under consideration.



Figure 1. The property boundaries are the yellow lines.

The two parcels have already been mapped and laid out to show areas to be retained and areas where development can occur. Figure 2 shows the broad land use categories. I have used those broad areas to inform the windthrow assessment.

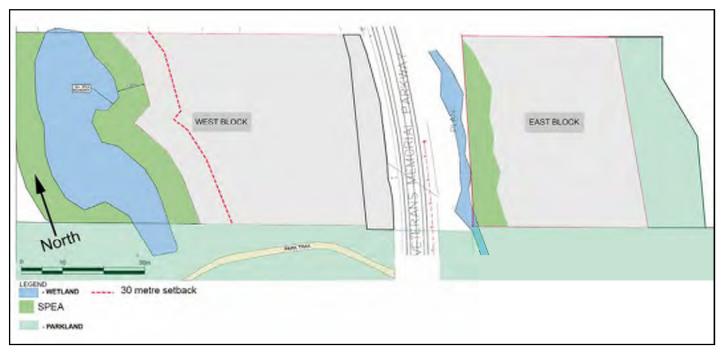


Figure 2. Land use categories.

Conditions on Site

Most of the forest cover on either side of the road is dominated by Douglas-fir, with a lesser component of Western redcedar, and a small amount of Grand fir. The forest is mainly a closed canopy of codominant tree crowns. There are a few bigleaf maples scattered through the riparian areas, and a few arbutus trees on the east edge of the west block, and the east edge of the east block. Throughout the site I observed the presence of several tree diseases, including extensive areas of laminated root rot (*Phellinus sulphurescens*) and *Phaelous schweinitzii* (stem decay as a heartrot), and some *Armillaria ostoyae* (root rot). There are a few remnant old growth Douglas-fir trees, several as large snags. In the west block there is extensive evidence of long-term windthrow from west to east, and south to north. New windthrow was noted in the north east corner of the west block, since the first site visit in September 2020.

In the east block, which is a steep slope rising uphill to the east, there is extensive windthrow mostly south to north, across the slope from the base to the ridge. There are several trees blown down from west to east in the riparian area. In most cases the windthrown trees show obvious evidence of root rot. A few were soil failures - more notable in the wetter riparian areas than on the dryer slopes.

Many of the trees in both blocks are already in severe decline and show very clear signs of laminated root rot in the crown foliage, along with obvious signs of drought stress, which may be exacerbating the disease issues.

Implications for the Proposed Development and Recommended Actions

West Block

Following extensive discussions, there have been many changes to the design and layout. The setback around the wetland has been extended east to a 30 metre mark. On the north east, and south areas around the proposed development a new approach has been devised and these areas are shown as conservation areas, as seen in Figure 3.

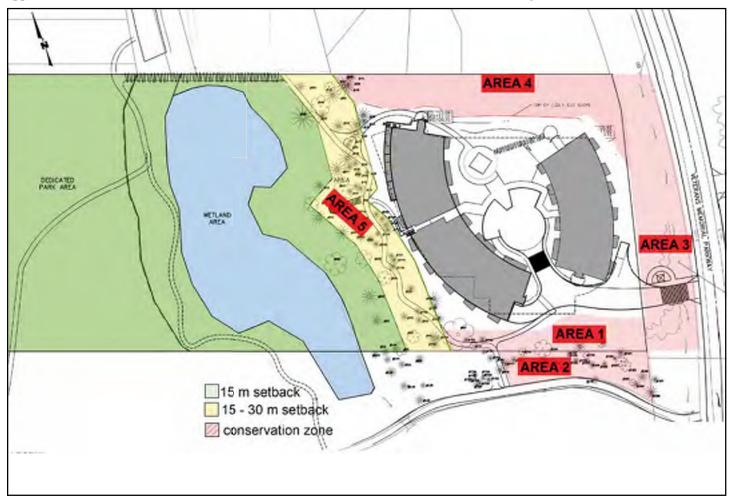


Figure 3. The west block.

Given the well established pattern of windthrow from west to east and south to north there are several areas of concern. These are discussed below and are identified in Figure 3 as conservation areas.

AREA 1 and AREA 2

Starting along the south boundary next to Havenwood Park, the forest cover here is sparse, open, and several trees are already partly uprooted to the north or the east, both within the property, and between the property line and the edge of the park trail. The taller trees between the north edge of the park trail and onto the development site should be removed. This recommendation extends into parkland, where there has already been a pattern of tree removals for the past decade or more as they uprooted.

AREA 3

The land to the east of the property along the road bank contains numerous dead, and dying trees, all of which pose a risk to the highway users. Clearing the property for development will leave tall trees in this area more exposed and at a higher risk of falling on to the highway. All overstorey trees should be removed.

AREA 4

The land form at the north end of the west block is steeper (>30%) and contains dead and dying trees, as well as more recently windthrown trees (south to north). Once the interior part of the west block is cleared, the taller overstorey trees in area 4 will be at greater risk of falling to the north, which in many cases means falling into the rear yards of nearby houses, or onto the houses. All overstorey trees should be removed.

AREA 5

This is the strip of land extending beyond the 15 metre setback around the wetland to a 30 metre line. Within this 15 metre zone there are several dead trees, as well as several dying trees. Once the main part of the west block has been cleared, the newly exposed edge of the forest along the 30 metre setback line, will need to be reassessed. If the tree risk assessor is concerned about one or more of these edge trees they may need to be removed.

Recommended approach for tree removal in Areas 1-4.

The four areas are identified as conservation areas because the intent is to mitigate the tree risks but retain the land base in a relatively undisturbed condition, and retain most of the understorey vegetation. Once the clearing has been completed the intent will be to reforest these areas by planting new native trees. If care is taken in the tall tree removal phase, it will be possible to conserve the forest floor and create a healthy new forest.

The best way to manage tree removals in the four areas discussed above is as follows.

- 1 Clear the adjacent land first of all.
- Directionally fall the tall trees into the already cleared area. If necessary have these trees climbed and use a rope to assist the direction of fall. Once these trees are on the ground have a machine reach into the area and lift the downed tree up and out of the park. There should be no need for machinery to enter the conservation areas and no need to drag the logs on the ground. They are only to be removed by lifting them up and out by a machine outside the conservation area. In some areas, it may be possible to leave wildlife trees (tall stumps). The height of the stump should be 2 metres less than the distance to the nearest target of concern.
- Once the tall trees have been removed the conservation area can be replanted. The fall months are the best time to do that so that the trees have a winter in the ground right away. I do not recommend using any conifer trees taller than 1 metre and no more than 2 metres for deciduous trees. Larger trees (conifer or deciduous) will either be in a pot or in a ball and burlap sack. Either way, they suffer a massive amount of transplant shock and in my experience over the past thirty years, many of them will be dead within a couple of growing seasons. It will be far better to plant smaller trees and more of them. I recommend a spacing of three metres. If the usual requirement is to plant x trees at a large size, amend the specification and plant twice as many smaller trees. The long-term success will be far greater.
- 4 Install fencing around each of the conservation areas once the tree removal work has been completed.

East Block

The land in the east block will be cleared between the SPEA and the upper slopes. The main focus is on the trees in and adjacent to the riparian area next to the Parkway. This area has already suffered some windthrow. Figure 4 shows the east block layout.

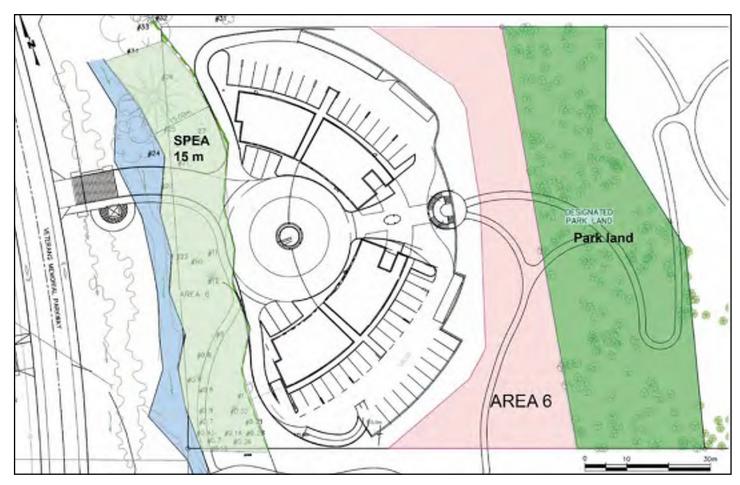


Figure 4. The east block.

The creek and SPEA lands

Within the creek area and the 15 metre SPEA I cannot recommend retention of any tall trees. There is already windthrow in the area, the ground is wet, and once the adjacent slopes have been cleared any remaining tall trees will not be stable. They will pose an unacceptable risk to users of the highway and the buildings on site. Any tree tall enough to reach the road or the new development will be classified as a Danger Tree and will need removal or conversion to a wildlife tree.

Area 6

The lands beyond the planned buildings and up to the park boundary will be conservation area 6. The area shown in Figure 4, assumes a 3 metre setback from the top of the cut face required for underground parking. Within Area 6 the tall overstorey trees will be removed as they will not be windfirm. It should be feasible to retain the rest of the land area in a relatively undisturbed condition and replant that once the tall trees have been removed.

Recommended approach for tree removal in Areas 6 and the creek / SPEA lands.

The recommended treatment is the same as for the conservation areas on the west side. The intent is to mitigate the tree risks but retain the land base in a relatively undisturbed condition, and retain most of the understorey vegetation. Once the clearing has been completed the intent will be to reforest these areas by planting new native trees. If care is taken in the tall tree removal phase, it will be possible to conserve the forest floor and create a healthy new forest.

The best way to manage tree removals in Area 6 is as follows.

- 1 Clear the adjacent land first of all.
- Directionally fall the tall trees into the already cleared area downslope to the west. If necessary have these trees climbed and use a rope to assist the direction of fall. Once these trees are on the ground have a machine reach into the area and lift the downed tree up and out of the park. There should be no need for machinery to enter Area 6, and dragging the logs on the ground shall be minimised, by lifting them up and out of the area with a machine situated outside the conservation area. In some areas, it may be possible to leave wildlife trees (tall stumps). The height of the stump should be 2 metres less than the distance to the nearest target of concern.
- Once the tall trees have been removed the conservation area can be replanted. The fall months are the best time to do that so that the trees have a winter in the ground right away. I do not recommend using any conifer trees taller than 1 metre and no more than 2 metres for deciduous trees. Larger trees (conifer or deciduous) will either be in a pot or in a ball and burlap sack. Either way, they suffer a massive amount of transplant shock and in my experience over the past thirty years, many of them will be dead within a couple of growing seasons. It will be far better to plant smaller trees and more of them. I recommend a spacing of three metres. If the usual requirement is to plant x trees at a large size, amend the specification and plant twice as many smaller trees. The long-term success will be far greater.
- 4 Install fencing around the SPEA and Area 6 once the tree removal work has been completed.

Summary

This report deals with the potential for windthrow of trees that might be retained on the development site. It is inadvisable to retain tall trees in the land areas identified as conservation areas. On the west side that will be Areas 1 through 5, and on the east side it will be the creek and SPEA, plus Area 6. There is a very clear pattern of past windthrow from west to east and south to north. The planned development will increase the windthrow potential for all the tall overstorey trees in these areas, and they will become danger or high risk trees. Retention is not recommended. However, it is entirely possible to retain a relatively undisturbed land base in the conservation areas, and replant them to create a healthy new forest for the future. A series of recommendations have been made to accomplish that goal. If they are followed correctly there will minimal ground disturbance, and a new forest can be created. In the west block, the new forest edge along the east side of the 30 metre setback will require a follow up risk assessment to evaluate those trees once other clearing work has been completed.

Limitations

It is the policy of Dunster & Associates Environmental Consultants Ltd. to attach the following clauses regarding limitations. We do this to ensure that developers, owners, and approving officers are clearly aware of what is technically and professionally realistic in retaining trees.

The assessment of the trees presented in this report has been made based on a walk through of the area and general observations of the forest cover. That includes a visual examination of trees for external indications of decay such as fungal fruiting bodies, evidence of insect attack, discoloured foliage, the condition of any visible root structures, the degree and direction of lean (if any), the general condition of the trees and the surrounding site, and evidence of previous windthrow events. Notwithstanding the recommendations and conclusions made in this report, it must be realised that trees are living organisms, and their health and vigour constantly changes over time. They are not immune to changes in site conditions, or seasonal variations in the weather.

While reasonable efforts have been made to ensure that the trees recommended for retention are healthy, no guarantees are offered, or implied, that these trees, or all parts of them, will remain standing. It is both professionally and practically impossible to predict with absolute certainty the behaviour of any single tree -- or group of trees -- , or all their component parts, in all given circumstances. Inevitably, a standing tree will always pose some risk. Most trees have the potential for failure in the event of adverse weather conditions, and this risk can only be eliminated if the tree is removed.

Although every effort has been made to ensure that this assessment is reasonably accurate, any trees retained after the initial land clearing should be re-assessed periodically. In accordance with standard practice, the assessment presented in this report is valid at the time it was undertaken. It is not a guarantee of safety.

- Notwithstanding the recommendations made in this report, Dunster & Associates Environmental Consultants Ltd. accept no responsibility for the implementation of all or any part of this report, unless we have specifically been requested to examine said implementation activities. Approval and implementation of this report in no way implies any inspection or supervisory role on the part of Dunster & Associates Environmental Consultants Ltd. In the event that inspection or supervision of all or part of the implementation of the report is requested, said request shall be in writing and the details agreed to in writing by both parties. Any on site inspection or supervisory work undertaken by Dunster & Associates Environmental Consultants Ltd. shall be recorded in written form and submitted to the client as a matter of record.
- This report was prepared by Dunster & Associates exclusively for Talbot Mackenzie and Associates. The contents reflect Dunster & Associates' best assessment of the trees and forest areas in light of the information available to it at the time of preparation of this report. Any use which a third party makes of this report, or any reliance on or decisions made based upon this report, are made at the sole risk of any such third parties. Dunster & Associates accepts no responsibility for any damages or loss suffered by any third party or by the Client as a result of decisions made or actions based upon the use or reliance of this report by any such party.
- The report has nine pages and shall be considered a whole, no sections are severable, and the report shall be considered incomplete if any pages are missing. The original report has colour illustrations. If the reader has a black and white copy of the report it shall be considered incomplete and any interpretation of the report may be incorrect in the absence of a full colour copy. Dunster & Associates accepts no responsibility for any such misinterpretations.

On Behalf of Dunster & Associates Environmental Consultants Ltd.



Dr. Julian A. Dunster, R.P.F., R.P.P., M.C.I.P., ISA Certified Arborist, ASCA Registered Consulting Arborist # 378, ISA Tree Risk Assessment Qualified Honourary Life Member ISA + PNWISA

SCHEDULE 9, STORMWATER MANAGEMENT PLAN

REPORT

VETERANS MEMORIAL PARKWAY MIXED-USE DEVELOPMENT (WEST SITE) RZ-20-010 STORMWATER MANAGEMENT PLAN

Prepared For: BC - ALTA Developments

Attn: Pari Saroya

Prepared By: Islander Engineering Ltd.

623 Discovery St. Victoria, BC V8T 5G4

Date: March 11, 2021

Rev2

Project: 2185



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1 INTRODUCTION

This report details the Stormwater Management strategies to support a Rezoning and Development Permit (DP) application for the proposed mixed-use development at a greenfield site (Part 62) along the West side of Veteran's Memorial Parkway (VMP), in Colwood BC, herein referred to as the "Site". Islander Engineering Ltd. previously prepared a stormwater management plan for the nearby "Wishart Gardens" development by the same developer, which applied a "zero increase in runoff policy" based on the 2-year storm event. A similar methodology has been proposed following a review of the Havenwood Park Management Plan which specifies all post-development flows entering the park must not exceed pre-development rates. As requested by the City of Colwood, the stormwater design methodology for this development shall be based on the 10-year storm event. Furthermore, the stormwater management design shall be completed pursuant to requirements set out in the City of Colwood Subdivision and Development of Land Bylaw, No. 285 (1995). The report is intended to support a rezoning application and any detailed design will be completed at Building Permit stage.

2 BACKGROUND & EXISTING CONDITIONS

The existing Site is an irregular shaped parcel that is bisected by Veteran's Memorial Parkway (VMP) resulting in two separate development areas along the east and west sides of the roadway (see the attached Site figures). The development plans and supporting stormwater management strategies for the east and west parcels have been prepared separately. The existing west parcel is located directly north of Havenwood Park and approximately 700m north of the intersection of VMP and Latoria Road. The Site is presently zoned CD-22 "Area 1", (Comprehensive Development 22, City of Colwood Land Use Bylaw No. 151, 1989) which permits the construction of a 21-Lot Strata development. The development plan includes rezoning the Site to permit the construction of two, multilevel residential buildings with above grade and below grade parking. The Site is surrounded by existing single-family residential development to the north along Hopwood Place and Resolution Way, a public utility lot to the west, VMP to the east and Havenwood Park to the south.



The development is located within the northern flank of the North Latoria Creek Watershed which encompasses an approximate 372ha partially developed drainage basin that extends from headwaters north of the Site to an ocean discharge near Albert Head south of the development. The pre-development Site area is naturally divided into two subcatchments which have been described in the table below:

Table 1 – Pre-Development Site Catchments

Catchment	Area (ha)	Description			
West subcatchment	1.713	Includes a low-lying wetland within the approximate center of the Site. Contributory areas include residential areas to the north along Resolution Way and to the west which are undeveloped. Existing flows from Resolution Way discharge directly to the wetland and do not impact the proposed development Site.			
East subcatchment	0.919	Includes the proposed development area east of the existing wetland. Contributory area extends to the north property boundary adjacent to existing residential development along Hopwood Place. Overland flows from the subcatchment are generally directed towards the southeast where they discharge through the northeast boundary of Havenwood Park and into the existing ditching fronting VMP east of the Site.			

The proposed development is located entirely within the east subcatchment which shall continue to discharge site waters to the systems on VMP. The Project Biologist (Aqua-Tex Scientific Consulting) has determined that a 15m Streamside Protection and Enhancement Area (SPEA) is necessary to protect the existing ecosystems and environment surrounding the existing wetlands located within the west subcatchment. The stormwater management plan shall ensure that no harm be instilled upon the creeks, wetland, or SPEA resulting from proposed development activities. The areas delineated by the SPEA and west of the existing wetlands will be dedicated as park and shall remain undeveloped apart from a pedestrian trail system. Accordingly, stormwater runoff from the development areas will be captured and directed away from these wetlands, discharging to a proposed drain service and the



existing ditching on VMP. All construction activities adjacent to the SPEA shall be coordinated and approved by the Project Biologist and City of Colwood Staff.

The wetland footprint extends partially over the southern property boundary into Havenwood Park where it eventually drains through a pair of existing culverts crossing under a pedestrian walking trail. An existing drainage channel continues southeastward through Havenwood Park before eventually crossing through a culvert under VMP, discharging into North Latoria Creek. The existing drainage systems within Havenwood Park south of the Site will not be impacted by the proposed development. North Latoria Creek flows southward through East Havenwood Park before finally discharging into Latoria Creek along Latoria Road. Latoria Creek proceeds eastward along Latoria Road for approximately 310m before meandering southward through Latoria Creek Park and discharging to an ocean outfall at Albert Head Lagoon approximately 2.2km southeast of the development.

The existing Site topography within the east subcatchment is highly variable and slopes steeply from north to south from the high-lying property boundary (approximate geodetic elevation of 129.0m) down to the lower southern property boundary (approximate geodetic elevation of 109.3m at the southeast property corner). The proposed development will require a minor realignment of the existing subcatchment boundaries based on preliminary Site grading plans which shall be finalized at Building Permit Stage. The realigned post-development east subcatchment area totals approximately 0.937ha (increased from 0.919ha pre-development) which includes the entirety of the proposed development areas. Stormwater runoff discharging from the existing slopes north of the proposed buildings shall be captured on-site and discharged directly to the new drain service, bypassing the proposed detention systems.

The existing ground cover on-site generally comprises steep, forested terrain (mature coniferous tree canopy) with interspersed areas of exposed rock outcropping and various pockets of shallow overburden and dense, invasive underbrush. Review of Quaternary Geological Map of Greater Victoria (Geoscience Map 2000-2) confirms the site is located within an area of *Outcrop and Thin Soil Cover Undifferentiated (Unit R1/2): "...includes*"



sparsely developed, mainly rocky, upland areas with little or no subsurface control, and where units R1 (bedrock) and R2 (thin soil cover) could not be readily differentiated on air photos due to extensive tree cover...". Accordingly, the use of underlying site soils to dispose of site generated stormwater runoff is unlikely and therefore the use of infiltration for a reduction of bylaw required storage volumes will not be considered at this stage.

A detailed analysis of on-site soils may be completed after rezoning of the property. If necessary, Gwaii will complete *Constant Head Well Permeameter (CHWP)* in-situ measurements of existing soils to determine "field-saturated" hydraulic conductivity (Kfs) prior to finalizing the design of the overall stormwater management system. All permeameter testing analysis shall be completed as per the *ETC Pask (Constant Head Well) Permeameter for In-Situ Measurement of Field Saturated Hydraulic Conductivity of Soils* published by Engineering Technologies Canada Ltd. (March 2016). Stormwater management strategies will be reviewed during each subsequent stage of development and any adjustments or revisions will be reviewed and approved by the City of Colwood Engineering Department.

3 DESIGN METHODOLOGY

The City of Colwood does not have a prescriptive stormwater management bylaw and the City is receptive to a variety of Best Management Practices (BMP). The development strategy shall incorporate a "zero increase in stormwater runoff" methodology based on the 10-year storm event as per correspondence with City of Colwood Staff. The 10-year, 24-hour recurrence event shall be detained on-site with controlled release to VMP to replicate pre-development conditions as best as possible. Stormwater runoff originating on-site shall be captured from impervious areas and directed into surface treatment BMP systems (rain gardens, bioswales, oil interceptors) before discharging to a sub-surface detention area. The detention systems shall be designed to provide additional treatment of inflows, attenuation of peak flows resulting from the developed areas, and controlled release of stormwater to receiving environments.



3.1 National Resource Conservation Service (NRCS) TR-55 (HydroCAD)

HydroCAD, a computer aided design software for modeling urban hydrology was used to confirm detention and maximum controlled release rate requirements for the proposed stormwater detention system. The design storms used to complete the HydroCAD analysis are adapted from the Short Duration Rainfall Intensity-Duration Frequency (IDF) curve included in the CoC Bylaw 285, standard drawing Number D-10, for a 24-hour storm events (Storm Type 1A for the Pacific Northwest) which has been summarized in Table 2 below:

Table 2 - Storm Intensities, CoC Bylaw No. 286, D-10

Design Storm	10 min.	20 min.	24hr Rate	24hr Total
10-Year	37 mm/hr	28 mm/hr	4.6 mm/hr	110.4 mm

Analysis of the Site was completed using the SCS method and NRCS TR-55 criteria—a summary of the model input information has been included:

- > Time of Concentration:
 - Sheet Flow (Pre-Development)
 - Maximum 100m flow length
 - Woods; Dense underbrush (Manning's No. = 0.80)
 - Minimum 5 Minute Inlet time (Post-Development, Direct Entry)
- Modeled Catchment Areas (Inflow):
 - o 0.919ha (Pre-Development)
 - 0.937ha (Post-Development)
- > Storm Type 1A, 24 Hour
- Curve Numbers (CN):
 - o 79 Woods; fair soil, HSG D (Pre-Development)
 - o 79 − 50-75% Grass cover; fair soil, HSG C (Landscaping)
 - o 98 Paved parking and Roofs, HSG C
 - o 98 Roofs, HSG C
- 48 Hour Analysis Time Span



3.2 Climate Change Consideration

In accordance with the Professional Practice Guidelines - Legislated Flood Assessments in a Changing Climate in BC (APEGBC, 2012) a safety factor of 10% has been used to adjust the included rainfall intensities to account for the effects of climate change. The adjusted values are shown below in Table 3.

Table 3 - Adjusted Storm Event Intensities and Depths

Design Storm	10 min.	20 min.	24hr Rate	24hr Total	
10-Year	40.7 mm/hr	30.8 mm/hr	5.1 mm/hr	121.4 mm	

4 STORMWATER MANAGEMENT ANALYSIS

4.1 Pre-Development Condition

Pre-development ground cover within the east subcatchment is generally comprised of steep, forested terrain (mature coniferous tree canopy) with interspersed areas of exposed rock outcropping and various pockets of shallow overburden and dense, invasive underbrush The existing Site topography is highly variable and slopes steeply from north to south from the high-lying property boundary (approximate geodetic elevation of 129.0m) down to the lower southern property boundary (approximate geodetic elevation of 109.3m at the southeast property corner). The pre-development peak flow from the site catchment area measured with HydroCAD for the pre-development catchment has been summarized in the table below:

Table 4 - Pre-Development Site Conditions

Storm Recurrence Interval	10-Year
Time of Concentration	51.9 Minutes
Pre-Development CN (Brush, Fair, HSG D)	79
Inflow Area	0.919 ha
Pre-Development Runoff Volume	607.0 m ³



Pre-Development Peak Discharge	28.72 L/s

For the pre-development model condition, a Hydraulic Soil Group (HSG) D was considered: these soils are characterized by "very low infiltration rates when thoroughly wetted, and consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material". A detailed pre-development hydraulic model output from HydroCAD has been included in Appendix B.

4.2 On-Site Analysis

The proposed on-site drainage systems shall be designed to convey the post-development peak flow (Q_p) associated with a 10-year recurrence interval. System capacity shall be confirmed based on Manning's formula as per City of Colwood bylaw requirements.

4.3 Storm Water Detention

Stormwater detention and controlled release will be provided with a StormTech SC-740 subsurface detention system (or approved equivalent) and a flow control manhole located at the low-lying southeast property corner adjacent to the paved access road. The total live storage volume and maximum release rate requirements for the total site area has been summarized in Table 5:

Table 5 - Detention Facilities

	StormTech SC-740								
Catchment Area ¹	Controlled Release Rate (L/s)	Orifice Design (mm x mm)	StormTech SC-740 Configuration						
0.937 ha	22.36	100 x 100	6x8 Chambers x 1.30 m ³ = 62.44 m ³ + 150 m ³ Stone x 40% Voids = 60.00 m ³ + 1200Ø Barrel x 0.762m Live Storage = 0.86 m ³ Total Live Storage = 123.3 m ³						

¹ – Includes impervious roof and parking areas and pervious landscape areas adjacent to buildings; to be confirmed at BP Stage



During a typical rainfall event, runoff will be captured from impermeable surfaces including rooftops and a majority of the hard-surfaced parking areas which will be directed to the subsurface detention system. A 1200Ø flow control manhole (PVC cap with a drilled rectangular vertical orifice) positioned near the end of the StormTech SC-740 system will regulate stormwater discharge from the Site into the offsite ditching on VMP. A short pipe laid at a flat grade will provide flow exchange between the detention system and the flow control manhole. An emergency overflow is provided to accommodate significant flow conditions for events exceeding the design capacity of the system. The detention volume and controlled release rate requirements may be achieved with multiple detention and flow control systems strategically located throughout the Site provided the overall hydraulic specifications are met. The location and configuration of the proposed systems will be determined at Building Permit stage.

The existing stormwater runoff discharging from the slopes north of the buildings shall be captured by the Site drainage system and discharged directly to the drain service, bypassing the proposed detention systems. A post-development flow summary representing discharge to the service at the southeast property corner has been summarized in the table below:

Table 6 - Pre-Development Site Conditions

Site Condition	Pre-Development	Post-Development
Storm Recurrence Interval	10-	Year
Time of Concentration	36.6 Minutes	16.9 Minutes
Pre-Development CN (Woods, Fair, HSG D)	79	79 & 88 ¹
Inflow Area	0.93	
Peak Discharge from Site	28.72 L/s	28.49 L/s ²

¹ – Includes existing ground cover north of buildings and composite ground cover on-site (CN determined in HydroCAD)

 $^{^2}$ – Includes controlled discharge from StormTech SC-740 system (22.36 L/s) and uncontrolled existing upland areas (6.13 L/s)



A detailed HydroCAD model summary for the post-development Site condition has been included as Appendix C.

4.4 On-Site Water Quality Improvements

During typical storm events, runoff generated from the rooftops and impervious parking areas exposed to vehicle traffic will be directed into various sediment basins with sumps (lawn basins, catch basins, inlet and outlet sump manholes adjacent to the StormTech detention system). The resulting attenuation of runoff within these sediment basins will permit settling of sediment and suspended solids that would otherwise discharge into the downstream municipal systems. Minimizing the transport of sediment and suspended solids into the Site drainage systems will prevent siltation and clogging of voids within the drain rock underlying the StormTech tanks and will avoid build-up within the upstream systems. Treatment of organic compounds is achieved using "Inbitex" biofilm supporting geotextile at the base of the StormTech system prior to discharge to the flow control manhole. The StormTech system is also equipped with an "isolation row" which is not directly connected to parallel chambers. This isolation row encourages settling of sediment and also enables access for routine inspection and flushing.

Since the site is predominately shallow bedrock, the infiltration capacity of existing on-site soils is likely limited. The Site Landscape plans recommend that absorbent landscaping, plantings and topsoils be placed in strategic areas around the Site. During a typical rainfall event, runoff from impermeable surfaces may be treated through the absorbent landscaping materials by removing first flush pollutants and sediment before entering the detention system. These materials will also provide attenuation of Site waters during typical, low-volume precipitation events. During more significant rainfall events, runoff may exceed the infiltration capacity of the landscaping materials, resulting in discharge into the Site drainage system.

4.5 200 Year Flood Routing

The on-site grading plan and natural Site topography ensures positive drainage away from all proposed structures. The central parking areas and Site access road provide a natural conduit for flood waters to discharge eastward towards VMP. Surface areas that are



intended for overland drainage should be hard-surfaced, seeded, planted, or protected with armoring to mitigate potential erosion concerns.

5 SEDIMENT AND EROSION CONTROL

During construction, the contractor is to implement sediment and erosion control procedures to ensure the quality of site run-off is maintained. A comprehensive Sediment and Erosion control plan will be completed at Building Permit Stage which the Contractor shall adhere to during all Site activities. Controlling erosion and preventing the release of sediments from construction sites is an effective means of minimizing sediment discharge to fish-bearing watercourses and the municipal storm drainage system. Silt fencing and/or drainage swales should be strategically placed to effectively prevent untreated site water from discharging to adjacent properties. These sediment and erosion control measures should be monitored periodically throughout the course of construction, and are to remain in place until substantial performance has been verified. An effective erosion and sediment control plan incorporates, but is not limited to the following procedures:

5.1 Layout and Clearing

- Install runoff management systems prior to site disturbance and construction activities:
- Stabilize bare soils the same day that they have been disturbed;
- Avoid clearing vegetation from sites during snowmelt or heavy rains;
- Avoid clearing or grading soils within 15 meters of a stream or ditch;
- Install appropriate measures (straw bales, filter cloth, etc.) to prevent sediment from entering a watercourse;
- Store excavated soils away from watercourses, storm drains and paved surfaces;
- Install a site access pad (crushed gravel before driveway road access) to prevent tracking mud offsite.

5.2 Erosion Control

- Encourage surface water to seep into the soil
- If possible, retain woody debris and organic matter on-site;
- Roughen or terrace slopes to prevent erosion;



- Cover soil stockpiles and bare slopes with mulch, tarps, etc;
- Backfill foundations as soon as possible following approval of perimeter drainage;
- Remove excess soil from the site as soon as possible after backfilling;
- Re-vegetate or landscape the site as soon as possible. If areas of a site must be left incomplete during the rainy season, sow a temporary cover crop, apply mulch or lay geotextile to stabilize exposed soils;
- Keep machinery within specific access areas. Limit the extent of machine access areas to the minimum necessary to complete construction;
- Inspect the construction site daily to ensure erosion control measures are working.

5.3 **Drainage and Sediment Control**

- Use berms or swales to divert runoff from entering the site;
- Use silt fencing around stockpiled and sloped areas;
- Install filter cloth, drain rock or straw bales to protect ditches and catch basins;
- Collect runoff for treatment in a sediment trap;
- Ensure containment and proper disposal of concrete waste water;
- Properly dispose of construction wastes (build materials, paints, etc.) off-site;
- Do not wash soils or sediments onto the street or into the storm sewer.

Due to the close proximity of the existing wetlands west of the development areas, Islander shall work with the Project Biologist (Aqua-Tex Scientific Consulting), the Contractor and the City of Colwood Engineering Department as necessary to closely monitor the site and identify where BMPs are best suited during construction of the proposed works.



6 CLOSURE

This report detailing the Stormwater Management strategies recommended for the development located on the West side of Veteran's Memorial Parkway (Part 62) has been prepared by,

ISLANDER ENGINEERING LTD.

Please contact the undersigned if you have any questions or concerns.

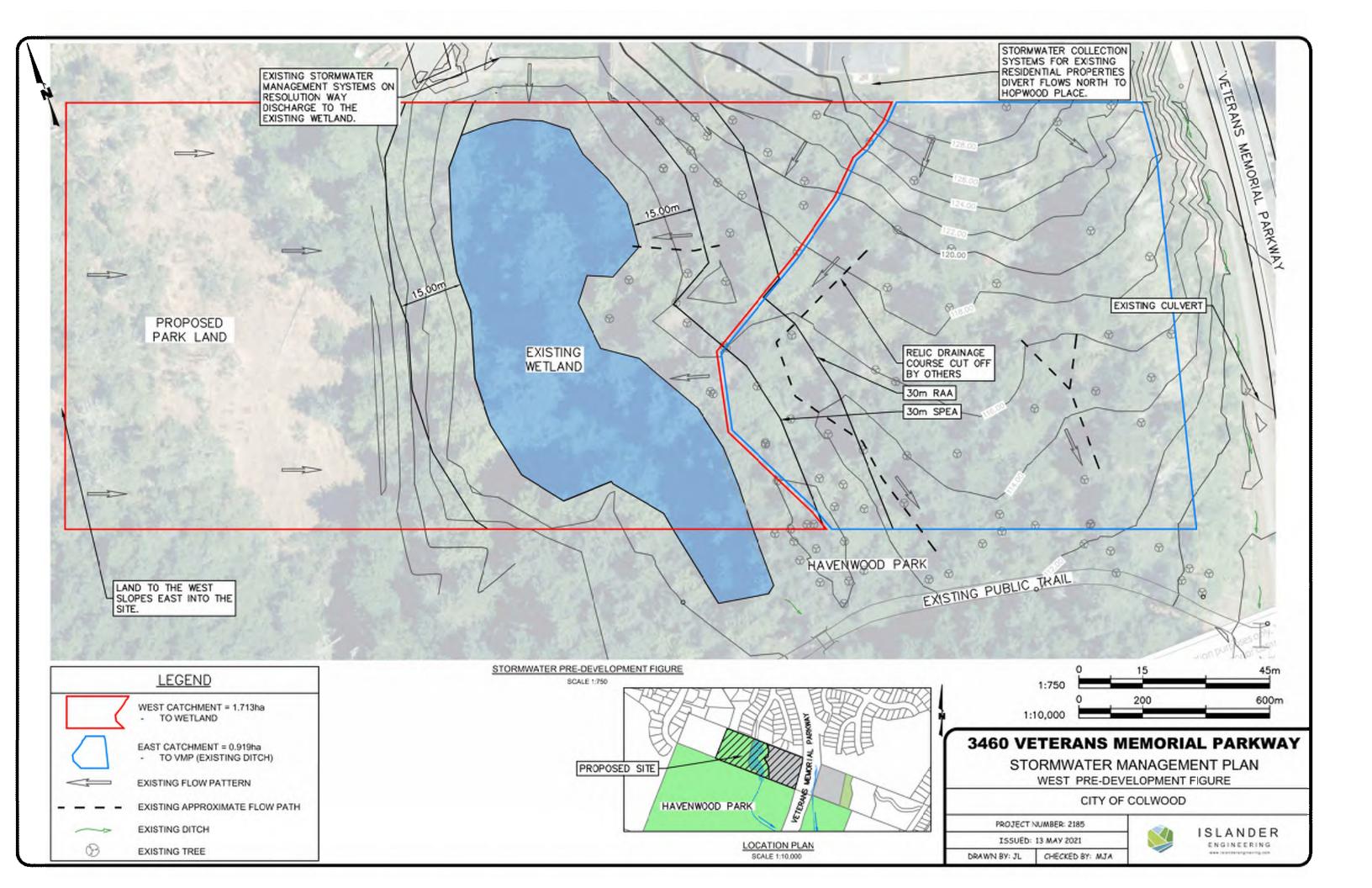
Prepared by,

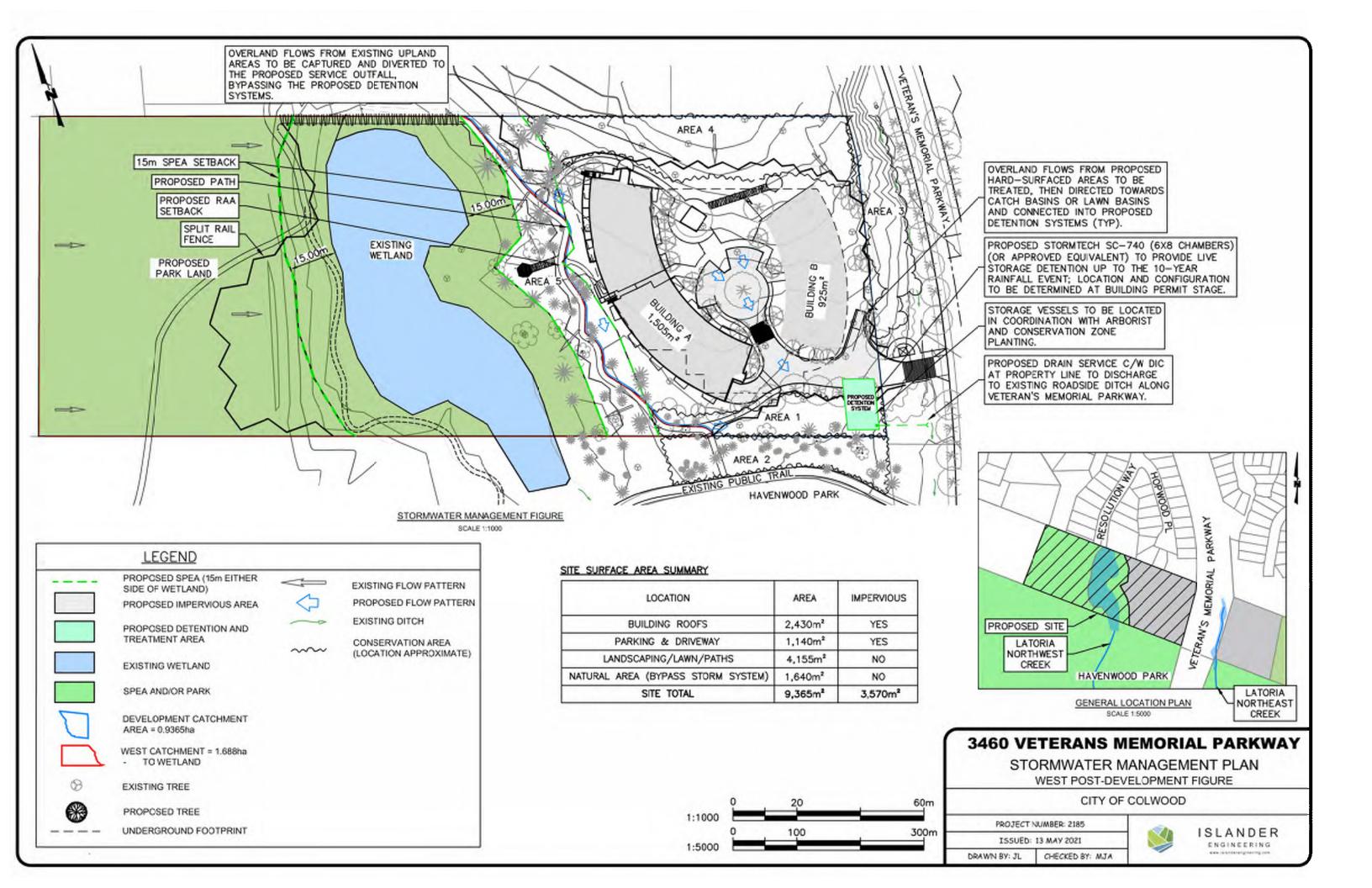
Gabrielle Swann, EIT Project Engineer Reviewed by,

Mike Achtem, P.Eng. Principal, Senior Engineer



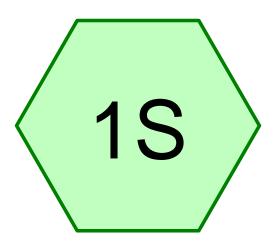
APPENDIX A Stormwater Management Figures







APPENDIX B Pre-Development HydroCAD Model



Pre-Development (West Site)









2021-04-06 - 2185 - VMP West Pre-dev

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Area Listing (all nodes)

Area	CN	Description		
(hectares)		(subcatchment-numbers)		
0.9190	79	Woods, Fair, HSG D (1S)		
0.9190		TOTAL AREA		

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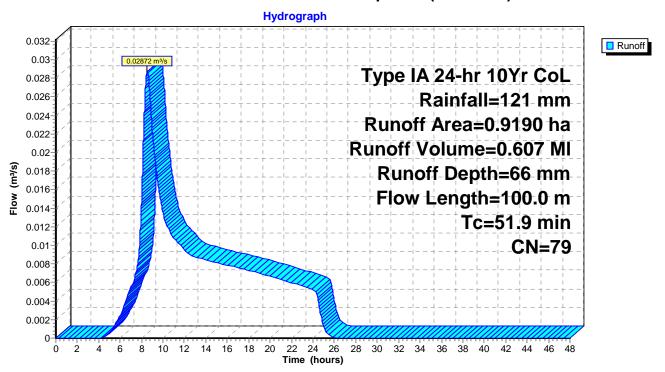
Summary for Subcatchment 1S: Pre-Development (West Site)

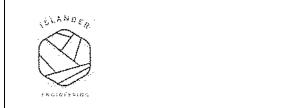
Runoff = 0.02872 m³/s @ 8.53 hrs, Volume= 0.607 Ml, Depth= 66 mm

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs Type IA 24-hr 10Yr CoL Rainfall=121 mm

	Area	ı (ha) Cl	N Desc	ription			
	0.	9190 7	9 Woo	ds, Fair, H	SG D		
_	0.	9190	100.0	00% Pervio	ous Area		
	Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description	
-	16.8	40.0	0.2500	0.04	,	Sheet Flow, Sheet Flow	_
	35.1	60.0	0.0900	0.03		Woods: Dense underbrush n= 0.800 P2= 82 mm Sheet Flow, Sheet Flow Woods: Dense underbrush n= 0.800 P2= 82 mm	
-	51.9	100.0	Total			VV COGS. Delise dilucipidati II— 0.000 I Z— 02 IIIIII	—

Subcatchment 1S: Pre-Development (West Site)





APPENDIX C Post-Development HydroCAD Model



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Area Listing (all nodes)

Are	ea CN	Description
(hectare	es)	(subcatchment-numbers)
0.415	55 79	50-75% Grass cover, Fair, HSG C (4S)
0.164	40 79	Woods, Fair, HSG D (3S)
0.114	40 98	Paved parking, HSG A (4S)
0.243	30 98	Unconnected roofs, HSG A (4S)
0.930	65	TOTAL AREA

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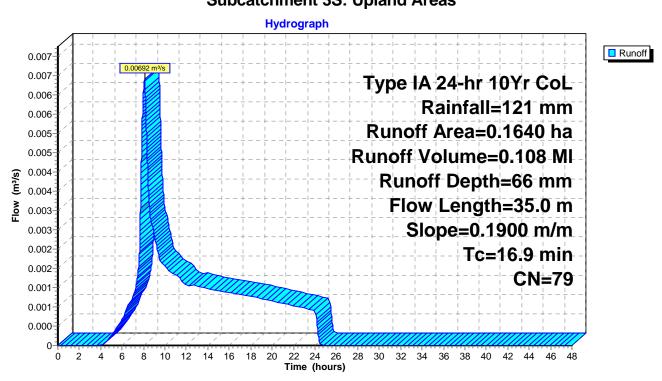
Summary for Subcatchment 3S: Upland Areas

Runoff = 0.00692 m³/s @ 8.09 hrs, Volume= 0.108 Ml, Depth= 66 mm

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs Type IA 24-hr 10Yr CoL Rainfall=121 mm

_	Area	ı (ha) C	N Desc	ription		
	0.	1640	79 Woo	ds, Fair, H	SG D	
	0.	1640	100.	00% Pervio	ous Area	
_	Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
	16.9	35.0	0.1900	0.03		Sheet Flow, Sheet Flow Woods: Dense underbrush n= 0.800 P2= 82 mm

Subcatchment 3S: Upland Areas



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Summary for Subcatchment 4S: Post-Development

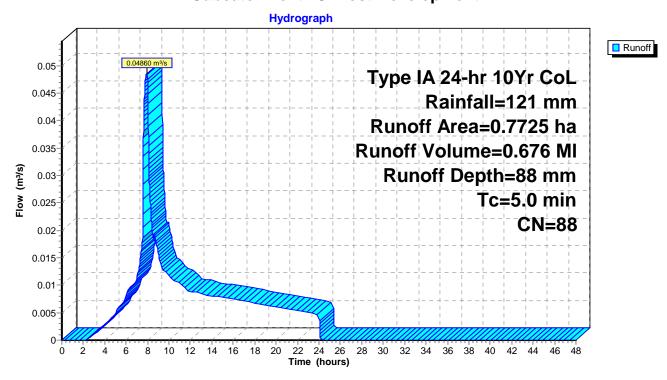
Assumed 75% grass cover, HSG C to represent landscaped areas & on-site catchment area is everything betweent the SPEA and VMP PL.

Runoff = 0.04860 m³/s @ 7.90 hrs, Volume= 0.676 Ml, Depth= 88 mm

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs Type IA 24-hr 10Yr CoL Rainfall=121 mm

Are	a (ha)	CN	Desc	ription			
	.2430	98	Unco	nnected ro	ofs, HSG A	4	
C	.1140	98	Pave	d parking,	HSG A		
C	.4155	79	50-75	5% Grass	cover, Fair,	HSG C	
C	.7725	88	Weig	hted Avera	age		
C	.4155		53.79	9% Perviou	is Area		
C	.3570		46.21	1% Impervi	ous Area		
C	.2430		68.07	7% Unconr	nected		
Tc	Leng	gth	Slope	Velocity	Capacity	Description	
(min)	(mete	rs)	(m/m)	(m/sec)	(m³/s)		
5.0						Direct Entry,	

Subcatchment 4S: Post-Development



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Summary for Pond 2P: StormTech SC-740

Inflow Area = 0.7725 ha, 46.21% Impervious, Inflow Depth = 88 mm for 10Yr CoL event Inflow 0.04860 m³/s @ 7.90 hrs. Volume= 0.676 MI Outflow 8.34 hrs, Volume= 0.655 MI, Atten= 54%, Lag= 26.6 min 0.02236 m³/s @ 8.34 hrs, Volume= Primary 0.02236 m³/s @ 0.655 MI 0.00000 m³/s @ 0.00 hrs, Volume= 0.000 MI Secondary =

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 5 Peak Elev= 109.758 m @ 8.34 hrs Surf.Area= 0.0169 ha Storage= 0.110 MI

Plug-Flow detention time= 86.6 min calculated for 0.655 MI (97% of inflow) Center-of-Mass det. time= 65.4 min (798.2 - 732.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	108.700 m	0.060 MI	9.37 mW x 17.96 mL x 1.26 mH Field A
			0.212 MI Overall - 0.062 MI Embedded = 0.150 MI x 40.0% Voids
#2A	109.000 m	0.062 MI	StormTech SC-740 x 48 Inside #1
			Effective Size= 1,134 mmW x 762 mmH => $0.599 \text{ m}^2 \text{ x } 2.17 \text{ mL} = 1.30 \text{ m}^3$
			Overall Size= 1,295 mmW x 762 mmH x 2.30 mL with 0.13 m Overlap
#3	108.700 m	0.003 MI	1.20 mD x 2.50 mH Vertical Cone/Cylinder
		0.125 MI	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices	
#1	Primary	109.000 m	100 mm W x 100 mm H Vert. Orifice/Grate	C= 0.600
#2	Secondary	109.800 m	250 mm Vert. Orifice/Grate C= 0.600	

Primary OutFlow Max=0.02236 m³/s @ 8.34 hrs HW=109.758 m TW=0.000 m (Dynamic Tailwater) **1=Orifice/Grate** (Orifice Controls 0.02236 m³/s @ 2.24 m/s)

Secondary OutFlow Max=0.00000 m³/s @ 0.00 hrs HW=108.700 m TW=0.000 m (Dynamic Tailwater) **2=Orifice/Grate** (Controls 0.00000 m³/s)

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Pond 2P: StormTech SC-740 - Chamber Wizard Field A

Chamber Model = StormTech SC-740

Effective Size= 1,134 mmW x 762 mmH => $0.599 \text{ m}^2 \text{ x } 2.17 \text{ mL} = 1.30 \text{ m}^3$ Overall Size= 1,295 mmW x 762 mmH x 2.30 mL with 0.13 m Overlap

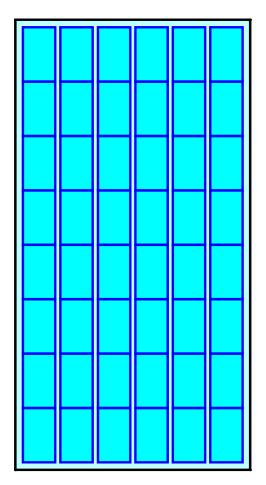
1,295 mm Wide + 200 mm Spacing = 1,495 mm C-C

8 Chambers/Row x 2.17 m Long = 17.36 m + 300 mm End Stone x 2 = 17.96 m Base Length 6 Rows x 1,295 mm Wide + 200 mm Spacing x 5 + 300 mm Side Stone x 2 = 9.37 m Base Width 300 mm Base + 762 mm Chamber Height + 200 mm Cover = 1.26 m Field Height

48 Chambers x 1.30 m³ = 62.44 m³ Chamber Storage

212.45 m³ Field - 62.44 m³ Chambers = 150.00 m³ Stone x 40.0% Voids = 60.00 m³ Stone Storage

Stone + Chamber Storage = 122.44 m³ = 0.122 Ml

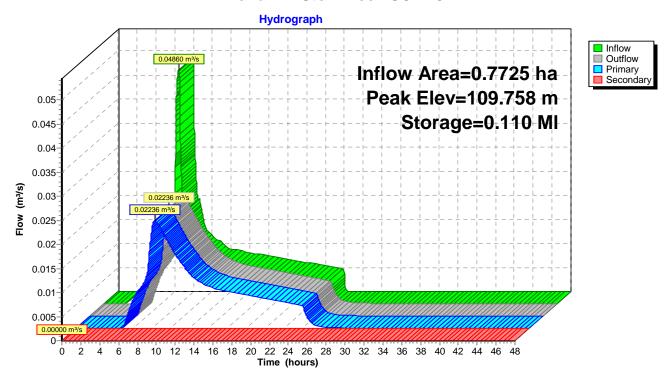




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Pond 2P: StormTech SC-740



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2021-04-06 - 2185 - VMP West Post-dev

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Summary for Link 4L: Offsite Discharge to VMP

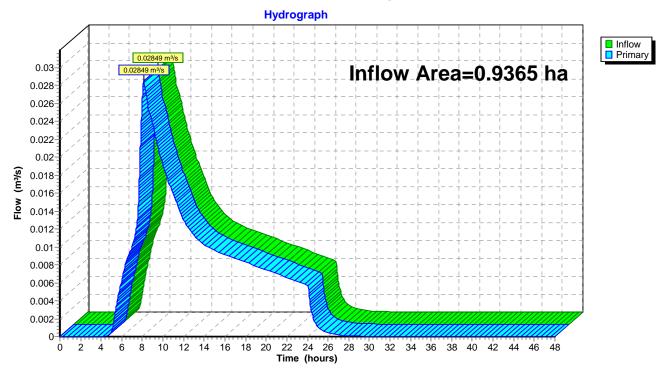
Inflow Area = 0.9365 ha, 38.12% Impervious, Inflow Depth = 82 mm for 10Yr CoL event

Inflow = $0.02849 \text{ m}^3/\text{s}$ @ 8.14 hrs, Volume= 0.764 MI

Primary = 0.02849 m³/s @ 8.14 hrs, Volume= 0.764 Ml, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 4L: Offsite Discharge to VMP



REPORT

VETERAN'S MEMORIAL PARKWAY MIXED-USE DEVELOPMENT (EAST SITE) RZ-20-010 STORMWATER MANAGEMENT PLAN

Prepared For: BC – ALTA Developments

Attn: Pari Saroya

Prepared By: Islander Engineering Ltd.

623 Discovery St. Victoria, BC V8T 5G4

Date: April 22, 2021

Rev 2

Project: 2185



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1 INTRODUCTION

This report details the Stormwater Management strategies to support a Rezoning and Development Permit (DP) application for the proposed mixed-use development at a greenfield site (Part 62) along the East side of Veteran's Memorial Parkway (VMP), in Colwood BC, herein referred to as the "Site". Islander Engineering Ltd. previously prepared a stormwater management plan for the nearby "Wishart Gardens" development by the same developer, which applied a "zero increase in runoff policy" based on the 2-year storm event. A similar methodology has been proposed following a review of the Havenwood Park Management Plan which specifies all post-development flows entering the park must not exceed pre-development rates. As requested by the City of Colwood, the stormwater design methodology for this development shall be based on the 10-year storm event. Furthermore, the stormwater management design shall be completed pursuant to requirements set out in the City of Colwood Subdivision and Development of Land Bylaw, No. 285 (1995). The report is intended to support a rezoning application and any detailed design will be completed at Building Permit stage.

2 BACKGROUND & EXISTING CONDITIONS

The existing Site is an irregular shaped parcel that is bisected by Veteran's Memorial Parkway (VMP) resulting in two separate development areas along the east and west sides of the roadway (see the attached Site figures). The development plans and supporting stormwater management strategies for the east and west parcels have been prepared separately. The existing parcel is located directly north of East Havenwood Park and approximately 730m north of the intersection of VMP and Latoria Road. The Site is presently zoned CD-22 Area 2, (Comprehensive Development 22, City of Colwood Land Use Bylaw No. 151, 1989) which permits the construction of a maximum of 30 residential units and 4-story buildings. The development plan includes rezoning the Site to permit the construction of two multi-level commercial / residential buildings with surface parking, underground parking, and two upper parking levels on the east parcel. The Site is surrounded by existing single-family residential development to the north along



Spotswood Terrace, the "Wishart Gardens" residential development (by the same developer) to the east, VMP to the west and Havenwood Park to the south.

The development is located within the northern flank of the North Latoria Creek Watershed which encompasses an approximate 372ha partially developed drainage basin which extends from headwaters north of the Site to an ocean discharge near Albert Head south of the development. North Latoria Creek flows southward from headwaters originating adjacent to the western Site boundary, through East Havenwood Park, and eventually discharging into Latoria Creek along Latoria Road. The Project Biologist (Aqua-Tex Scientific Consulting) has determined that a 15m Streamside Protection and Enhancement Area (SPEA) is necessary to protect the existing ecosystem and surrounding environment surrounding North Latoria Creek. The stormwater management plan shall ensure that no harm shall be instilled upon the creek, wetland, or SPEA resulting from the development. Latoria Creek proceeds eastward along Latoria Road for approximately 310m before meandering southward through Latoria Creek Park and discharging to an ocean outfall at Albert Head Lagoon approximately 2.2km southeast of the development. All construction activities adjacent to the SPEA shall be coordinated and approved by the Project Biologist and City of Colwood Staff.

The existing Site topography slopes steeply from east to west from a high-lying ridge located east of the development (approximate geodetic elevation of 156.0m) down to North Latoria Creek at the low-lying southwestern property corner (approximate geodetic elevation of 105.0m). The total Site catchment area totals approximately 1.596ha which extends from North Latoria Creek to the high-lying ridge adjacent to "Wishart Gardens" east of the Site. The stormwater management plan for "Wishart Gardens" ensures stormwater runoff is captured on-site and directed eastward towards systems on Wishart Road. Overland flows from the existing residential development north of the property discharges to the roadside ditch along VMP and does not impact the Site. Stormwater runoff discharging from these eastern slopes shall be captured on-site and conveyed towards North Latoria Creek to maintain the general pre-development drainage pattern.



The existing ground cover on-site generally comprises steep, forested terrain (mature coniferous tree canopy) with interspersed areas of exposed rock outcropping and various pockets of shallow overburden and dense, invasive underbrush. Review of Quaternary Geological Map of Greater Victoria (Geoscience Map 2000-2) confirms the site is located within an area of Outcrop and Thin Soil Cover Undifferentiated (Unit R1/2): "...includes sparsely developed, mainly rocky, upland areas with little or no subsurface control, and where units R1 (bedrock) and R2 (thin soil cover) could not be readily differentiated on air photos due to extensive tree cover...". Accordingly, the use of underlying site soils to dispose of site generated stormwater runoff is unlikely and therefore the use of infiltration for a reduction of bylaw required storage volumes will not be considered at this stage.

A detailed analysis of on-site soils may be completed after rezoning of the property. If necessary, Gwaii will complete *Constant Head Well Permeameter (CHWP)* in-situ measurements of existing soils to determine "field-saturated" hydraulic conductivity (Kfs) prior to finalizing the design of the overall stormwater management system. All permeameter testing analysis shall be completed as per the *ETC Pask (Constant Head Well) Permeameter for In-Situ Measurement of Field Saturated Hydraulic Conductivity of Soils* published by Engineering Technologies Canada Ltd. (March 2016). Stormwater management strategies will be reviewed during each subsequent stage of development and any adjustments or revisions will be reviewed and approved by the City of Colwood Engineering Department.

3 DESIGN METHODOLOGY

The City of Colwood does not have a prescriptive stormwater management bylaw and the City is receptive to a variety of Best Management Practices (BMP). The development strategy shall incorporate a "zero increase in stormwater runoff" methodology based on the 10-year storm event as per correspondence with City of Colwood Staff. The 10-year, 24-hour recurrence event shall be detained on-site with controlled release to North Latoria Creek to replicate pre-development conditions as best as possible. Stormwater runoff originating on-site shall be captured from impervious areas and directed into surface treatment BMP systems (rain gardens, bioswales, oil interceptors) before discharging to a



sub-surface detention area. The detention systems shall be designed to provide additional treatment of inflows, attenuation of peak flows resulting from the developed areas, and controlled release of stormwater to receiving environments.

3.1 National Resource Conservation Service (NRCS) TR-55 (HydroCAD)

HydroCAD, a computer aided design software for modeling urban hydrology was used to confirm detention and maximum controlled release rate requirements for the proposed stormwater detention system. The design storms used to complete the HydroCAD analysis are adapted from the Short Duration Rainfall Intensity-Duration Frequency (IDF) curve included in the CoC Bylaw 285, standard drawing Number D-10, for a 24-hour storm events (Storm Type 1A for the Pacific Northwest) which has been summarized in Table 1 below:

Table 1 - Storm Intensities, CoC Bylaw No. 286, D-10

Design Storm	10 min.	20 min.	24hr Rate	24hr Total
10-Year	37 mm/hr	28 mm/hr	4.6 mm/hr	110.4 mm

Analysis of the proposed system is based on NRCS TR-55 criteria (Urban Hydrology for Small Watersheds)—a summary of the model input information has been included:

- Time of Concentration:
 - Sheet Flow (Pre-Development)
 - Maximum 100m flow length
 - Approximate 29.0-30.0% average slope from high-lying eastern ridge east of the Site to the low-lying western property boundary
 - Woods; Dense underbrush (Manning's No. = 0.80)
 - Shallow Concentrated Flow
 - Beyond Maximum 100m flow length
 - Minimum 5 Minute Inlet time (Post-Development, Direct Entry)
- Modeled Catchment Area (Inflow):
 - o Total catchment area: 1.596 ha
- Storm Type 1A, 24 Hour



Curve Numbers (CN):

- 79 Woods; fair soil, HSG D (Pre-Development)
- 79 − 50-75% Grass cover; fair soil, HSG C (Landscaping)
- o 98 Paved parking and Roofs, HSG C
- o 98 Roofs, HSG C
- > 48 Hour Analysis Time Span

3.2 Climate Change Consideration

In accordance with the Professional Practice Guidelines - Legislated Flood Assessments in a Changing Climate in BC (APEGBC, 2012) a safety factor of 10% has been used to adjust the included rainfall intensities to account for the effects of climate change. The adjusted values are shown below in Table 2.

Table 2 - Adjusted Storm Event Intensities and Depths

Design Storm	10 min.	20 min.	24hr Rate	24hr Total
10-Year	40.7 mm/hr	30.8 mm/hr	5.1 mm/hr	121.4 mm

4 STORMWATER MANAGEMENT ANALYSIS

4.1 Pre-Development Condition

Pre-development ground cover is generally comprised of steep, forested terrain (mature coniferous tree canopy) with interspersed areas of exposed rock outcropping and various pockets of shallow overburden and dense, invasive underbrush The existing Site topography slopes steeply from east to west from a high-lying ridge located east of the development (approximate geodetic elevation of 156.0m) down to North Latoria Creek at the low-lying southwestern property corner (approximate geodetic elevation of 105.0m). The pre-development peak flow from the site catchment area (including upland flows) measured with HydroCAD for the pre-development catchment has been summarized in the table below:



Table 3 - Pre-Development Site Conditions

Storm Recurrence Interval	10-Year	
Time of Concentration	36.6 Minutes	
Pre-Development CN (Brush, Fair, HSG D)	79	
Inflow Area ¹	1.596 ha	
Pre-Development Runoff Volume	1,071.0 m ³	
Pre-Development Peak Discharge	56.38 L/s	

¹ Includes upland catchment area east of the Site

For the pre-development model condition, a Hydraulic Soil Group (HSG) D was considered: these soils are characterized by "very low infiltration rates when thoroughly wetted, and consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material". A detailed pre-development hydraulic model output from HydroCAD has been included in Appendix B.

4.2 On-Site Analysis

The proposed on-site drainage systems shall be designed to convey the post-development peak flow (Q_p) associated with a 10-year recurrence interval. System capacity shall be confirmed based on Manning's formula as per City of Colwood bylaw requirements.

4.3 Storm Water Detention

Stormwater detention and controlled release will be provided with a StormTech SC-740 subsurface detention system (or approved equivalent) and a flow control manhole located along the west side of the Site likely beneath the paved access road. The total live storage volume and maximum release rate requirements for the total site area has been summarized in Table 4:



Table 4 - Detention Facilities

StormTech SC-740			
Catchment Area ¹	Controlled Release Rate (L/s)	Orifice Design (mm x mm)	StormTech SC-740 Configuration
1.596 ha	20.69	95 x 95	2x22 Chambers x 1.30 m ³ = 57.24 m ³ + 155.74 m ³ Stone x 40% Voids = 62.29 m ³ + 1200Ø Barrel x 0.762m Live Storage = 0.86 m ³ Total Live Storage = 120.39 m ³

¹ – Includes impervious roof and parking areas and pervious landscape areas adjacent to buildings; to be confirmed at BP Stage

During a typical rainfall event, runoff will be captured from impermeable surfaces including rooftops and a majority of the hard-surfaced parking areas which will be directed to the subsurface detention system. A 1200Ø flow control manhole (PVC cap with a drilled rectangular vertical orifice) positioned near the end of the StormTech SC-740 system will regulate stormwater discharge from the Site into the receiving environment. A short pipe laid at a flat grade will provide flow exchange between the detention system and the flow control manhole. An emergency overflow is provided to accommodate significant flow conditions for events exceeding the design capacity of the system. The detention volume and controlled release rate requirements may be achieved with multiple detention and flow control systems strategically located throughout the Site provided the overall hydraulic specifications are met. The location and configuration of the proposed systems will be determined at Building Permit stage.

The existing stormwater runoff discharging from the slopes east of the Site shall be captured by the Site drainage system and directed towards North Latoria Creek, bypassing the proposed detention systems to maintain the pre-development drainage pattern. The outlet systems shall permit gradual exfiltration or dispersed overland flow through a rip-rap swale or other approved outlet structure before discharge into North Latoria Creek. Point source discharge through a conventional outfall system shall not be permitted. The design and construction of the outfall and conveyance systems adjacent to North Latoria Creek



shall be coordinated and approved by the Project Biologist (Aqua-Tex Scientific Consulting) and City of Colwood Staff. A post-development flow summary representing discharge into North Latoria Creek has been summarized in the table below:

Table 5 - Pre-Development Site Conditions

Site Condition	Pre-Development	Post-Development	
Storm Recurrence Interval	10-Year		
Time of Concentration	36.6 Minutes	35.9 Minutes	
Pre-Development CN (Brush, Fair, HSG D)	79	79 & 92 ¹	
Inflow Area	1.596 ha		
Peak Discharge to Creek	56.38 L/s	56.37 L/s ²	

 $[\]overline{\ }$ - Includes existing ground cover east of Site and composite ground cover on-site (CN determined in HydroCAD)

A detailed HydroCAD model summary for the post-development Site condition has been included as Appendix C.

4.4 On-Site Water Quality Improvements

During typical storm events, runoff generated from the rooftops and impervious parking areas exposed to vehicle traffic will be directed into various sediment basins with sumps (lawn basins, catch basins, inlet and outlet sump manholes adjacent to the StormTech detention system). The resulting attenuation of runoff within these sediment basins will permit settling of sediment and suspended solids that would otherwise discharge into the downstream receiving environments. Minimizing the transport of sediment and suspended solids into the Site drainage systems will prevent siltation and clogging of voids within the drain rock underlying the StormTech tanks and will avoid build-up within the upstream systems. Treatment of organic compounds is achieved using "Inbitex" biofilm supporting geotextile at the base of the StormTech system prior to discharge to the flow control

² – Includes controlled discharge from StormTech SC-740 system (20.69 L/s) and existing upland areas (35.68 L/s)



manhole. The StormTech system is also equipped with an "isolation row" which is not directly connected to parallel chambers. This isolation row encourages settling of sediment and also enables access for routine inspection and flushing.

Since the site is predominately shallow bedrock, the infiltration capacity of existing on-site soils is likely limited. The Site Landscape plans recommend that absorbent landscaping, plantings and topsoils be placed in strategic areas around the Site. During a typical rainfall event, runoff from impermeable surfaces may be treated through the absorbent landscaping materials by removing first flush pollutants and sediment before entering the detention system. These materials will also provide attenuation of Site waters during typical, low-volume precipitation events. During more significant rainfall events, runoff may exceed the infiltration capacity of the landscaping materials, resulting in discharge into the Site drainage system.

4.5 200 Year Flood Routing

The on-site grading plan and natural Site topography ensures positive drainage away from all proposed structures. The central parking areas and Site access road provide a natural conduit for flood waters to discharge westward towards VMP and North Latoria Creek. Surface areas that are intended for overland drainage should be hard-surfaced, seeded, planted, or protected with armoring to mitigate potential erosion concerns.

5 SEDIMENT AND EROSION CONTROL

During construction, the contractor is to implement sediment and erosion control procedures to ensure the quality of site run-off is maintained. A comprehensive Sediment and Erosion control plan will be completed at Building Permit Stage which the Contractor shall adhere to during all Site activities. Controlling erosion and preventing the release of sediments from construction sites is an effective means of minimizing sediment discharge to fish-bearing watercourses and the municipal storm drainage system. Silt fencing and/or drainage swales should be strategically placed to effectively prevent untreated site water from discharging to adjacent properties. These sediment and erosion control measures should be monitored periodically throughout the course of construction, and are to remain



in place until substantial performance has been verified. An effective erosion and sediment control plan incorporates, but is not limited to the following procedures:

5.1 Layout and Clearing

- Install runoff management systems prior to site disturbance and construction activities;
- Stabilize bare soils the same day that they have been disturbed;
- Avoid clearing vegetation from sites during snowmelt or heavy rains;
- Avoid clearing or grading soils within 15 meters of a stream or ditch;
- Install appropriate measures (straw bales, filter cloth, etc.) to prevent sediment from entering a watercourse;
- Store excavated soils away from watercourses, storm drains and paved surfaces;
- Install a site access pad (crushed gravel before driveway road access) to prevent tracking mud offsite.

5.2 Erosion Control

- Encourage surface water to seep into the soil
- If possible, retain woody debris and organic matter on-site;
- Roughen or terrace slopes to prevent erosion;
- Cover soil stockpiles and bare slopes with mulch, tarps, etc;
- Backfill foundations as soon as possible following approval of perimeter drainage;
- Remove excess soil from the site as soon as possible after backfilling;
- Re-vegetate or landscape the site as soon as possible. If areas of a site must be left incomplete during the rainy season, sow a temporary cover crop, apply mulch or lay geotextile to stabilize exposed soils;
- Keep machinery within specific access areas. Limit the extent of machine access areas to the minimum necessary to complete construction;
- Inspect the construction site daily to ensure erosion control measures are working.

5.3 <u>Drainage and Sediment Control</u>

- Use berms or swales to divert runoff from entering the site;
- Use silt fencing around stockpiled and sloped areas;



- Install filter cloth, drain rock or straw bales to protect ditches and catch basins;
- Collect runoff for treatment in a sediment trap;
- Ensure containment and proper disposal of concrete waste water;
- Properly dispose of construction wastes (build materials, paints, etc.) off-site;
- Do not wash soils or sediments onto the street or into the storm sewer.

Due to the close proximity of North Latoria Creek, Islander shall work with the Project Biologist (Aqua-Tex Scientific Consulting), the Contractor and the City of Colwood Engineering Department as necessary to closely monitor the site and identify where BMPs are best suited during construction of the proposed works.



6 CLOSURE

This report detailing the Stormwater Management strategies recommended for the development located on the East side of Veteran's Memorial Parkway (Part 62) has been prepared by,

ISLANDER ENGINEERING LTD.

Please contact the undersigned if you have any questions or concerns.

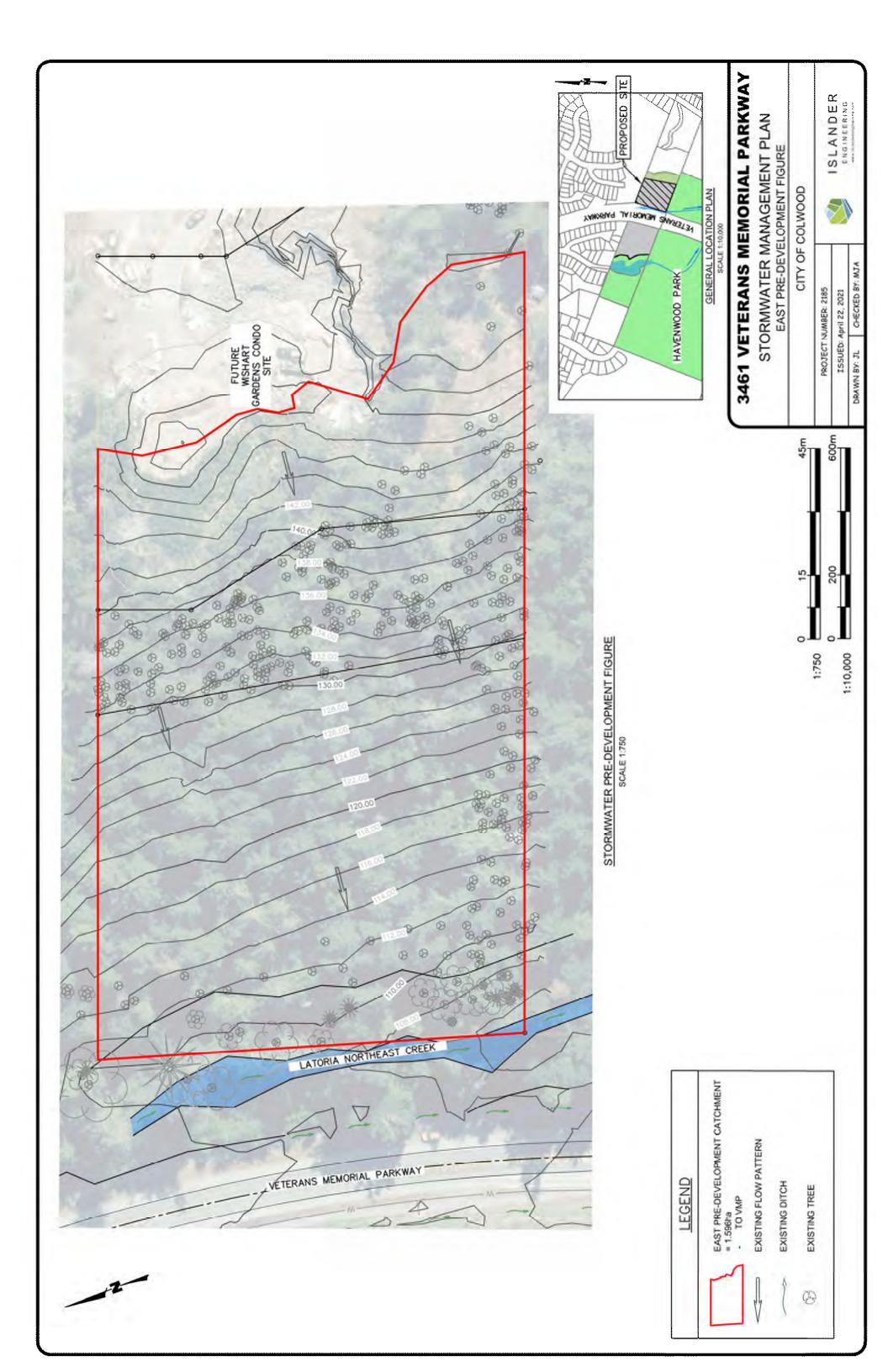
Prepared by,

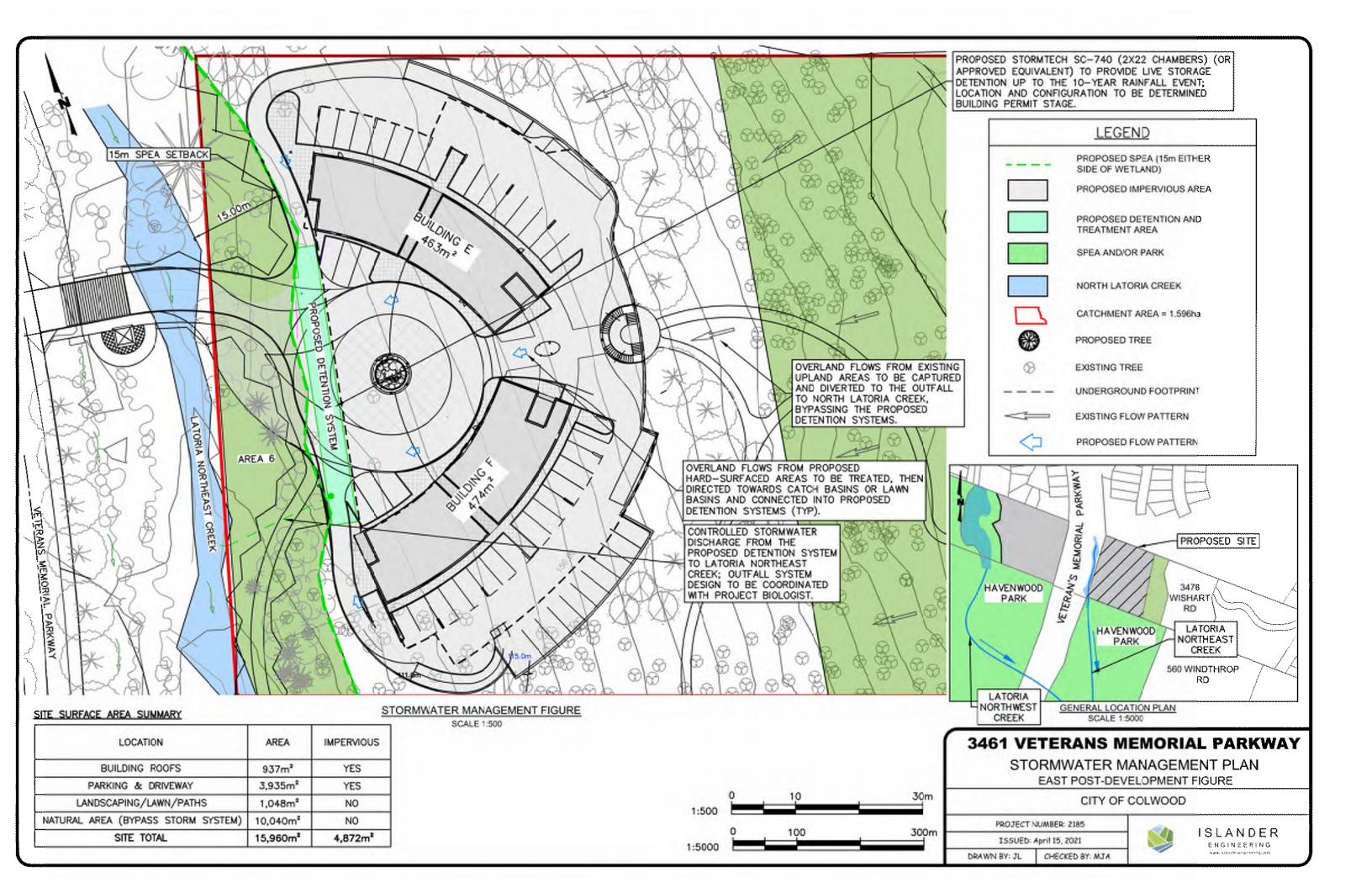
Gabrielle Swann, EIT Water Resources Engineer Reviewed by,

Michael J. Achtem, P.Eng. PMP. CCA Principal, Managing Director



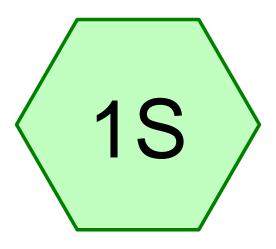
APPENDIX A Stormwater Management Figures







APPENDIX B Pre-Development HydroCAD Model



Pre-Development (East Site)









2021-04-08 - 2185 - VMP East Pre-dev HydroCADPrepared by Gwaii Engineering Ltd.
HydroCAD® 9.10 s/n 06344 © 2009 HydroCAD Software Solutions LLC

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Area Listing (all nodes)

Area	CN	Description
(hectares)		(subcatchment-numbers)
1.5960	79	Woods, Fair, HSG D (1S)
1.5960		TOTAL AREA

HydroCAD® 9.10 s/n 06344 © 2009 HydroCAD Software Solutions LLC

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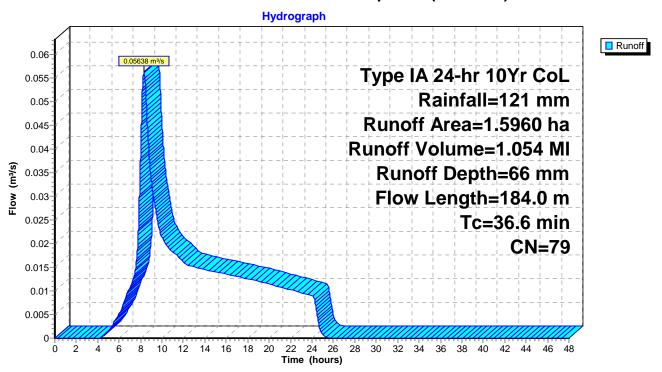
Summary for Subcatchment 1S: Pre-Development (East Site)

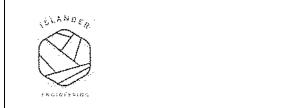
Runoff = $0.05638 \text{ m}^3/\text{s}$ @ 8.33 hrs, Volume= 1.054 Ml, Depth= 66 mm

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs Type IA 24-hr 10Yr CoL Rainfall=121 mm

_	Area	ı (ha) Cl	N Desc	cription					
Ī	1.5960 79 Woods, Fair, HSG D								
1.5960 100.00% Pervious Area									
	Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description			
_	33.0	100.0	0.2920	0.05	, ,	Sheet Flow, Sheet Flow			
_	3.6	84.0	0.2600	0.39		Woods: Dense underbrush n= 0.800 P2= 82 mm Shallow Concentrated Flow, Shallow Concentrated Flow Forest w/Heavy Litter Kv= 0.76 m/s			
	36.6	184.0	Total						

Subcatchment 1S: Pre-Development (East Site)





APPENDIX C Post-Development HydroCAD Model



2021-04-08 - 2185 - VMP East Post-dev HydroCAD

Prepared by Gwaii Engineering Ltd.
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Area Listing (all nodes)

Area	CN	Description	
(hectares)		(subcatchment-numbers)	
0.1048	79	50-75% Grass cover, Fair, HSG C (1S)	
1.0040	79	Woods, Fair, HSG D (4S)	
0.3935	98	Paved parking, HSG C (1S)	
0.0937	98	Roofs, HSG A (1S)	
1.5960		TOTAL AREA	

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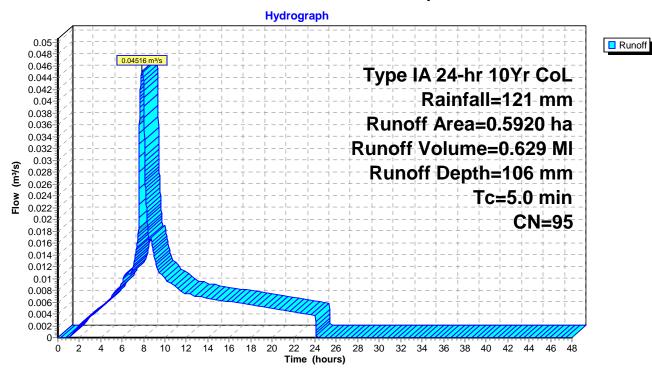
Summary for Subcatchment 1S: Post-Development

Runoff = 0.04516 m³/s @ 7.86 hrs, Volume= 0.629 Ml, Depth=106 mm

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs Type IA 24-hr 10Yr CoL Rainfall=121 mm

Area	a (ha)	CN	Desc	ription			
0	.3935	98	Pave	d parking,	HSG C		
0	.0937	98	Roof	s, HSG A			
0	.1048	79	50-75	5% Grass	cover, Fair,	HSG C	
0	.5920	95	Weig	hted Avera	age		
0	.1048		17.70	0% Perviou	ıs Area		
0	.4872		82.30	0% Imperv	ious Area		
Tc	Leng	jth	Slope	Velocity	Capacity	Description	
(min)	(mete	s)	(m/m)	(m/sec)	(m³/s)		
5.0						Direct Entry,	

Subcatchment 1S: Post-Development



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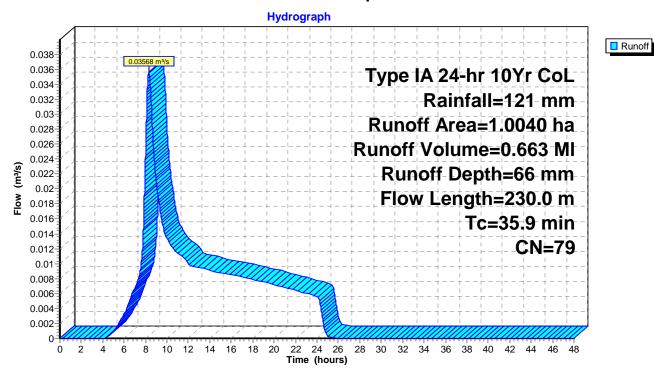
Summary for Subcatchment 4S: Upland Areas

Runoff = $0.03568 \text{ m}^3\text{/s}$ @ 8.30 hrs, Volume= 0.663 Ml, Depth= 66 mm

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs Type IA 24-hr 10Yr CoL Rainfall=121 mm

	Area	ı (ha) Cl	N Desc	cription			
1.0040 79 Woods, Fair, HSG D							
	1.	0040	100.0	00% Pervi	ous Area		
	Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description	
	33.0	100.0	0.2920	0.05		Sheet Flow, Sheet Flow	
	2.0	50.0	0.2960	0.41		Woods: Dense underbrush n= 0.800 P2= 82 mm Shallow Concentrated Flow, Shallow Concentrated Flow Forest w/Heavy Litter Kv= 0.76 m/s	
	0.9	80.0	0.0200	1.44	0.02545	Pipe Channel, Curtain Drain 150 mm Round Area= 0.02 m ² Perim= 0.47 m r= 0.04 m n= 0.011	
	35.9	230.0	Total				

Subcatchment 4S: Upland Areas



2021-04-08 - 2185 - VMP East Post-dev HydroCAD *Type IA 24-hr 10Yr CoL Rainfall=121 mm* Prepared by Gwaii Engineering Ltd. Printed 4/22/2021

HydroCAD® 9.10 s/n 06344 © 2009 HydroCAD Software Solutions LLC

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Summary for Pond 2P: Stormtech SC-740

Inflow Area = 0.5920 ha, 82.30% Impervious, Inflow Depth = 106 mm for 10Yr CoL event Inflow 0.04516 m³/s @ 7.86 hrs. Volume= 0.629 MI Outflow 8.31 hrs, Volume= 0.608 MI, Atten= 54%, Lag= 27.0 min 0.02069 m³/s @ 0.02069 m³/s @ 8.31 hrs, Volume= Primary = 0.608 MI 0.00000 m³/s @ 0.00 hrs, Volume= 0.000 MI Secondary =

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 5 Peak Elev= 105.792 m @ 8.31 hrs Surf.Area= 0.0170 ha Storage= 0.110 MI

Plug-Flow detention time= 95.3 min calculated for 0.608 MI (97% of inflow) Center-of-Mass det. time= 70.8 min (753.6 - 682.8)

<u>Volume</u>	Invert	Avail.Storage	Storage Description	
#1	104.400 m	0.003 MI	1.20 mD x 2.50 mH Vertical Cone/Cylinder	
#2A	104.700 m	0.062 MI	3.49 mW x 48.34 mL x 1.26 mH Field A	
			0.213 MI Overall - 0.057 MI Embedded = 0.156 MI x 40.0% Voids	
#3A	105.000 m	0.057 MI	StormTech SC-740 x 44 Inside #2	
			Effective Size= 1,134 mmW x 762 mmH => $0.599 \text{ m}^2 \text{ x } 2.17 \text{ mL} = 1.30 \text{ m}^3$	
			Overall Size= 1,295 mmW x 762 mmH x 2.30 mL with 0.13 m Overlap	
		0.122 MI	Total Available Storage	

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices	
#1	Primary	105.000 m	95 mm W x 95 mm H Vert. Orifice/Grate	C= 0.600
#2	Secondary	105.800 m	300 mm Vert. Orifice/Grate C= 0.600	

Primary OutFlow Max=0.02069 m³/s @ 8.31 hrs HW=105.792 m TW=0.000 m (Dynamic Tailwater) 1=Orifice/Grate (Orifice Controls 0.02069 m³/s @ 2.29 m/s)

Secondary OutFlow Max=0.00000 m³/s @ 0.00 hrs HW=104.400 m TW=0.000 m (Dynamic Tailwater) **2=Orifice/Grate** (Controls 0.00000 m³/s)

Pond 2P: Stormtech SC-740 - Chamber Wizard Field A

Chamber Model = StormTech SC-740

Effective Size= 1,134 mmW x 762 mmH => $0.599 \text{ m}^2 \text{ x } 2.17 \text{ mL} = 1.30 \text{ m}^3$ Overall Size= 1,295 mmW x 762 mmH x 2.30 mL with 0.13 m Overlap

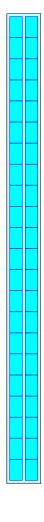
1,295 mm Wide + 300 mm Spacing = 1,595 mm C-C

22 Chambers/Row x 2.17 m Long = 47.74 m + 300 mm End Stone x 2 = 48.34 m Base Length 2 Rows x 1,295 mm Wide + 300 mm Spacing x 1 + 300 mm Side Stone x 2 = 3.49 m Base Width 300 mm Base + 762 mm Chamber Height + 200 mm Cover = 1.26 m Field Height

44 Chambers x 1.30 m³ = 57.24 m³ Chamber Storage

212.97 m³ Field - 57.24 m³ Chambers = 155.74 m³ Stone x 40.0% Voids = 62.29 m³ Stone Storage

Stone + Chamber Storage = 119.53 m³ = 0.120 MI

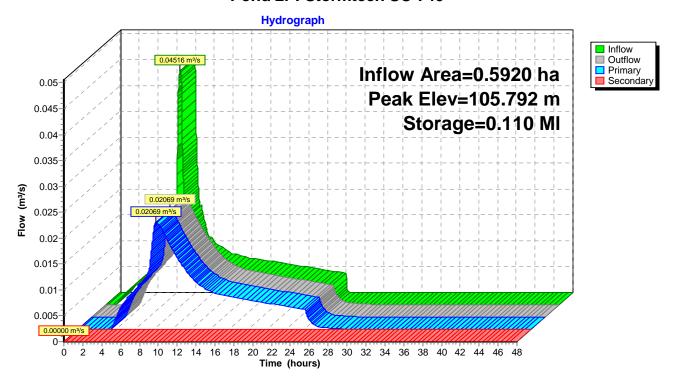




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Pond 2P: Stormtech SC-740



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Summary for Link 3L: Offsite Discharge to North Latoria Creek

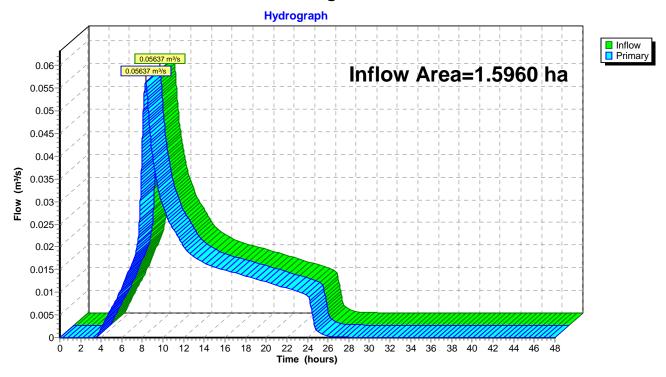
Inflow Area = 1.5960 ha, 30.53% Impervious, Inflow Depth = 80 mm for 10Yr CoL event

Inflow = $0.05637 \text{ m}^3/\text{s} \otimes 8.31 \text{ hrs}$, Volume= 1.271 MI

Primary = 0.05637 m³/s @ 8.31 hrs, Volume= 1.271 Ml, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 3L: Offsite Discharge to North Latoria Creek



SCHEDULE 10, GEOTECHNICAL REPORT



RYZUK GEOTECHNICAL

Engineering & Materials Testing

6-40 Cadillac Ave, Victoria, BC, V8Z 1T2 Tel: 250-475-3131 E-mail: mail@ryzuk.com www.ryzuk.com

May 6, 2021 File No: 9743-3

Islander Engineering Ltd. 623 Discovery Street Victoria, BC V8T 5G4

Attn: Mike Achtem (machtem@islanderengineering.com)

Dear Sir,

Re: Proposed Multi-Use Development

PID 009426612 Veterans Memorial Parkway - Colwood, BC

As requested, we attended the referenced site on November 12, 2020 to assess the existing geotechnical conditions as such relate to the proposed construction of a multi-use development. Significant portions of the property are steeper than 30% and therefore are designated as a Development Permit Area (Natural Hazard DPA), within the City of Colwood Official Community Plan (OCP Bylaw 171). Accordingly, professional review of the proposed development is required to meet the intent of the Bylaw. Our associated observations, comments, and recommendations in this regard and for preliminary feasibility considerations are contained herein. Our work has been undertaken in accordance with, and is subject to, the attached Terms of Engagement.

The site is located within the southwestern portion of Colwood and is bisected by Veteran's Memorial Parkway (VMP), and bounded by residential lots to the north, east, and west, and by Havenwood Park to the south. The site topography is generally characterized by gentle to moderate slopes rising upwards from the road to the east and west, with the topographic high located along the west side of the northern property boundary. The attached conceptual drawings provided, show the location of the proposed buildings and associated infrastructure.

Throughout the site to the west of VMP the topography becomes gently sloping to level over the footprint of the proposed buildings and parking areas then continues sloping upwards towards the north. There is approximately 10 m of topographical relief between the properties to the north and the building footprint areas. The site to the east of VMP is gently sloping throughout the footprint of the proposed buildings and becomes moderately sloped to the east. There is

approximately 15 meters of topographical gain between the proposed building and the property line to the east, and 5 m of topographical relief between the proposed building area an ephemeral creek which parallels VMP.

The slopes throughout the area are considered to be bedrock controlled in general. Surface conditions were observed to comprise a veneer of topsoils and moss, over talus and bedrock outcrops were ubiquitous. Pockets of dense glacial soils may also be present within surface depressions atop the bedrock. The bedrock was observed to be a massive to variably jointed basaltic formation inferred to be a part of the Metchosin Volcanics. The rock cuts exposed along the VMP right-of-way display a roughly sub-orthogonal truncated joint set being steeply inclined principal set, though locally being quite variable within inclusion of horizontally situated shear zones. It would be reasonable to expect similar conditions may be encountered within the adjacent areas proposed for development.

We consider the bedrock slopes throughout the site are inclined at a maximum of approximately 45 degrees and are judged to be globally stable. No significant source areas of rockfall were identified.

We have reviewed proposed building elevations and grading plans and excavation into the slopes will be required for the foundations. Excavations will be limited to the parkade and building footprints with approximately 1 m of working room on all sides, we anticipate excavations will make use of blasting throughout the site. Care will be taken during excavation and blasting activities to minimize the impact to the surrounding grade, soils, and vegetation. Blasting vibrations should be limited by best practice to not exceed threshold values of 50 mm/s PPV at residences or less where sensitive infrastructures exists, if applicable. Vibration monitoring during all blasting activities is recommended. We anticipate that the topography surrounding the proposed structures would remain as close to the natural grade as possible.

We recommend that all rock cutslopes are configured at 75 degrees from horizontal and blasting carried out under controlled conditions to minimize back break of the cutslopes (trim blasting or pre-shear etc.). In the areas adjacent to property lines where this angle cannot be achieved, we consider that subvertical rock cuts would be feasible up to a height of 4.0 m. Additionally, surrounding the parkade, the rock cuts may be subvertical and considered stable as temporary rock cuts that will be backfilled following parkade construction. All cutslopes should be thoroughly scaled under geotechnical supervision to remove loose materials prior to worker access. Even with proper care taken in this regard, adverse joints/fractures may be present upon exposure and stabilization work consisting of rock bolts and/or shotcrete, may be required to maintain temporary worker safety and permanent stability.

Permanent rock cuts in proximity to the habitable and structurally critical portions of the buildings should be offset horizontally by a distance equal to the finished proposed cut height

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from habitable structures. Additionally, the slope crest should be offset from property lines and riparian zones a minimum distance of 1.0 m. In general, at the base of the rock cuts, we recommend the inclusion of a 2 m wide catchment area of soft landscaping bordered by a 1 m upstanding concrete or rock wall, the geometry of the catchment area may be reviewed during construction. Permanent rock cuts greater than 4.0 m in height must be angled a minimum of 75 degrees from horizontal. In the event that permanent rock slopes are deemed unstable and require stabilization, subsurface encroachment agreements with neighboring properties may be required.

In the locations where driveways or landscaped areas are in the vicinity of the permanent rock cuts, these may be used as a part of the of the rock cut offset from habitable structures. In these areas, a 1 m high upstanding concrete or rock wall must be constructed at the edge of the driveway/landscaped area and the toe of the rock cut must be located 2 m behind the upstanding wall, to provide an adequate rock catchment area. In areas where 2 m catchment areas are not feasible, draped meshing likely will be needed atop the permanent rock cuts. In both cases further stabilization work may be required, including rock bolts and/or shotcrete.

If local soils are encountered, the cutslope geometry would be determined based on the observed materials and conditions. We recommend that any proposed permanent fill slopes be shaped at 25 degrees or flatter and benching and retaining walls may be required to properly prepare the site for the finished intent. Additionally, we recommend that permanent soil slopes be revegetated following construction.

We anticipate that the proposed development will involve the removal of approximately 76 000 m³ of material, to accommodate for the two stories of underground parking for both sites. We understand that the disturbance of vegetation and soils shall be localized to the parkade footprints thus minimizing the ecosystem disturbance and maintaining trees, as per District of Colwood's OCP – Site Adaptive Principles.

No significant water courses were noted within the sloped areas. The noted ephemeral drainage along VMP is expected to have a shallow bedrock erosion resistant channel bed. We expect that ground water would be encountered at depth within the bedrock and that surface runoff would be relatively rapid during significant storm events due to the shallow impedance of the bedrock. We do not consider the site to be at risk of flooding, though surface grading and civil infrastructure drainage would need to be designed to sufficiently control surface and perched groundwater as related to the development.

The site includes medium to large coniferous and deciduous trees. We understand that during construction there will be significant ground disturbance and an arborist should be consulted to ensure the stability of remaining trees to mitigate the risk of windthrow.

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of the Province of British Columbia

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To mitigate changes in natural drainage patterns, we recommend that the driveways be graded to allow for the water to naturally follow the existing topography and percolate into the native soils or free draining fills. If this is not possible, we recommend swales be incorporated into the final design to allow the water to flow to a location where it can discharge without causing erosion and infiltrate into free draining fill to percolate/disperse. We recommend that all backfill used on the site be free draining to prevent disturbance to natural flow patterns and the buildup of hydrostatic pressure on the foundations or retaining walls. These measures will allow the water to flow in designated water flow pathways without altering the existing hydraulic regime, as per City of Colwood's OCP – Site Adaptive Principles.

We recommend that the proposed foundations be extended to bear atop native undisturbed mineral soils, intact/fractured in-place bedrock, or approved engineered fill placed atop approved subgrade and such would be subject to professional review. Upon request, we can provide additional geotechnical design recommendations associated with the proposed construction subsequent to development permit approval.

In summary, we consider that the proposed development would be feasible from a geotechnical perspective. Care will be required during excavation and blasting to limit disturbance to the surrounding residential areas in accordance with best practice for urban operations. Provided the finished development is conformant with professional design recommendations we consider that the land may be used safely for the use intended, pursuant to the DPA guidelines and Section 56 of the Community Charter and the B.C. Building Code. Our assessment has taken into consideration a design seismic event with a 2% probability of exceedance in 50 years. We hope the preceding is suitable for your purposes at present. If you have any questions with

respect to the above, please contact us.

Kind Regards, Ryzuk Geotechnical

McKenzie Douglas, EIT

Junior Engineer

Andrew Jackson, P.Geo., Eng. L.

Project Manager

Attachment:

Terms of Engagement

Appendix D: Landslide Assessment

Ryzuk Geotechnical



TERMS OF ENGAGEMENT

1 GENERAL

- 1.1 Ryzuk Geotechnical (the Consultant) shall render the Services, as specified in the agreed Scope of Services, to the Client for this Project in accordance with the following terms of engagement. The Services, and any other associated documents, records or data, shall be carried out and/or prepared in accordance with generally accepted engineering practices in the location where the Services were performed. No other warranty, expressed or implied, is made. The Consultant may, at its discretion and at any stage, engage sub-consultants to perform all or any part of the Services.
- 1.2 Ryzuk Geotechnical is a wholly owned subsidiary of Ryzuk Geotechnical Ltd.

2 COMPENSATION

2.1 All charges will be payable in Canadian Dollars. Invoices will be due and payable by the Client on receipt of the invoice without hold back. Interest on overdue accounts is 24% per annum.

3 REPRESENTATIVES

3.1 Each party shall designate a representative who is authorized to act on behalf of that party and receive notices under this Agreement.

4 TERMINATION

- 4.1 Either party may terminate this engagement without cause upon thirty (30) days' notice in writing. On termination by either party under this paragraph, the Client shall forthwith pay to the Consultant its Charges for the Services performed, including all expenses and other charges incurred by the Consultant for this Project.
- 4.2 If either party breaches this engagement, the non-defaulting party may terminate this engagement after giving seven (7) days' notice to remedy the breach. On termination by the Consultant under this paragraph, the Client shall forthwith pay to the Consultant its Charges for the Services performed to the date of termination, including all fees and charges for this Project.

5 ENVIRONMENTAL

5.1 The Consultant's field investigation, laboratory testing and engineering recommendations will not address or evaluate pollution of soil or pollution of groundwater. The Consultant will cooperate with the Client's environmental consultant during the field work phase of the investigation.

6 PROFESSIONAL RESPONSIBILITY

6.1 In performing the Services, the Consultant will provide and exercise the standard of care, skill and diligence required by customarily accepted professional practices and procedures normally provided in the performance of the Services contemplated in this engagement at the time when and the location in which the Services were performed.

7 INSURANCE

- 1.7.1 Ryzuk Geotechnical is covered by Professional Indemnity Insurance as follows:
- 1. \$ 3,000,000 each and every claim
- 2. \$ 5,000,000 aggregate
- 3. \$ 5,000,000 commercial/general liability coverage
- 7.2 Notwithstanding the provision of insurance coverage by the Client, the Engineer hereby agrees to indemnify and save



harmless the Client, its successor(s), assign(s) and authorizes representative(s) and each of them from and against losses, claims, damages, actions, and causes of action, (collectively referred to as "Claims") that the Client may sustain, incur, suffer or be put to at any time either before or after the expiration or termination of this Agreement, that arise out of errors, omissions or negligent acts of the Engineer or their Subconsultant(s), servant(s), agent(s) or employee(s) under this Agreement, excepting always that this indemnity does not apply to the extent, if any, to which the Claims are caused by errors, omissions or the negligent acts of the Client, its other consultant(s), assign(s) and authorized representative(s) or any other persons.

8 LIMITATION OF LIABILITY

- 8.1 The Consultant shall not be responsible for:
- 1. the failure of a contractor, retained by the Client, to perform the work required for the Project in accordance with the applicable contract documents;
- 2. the design of or defects in equipment supplied or provided by the Client for incorporation into the Project;
- 3. any cross-contamination resulting from subsurface investigations;
- 4. any Project decisions made by the Client if the decisions were made without the advice of the Consultant or contrary to or inconsistent with the Consultant's advice;
- 5. any consequential loss, injury or damages suffered by the Client, including but not limited to loss of use, earnings and business interruption;
- 6. the unauthorized distribution of any confidential document or report prepared by or on behalf of the consultant for the exclusive use of the Client
- 7. Subsurface structures and utilities
- 8.2 The Consultant will make all reasonable efforts prior to and during subsurface site investigations to minimize the risk of damaging any subsurface utilities/mains. If, in the unlikely event that damage is incurred where utilities were unmarked and/or undetected, the Consultant will not be held responsible for damages to the site or surrounding areas, utilities/mains or drilling equipment or the cost of any repairs.
- 8.3 The total amount of all claims the Client may have against the Consultant or any present or former partner, executive officer, director, stockholder or employee thereof under this engagement, including but not limited to claims for negligence, negligent misrepresentation and breach of contract, shall be strictly limited to the amount of any professional liability insurance the Consultant may have available for such claims. Where the Engineer is a corporation or partnership, the Client and Consultants of the Client will limit any claim they may have to the corporation or partnership, without liability on the part of any officer, director, member, employee, or agent of such corporation or partnership.
- 8.4 No claim may be brought against the Consultant in contract or tort more than two (2) years after the date of discovery of such defect.

9 DOCUMENTS AND REPORTING

- 9.1 All of the documents prepared by the Consultant or on behalf of the Consultant in connection with the Project are instruments of service for the execution of the Project. The Consultant retains the property and copyright in these documents, whether the Project is executed or not. These documents may not be used on any other project without the prior written agreement of the Consultant.
- 9.2 The documents have been prepared specifically for the Project, and are applicable only in the case where there has been no physical alteration to, or deviation from any of the information provided to the Consultant by the Client or agents of the Client. The Client may, in light of such alterations or deviations, request that the Consultant review and revise these documents.
- 9.3 The identification and classification as to the extent, properties or type of soils or other materials at the Project site has been based upon investigation and interpretation consistent with the accepted standard of care in the engineering consulting practice in the location where the Services were performed. Due to the nature of geotechnical engineering, there is an inherent risk that some conditions will not be detected at the Project site, and that actual subsurface conditions may vary considerably from investigation points. The Client must be aware of, and accept this risk, as must any other party making use of any documents prepared by the Consultant regarding the Project.



9.4 Any conclusions and recommendations provided within any document prepared by the Consultant for the Client has been based on the investigative information undertaken by the Consultant, and any additional information provided to the Consultant by the Client or agents of the Client. The Consultant accepts no responsibility for any associated deficiency or inaccuracy as the result of a miss-statement or receipt of fraudulent information.

10 JOBSITE SAFETY AND CONTROL

- 10.1 The Client acknowledges that control of the jobsite lies solely with the Client, his agents or contractors. The presence of the Consultant's personnel on the site does not relieve the Client, his agents or contractors from their responsibilities for site safety. Accordingly, the Client must endeavor to inform the Consultant of all hazardous or otherwise dangerous conditions at the Project site of which the Client is aware.
- 10.2 The client must acknowledge that during the course of a geotechnical investigation, it is possible that a previously unknown hazard may be discovered. In this event, the Client recognizes that such a hazard may result in the necessity to undertake procedures which ensure the safety and protection of personnel and/or the environment. The Client shall be responsible for payment of any additional expenses incurred as a result of such discoveries, and recognizes that under certain circumstances, discovery of hazardous conditions or elements requires that regulatory agencies must be informed. The Client shall not bring about any action or dispute against the Consultant as a result of such notification.

11 FIELD SERVICES

11.1 Where applicable, field services recommended for the Project are the minimum necessary, in the sole discretion of the Consultant, to observe whether the work or a contractor retained by the Client is being carried out in general conformity with the intent of the Services. Any reduction from the level of services recommended will result in the Consultant providing qualified certifications for the work.

12 DISPUTE RESOLUTION

12.1 If requested in writing by either the Client or the Consultant, the Client and the Consultant shall attempt to resolve any dispute between them arising out of or in connection with this Agreement by entering into structured non-binding negotiations with the assistance of a mediator on a without prejudice basis. The mediator shall be appointed by agreement of the parties. If a dispute cannot be settled within a period of thirty (30) calendar days with the mediator, the dispute shall be referred to and finally resolved by arbitration under the rules of the arbitrator appointed by agreement of the parties or by reference to a Judge of the British Columbia Court.

13 CONFIDENTIALITY

13.1 During the period of this Agreement, the Consultant shall not use or disclose any Confidential Information to any third parties. The Consultant will only use Confidential Information for the sole purpose of carrying out the service(s) agreed upon. Access to the Client's Confidential Information will be restricted to employees who need the information to perform work duties. The Consultant may share photos of the project without disclosing any information not already made public unless the Client refuses consent of photos shared on social media. Unless already made public, the Consultant will not share owner or site address information on social media or with outside parties.

APPENDIX D: LANDSLIDE ASSESSMENT ASSURANCE STATEMENT

Note: This Statement is to be read and completed in conjunction with the "APEGBC Guidelines for Legislated Landslide
Assessments for Proposed Residential Development in British Columbia", March 2006/Revised September 2008 ("APEGBC
Guidelines") and the "2006 BC Building Code (BCBC 2006)" and is to be provided for landslide assessments (not floods or flood
controls) for the purposes of the Land Title Act, Community Charter or the Local Government Act. Italicized words are defined in the
APEGBC Guidelines.

To: Th	e Approving Authority	Date:	Α	Dr - 30	/21	
(city of cowood					
	3300 Wishart Rd, Vi	ctoria, BC				
Jur	risdiction and address					
With re	eference to (check one):					
	Land Title Act (Section 86) - Subdiv					
	Local Government Act (Sections 91)		elopme	ent Perm	it	
	Community Charter (Section 56) – E		Mad			
	British Columbia Building Code 2000 and Safety Policy Branch Informatio	6 sentences 4.1.8.1	6 (8) a	nd 9.4 4		BC Building
For the	Property:	100				
	PID: 009-426-612	3460	and	3461	veterani	Memoria
	Legal description and civic address of the Pro	operty				
	ndersigned hereby gives assurance th eer or Professional Geoscientist.	at he/she is a Qual	ified Pi	rofession	al and is a Prol	fessional
Proper	signed, sealed and dated, and thereb rty in accordance with the APEGBC G nent. In preparing that report I have:					
Check b	o the left of applicable items					
1.	Collected and reviewed appropriate	background inform	ation			
12.	Reviewed the proposed residential of	development on the	Prope	erty		
	Conducted field work on and, if requ	ired, beyond the Pr	roperty			
_4.	Reported on the results of the field v	work on and, if requ	ired, b	eyond th	e Property	
5.	Considered any changed conditions	on and, if required	, beyor	nd the Pr	operty	
6.	For a landslide hazard analysis or la	indslide risk analys	is I hav	/e:		
-	6.1 reviewed and characterized, if a 6.2 estimated the landslide hazard	ppropriate, any lan	dslide	that may	affect the Prop	erty
	6.3 identified existing and anticipate Property	d future elements a	nt risk o	on and, if	required, beyo	nd the
1	6.4 estimated the potential consequ	ences to those eler	ments .	at risk		
7.	Where the Approving Authority has				I have:	
_	7.1 compared the level of landslide my investigation					e findings of
C	7.2 made a finding on the level of la	ndslide safety on th	ne Pro	perty bas	ed on the com	parison
_	∠1.3 made recommendations to redu					
8.	Where the Approving Authority has	not adopted a leve	l of lan	dslide sa	fety I have:	

8.1	described the method of landslide hazard analysis or landslide risk analysis used
	referred to an appropriate and identified provincial, national or international guideline for level of landslide safety
8.3	compared this guideline with the findings of my investigation
8.4	made a finding on the level of landslide safety on the Property based on the comparison
8.5	made recommendations to reduce landslide hazards and/or landslide risks
	ported on the requirements for future inspections of the Property and recommended who should duct those inspections.
Based on	my comparison between
Check o	one
	the findings from the investigation and the adopted level of landslide safety (item 7.2 above) the appropriate and identified provincial, national or international guideline for level of landslide safety (item 8.4 above)
I hereby assessme	give my assurance that, based on the conditions[1] contained in the attached landslide nt report,
Check o	for <u>subdivision approval</u> , as required by the Land Title Act (Section 86), "that the land may be used safely for the use intended"
	Check one ☐ with one or more recommended registered covenants. ☐ without any registered covenant.
6	for a <u>development permit</u> , as required by the Local Government Act (Sections 919.1 and 920), my report will "assist the local government in determining what conditions or requirements under [Section 920] subsection (7.1) it will impose in the permit".
0	for a <u>building permit</u> , as required by the Community Charter (Section 56), "the land may be used safely for the use intended"
	Check one □ with one or more recommended registered covenants. □ without any registered covenant.
	for flood plain bylaw variance, as required by the "Flood Hazard Area Land Use Management Guidelines" associated with the Local Government Act (Section 910), "the development may occur safely".
	for flood plain bylaw exemption, as required by the Local Government Act (Section 910), "the land may be used safely for the use intended".
Andn Name (print)	en Jackson Apr. 30/21 Date
Signature	
DI	

^[1] When seismic slope stability assessments are involved, level of landslide safety is considered to be a "life safety" criteria as described in the National Building Code of Canada (NBCC 2005), Commentary on Design for Seismic Effects in the User's Guide, Structural Commentaries, Part 4 of Division B. This states:

[&]quot;The primary objective of seismic design is to provide an acceptable level of safety for building occupants and the general public as the building responds to strong ground motion; in other words, to minimize loss of life. This implies that, although there will likely be extensive structural and non-structural damage, during the DGM (design ground motion), there is a reasonable degree of confidence that the building will not collapse nor will its attachments break off and fall on people near the building. This performance level is termed 'extensive damage' because, although the structure may be heavily damaged and may have lost a substantial amount of its initial strength and stillness, it retains some margin of resistance against collapse".

40 Cadillac Ave *b	A. R. JACKSON # 38270 A DE
Victoria, BC	DISTIBIL
(250) 47(-313) Telephone	(Affix Professional seal here)
If the Qualified Professional is a member of a firm, con	nplete the following.
I am a member of the firm Ry 2014 and I sign this letter on behalf of the firm.	(Print name of firm)

FESSIO