Wedler Engineering LLP
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Courtenay, BC V9N 3N6

May 18, 2021

File Ref: V21-0453/A1

1265024 BC Ltd.
#111-619 Moberly Road
Vancouver, BC V5Z 4B1

Attention: Tomas Nielsen

Reference: **Bareland Strata Subdivision**
Conceptual Site Servicing Design Brief – 1915 Cumberland Road, Courtenay, BC

This brief presents an outline of the anticipated servicing needs of the proposed development located at 1915 Cumberland Road. The brief has been prepared per the design criteria outlined in the City's Subdivision and Development Servicing Bylaw No. 2919 and has been prepared in support of the rezoning application for the subject property.

Site Information

The subject property is legally described as Lot 1, Plan VIP32210 District Lot 96 in Land District 15. The lot is approximately 1.20 Ha in size, and currently zoned as Residential One A (R-1A). The property is bounded by Cumberland Road to the southeast, Larsen Road to the northwest, and residential properties to the northeast and southwest. Figure 1 shows the current state of the site, which includes one single-family dwelling.

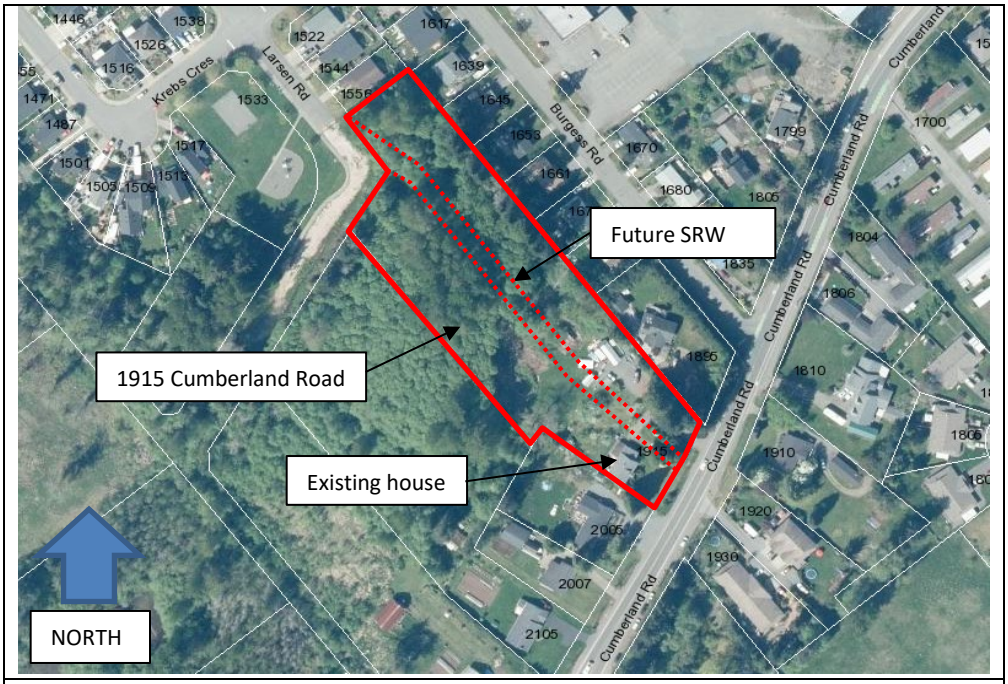


Figure 1 – Current State of Site (subject lot outlined in red)

Proposed Development

It is proposed that the property be rezoned to Residential One E (R-1E). The proposed development will be a bare-land strata subdivision of 18 residential lots. Each lot will be at least 450 m^2 and will allow for a single-family residential dwelling with a secondary suite. Figure 2 is a rendering of a concept level layout for the site.

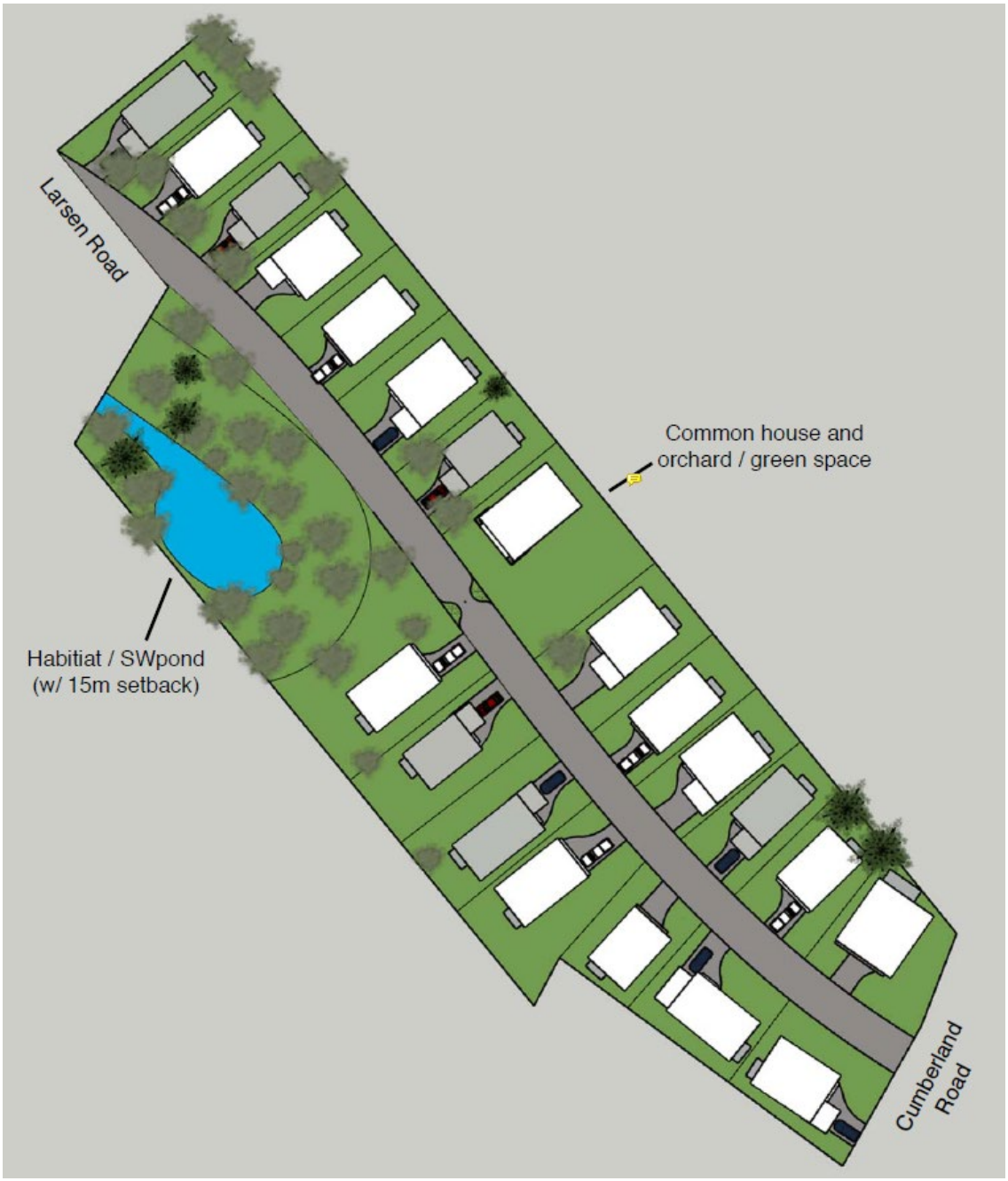


Figure 2 – Proposed Conceptual Layout

Anticipated Servicing Needs

The anticipated servicing requirements for the proposed site including roadworks, waterworks, wastewater, and stormwater have been reviewed. This assessment is based on the best-known information at the time of preparation of this report.

The civil servicing calculations are included in Appendix A.

Roadworks

The proposed subdivision will be serviced by a single-private road between Cumberland Road and Larsen Road. The road will be approximately 695 m in length and 7.0 m in width and will be built to accommodate a low volume of traffic. A SROW will run parallel to the proposed road to contain a sanitary sewer main. The final layout will be determined through both the rezoning and subdivision processes.

Waterworks

A water main will be built within the proposed road alignment of the new subdivision and will be tied into the existing 250 mm diameter PVC water main system along Cumberland Road, and into the existing main at the end of Larsen Road. The nearest City hydrant is located along Cumberland Road approximately 95 m from the subject property. It is anticipated that fire hydrants will be installed onsite for fire protection. The hydrants will be located so the proposed lots will be within 45 m radius of them (approximately 2 required).

The calculated maximum day demand including the required fire flow for the proposed development is approximately **140.1 L/s**. This accounts for the water demand based on having a single-family residential dwelling with a secondary suite on each lot. See Appendix A for the detailed calculations. The required fire flow has been based on the Water Supply for Public Fire Protection calculations (in accordance with the Fire Underwriters Survey). It is assumed that the existing city mains will be able to accommodate the required flows for the subject development.

Wastewater

A 300 mm sanitary main is planned to be installed between Larsen Road and Cumberland Road[1]. Figure 3 shows the future sanitary main within a proposed SRW for the main.

It is anticipated that all 18 lots will be serviced by the 300 mm sanitary main. The calculated total design flow of wastewater from all lots is **0.81 L/s**. See Appendix A for the detailed calculations. The total design flow includes estimated infiltration into the system and assumes 2.2 persons per residential unit, based on the 2016 Courtenay Statistical Profile from Statistics Canada. It is assumed that the 300 mm sanitary main will be able to accommodate the sanitary flows from the development.

[1] GeoAdvice Engineering Inc., “Sewer System Improvement Recommendations”, (January 2020), Figure 6.1.

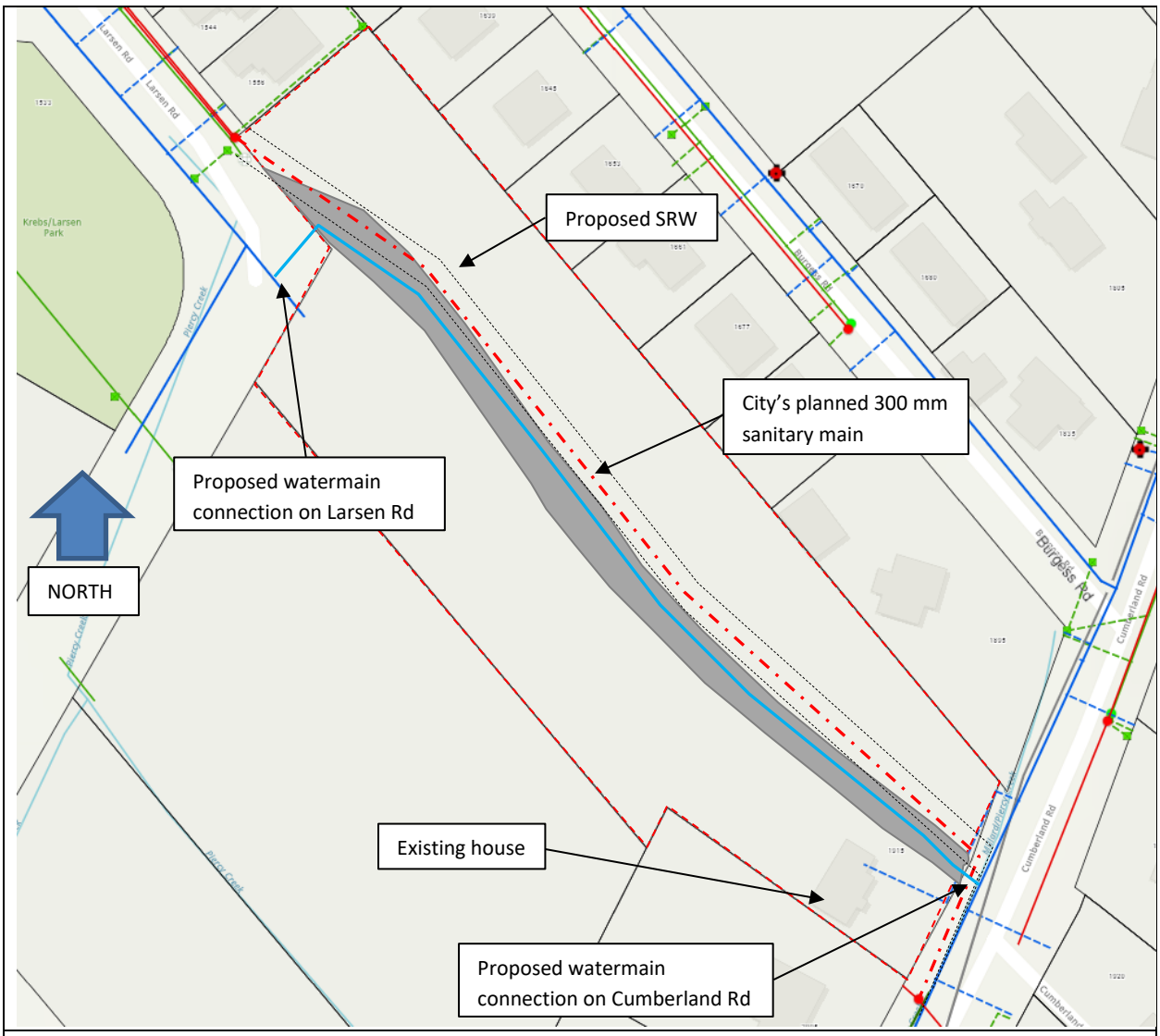


Figure 3 – Conceptual Servicing Layout

Stormwater

The storm system will be designed to limit post-development flows to pre-development rates. Currently, the stormwater generally drains to the south, with an average slope of less than 1%. A large portion of the site drains to some existing wetland areas on the north-west portion of the site. Water in this wetland flows to the existing ditch at the end of the Larsen Road. A portion of the site also sheets towards Cumberland Road.

An initial calculation using the rational method was completed to determine the impact of the development to the quantity of run-off from this site. The calculated flow for the post-development runoff during a 25-year storm event is approximately **145 L/s** and the calculated pre-development rate is 11 L/s. See Appendix A for the detailed calculations. Storm runoff control measures will be built to mitigate this increase in runoff.

Using the calculated pre-development flow rate as a release rate, a detention volume of **135.9 m³** is required to maintain flows at the pre-development level up to 1 in 25 year storm event.

A constructed wetland has been designed and approved by the BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD). See drawing V21-0453/A-01 included in Appendix B. The proposed wetland will be constructed in the north-west corner of the property and will replace an existing wet area. The wetland will have a total of 270 m^3 active storage capacity to accommodate the required detention volume and any increase in storm runoff after the proposed development. A flow control structure will be installed on the outlet to ensure that the pre-development release rates are maintained.

The following strategies will be considered for further mitigating the increase in runoff from the site:

- Underground storm piping with manholes/catch basins may be installed within the private road alignment to collect runoff from the road. Rainwater leaders from future houses may also be connected to the system.
- Rainwater storage may be provided by infiltration swale or rain garden. Both may include a rock reservoir below ground for storage. Standard details are provided in Figure 4 below.

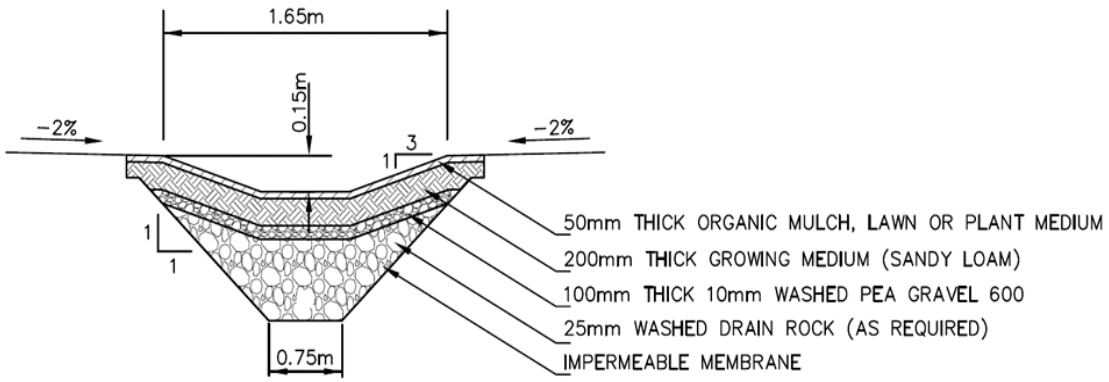


Figure 4 - Typical Bio-Swale Cross-Section Detail

  - Runoff from future houses could be conveyed through roof leaders to these facilities via splash pads or via direct connections.
- Provision of overland flow routes through site grading design for major storms (i.e. 1 in 100 year recurrence interval).
- All onsite facilities should be designed with a suitable overflow and site grading that will convey excess flows safely without causing property damage or other unwanted effects.

Additional best management practices recommended for this site which may be implemented as part of construction are as follows:

- Reducing hard surfaces through the use of gravel, permeable pavements or structural grass systems for parking areas.
- Green roofs to reduce run-off.
- Storage and re-use of rainwater to reduce runoff volume and flows.

- Use of oil-silt separators to treat runoff from hard surfaces.

Erosion and Sediment Control

An erosion and sediment control plan will be developed to manage the quality and quantity of water runoff from the site during construction. The plan will be developed in accordance with the criteria set forth by the City.

Conclusion

The design of all site services will conform to the bylaws of the City of Courtenay and will be constructed by a qualified contractor. Service tie-ins, locations, setbacks, and frontages will conform to the City of Courtenay standards.

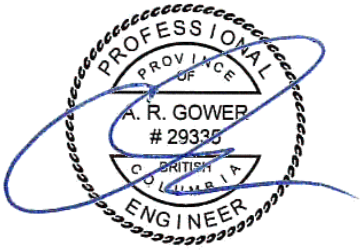
Servicing requirements for third-party utilities including BC Hydro, Telus, Shaw and Fortis BC will be included and coordinated once preliminary design works for the proposed subdivision have commenced.

If you have any questions, please feel free to contact the undersigned.

Yours truly,

Wedler Engineering LLP

Per: Reviewed by:



2021-05-18

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Attachments:

Appendix A – Servicing Calculations
Appendix B –Drawing No. V21-0453/A-01, Rev B, Dated: December 7, 2020 (bound separately)

APPENDIX A
Servicing Calculations

Bareland Strata Subdivision
1915 Cumberland Road, Courtenay BC

WEDLER ENGINEERING

Wedler Project: V20-0448/A
Calculated By: M.Vital
Date: 06-May-21

Estimation of Water Demand

Domestic			
AADF	635	L/c/day	Flows from CoC's Bylaw No. 2919 Section 2.3
Peak Day	2100	L/c/day	Flows from CoC's Bylaw No. 2919 Section 2.3
Peak Hour	3000	L/c/day	Flows from CoC's Bylaw No. 2919 Section 2.3

Equivalent Population		
Units (1 main dwelling with secondary suite per lot)	36	
People per unit (*)	2.2	* Based on 2016 Courtenay Statistical Profile from Statistics Canada website
Equivalent population	**79.2**	

Water Demand

	Residential	
AADF	50,292	L/day
	0.58	L/s
Peak Day	166,320	L/day
	1.93	L/s
Peak Hour	237,600	L/day
	2.75	L/s

Fire Flow Calculation F=220C(A)^0.5

Residential				
C	1.5	wood framed construction		
A	2,860	sq.ft.		
	266	sq.m.		
F=	5,379	L/min		
Occupancy				
Low Hazard				
Decrease	25%			
F Decrease	1,345	L/min		
No Sprinkler Provided				
Decrease	0%			
F Decrease	-	L/min		
Exposure	*Assumed exposure based on the following:			
	North Side		20	15%
	East Side		5	23.57%
	West Side		5	23.57%
	South Side		16	17.00%
		Total increase		79%
F Increase	4,257	L/min		
Resulting				
F Residential	8,292	L/min		
Total F			8,292	L/min
			138	**L/s**

Peak Demand = Peak Hour Demand OR Peak Day Demand + Fireflow			
Minimum Fire Flow =	90	L/s	per MMCD guidelines - for 'Townhouses'
Required Fire Flow =	138	L/s	greater between calculated F & min F per MMCD
Water Demand	Peak Day Demand +Req Fire Flow =		**140.1 L/s**

1915 Cumberland Road
Bare Land Strata Subdivision
City of Courtenay, BC

WEDLER ENGINEERING

Wedler Project: V21-0453/A
Calculated: M. Vital
Date: 06-May-21

Estimation of Sanitary Loading

1915 Cumberland Road		
Residential		
Units (1 dwelling w/ secondary suite)		36
People per unit (Note 1)		2.2
Total Residents		79
Sewerage Rate (L/capita/day)		360
Average Residential Sewerage (L/day)		28,512
Average Residential Sewerage (L/s)		**0.330**
	Total Equivalent Population	79
Harmon Formula:	**Site Peaking Factor**	**2.09**
Lot Infiltration		
Lot Portion (ha)		1.19
Infiltration Rate (L/s/ha, Note 2)		0.1
Infiltration (L/s)		0.119
Design Flow (L/s)		**0.808**
Total Sanitary Flow (L/s)		**0.808**

Note 1: Based on 2016 Courtenay Statistical Profile from Statistics Canada Profile
Note 2: Based on McElhanney Sanitary Sewer Study - 2002 Update

1915 Cumberland Road
Bare Land Strata Subdivision
City of Courtenay, BC

Wedler Project: V21-0453/A
Calculated By: M. Vital
Date: May 7, 2021

Modified Rational Method - 25 year storm

Modified Rational Method to determine Detention

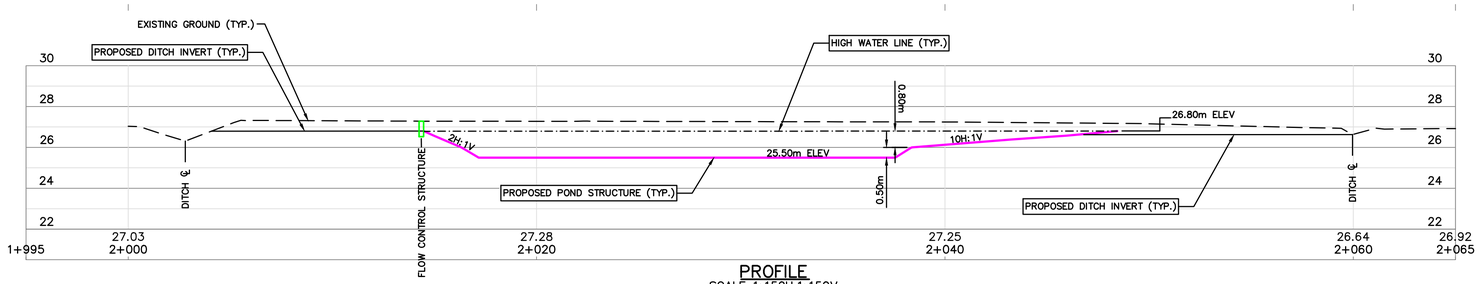
DETENTION CALCULATION

Catchment Area In Hectares	A= 1.19
Runoff Coefficient	C= 0.57
Return Period In Years	R= 25
Pre Development Release Rate (m3/s)	Q= 0.0202

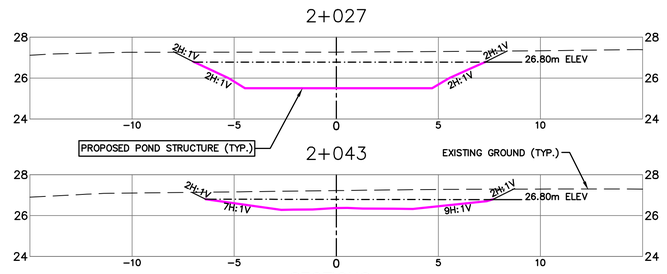
Storage Required Using The Modified Rational Method

Time (minutes)	Intensity (mm/hr)	Peak Flow at T (Qp2) (m3/sec)	Peak Flow - Post (Qp1) (m3/sec)	Storage Volume (m3)	Infiltrative Volume (m3)	Final Storage (m3)
0	0.0	0.0000	0.1	0.000	0.000	0.00
4	121.26	0.2285	0.1	49.705	0.797	48.91
5	108.49	0.2045	0.1	55.047	0.996	54.05
6	99.05	0.1867	0.1	59.761	1.195	58.57
7	91.72	0.1729	0.1	64.000	1.394	62.61
8	85.81	0.1617	0.1	67.863	1.593	66.27
9	80.91	0.1525	0.1	71.418	1.793	69.63
10	76.76	0.1447	0.1	74.715	1.992	72.72
15	62.70	0.1182	0.1	88.411	2.988	85.42
20	54.32	0.1024	0.1	99.014	3.983	95.03
30	44.37	0.0836	0.1	114.860	5.975	108.88
40	38.44	0.0724	0.1	126.329	7.967	118.36
50	34.39	0.0648	0.1	135.000	9.958	125.04
60	31.40	0.0592	0.1	141.683	11.950	129.73
90	25.64	0.0483	0.1	153.852	17.925	135.93
120	22.22	0.0419	0.1	158.430	23.900	134.53
180	18.15	0.0342	0.1	154.438	35.850	118.59
240	15.72	0.0296	0.1	139.704	47.800	91.90
300	14.06	0.0265	0.1	118.105	59.750	58.35
360	12.84	0.0242	0.1	91.628	71.700	19.93
420	11.89	0.0224	0.1	61.453	83.650	-22.20
480	11.12	0.0210	0.1	28.351	95.600	-67.25
540	10.49	0.0198	0.1	-7.144	107.550	-114.69
600	9.95	0.0188	0.1	-44.642	119.500	-164.14
720	9.09	0.0171	0.1	-124.538	143.400	-267.94
840	8.41	0.0159	0.1	-209.666	167.300	-376.97
960	7.87	0.0148	0.1	-298.938	191.200	-490.14
						135.93

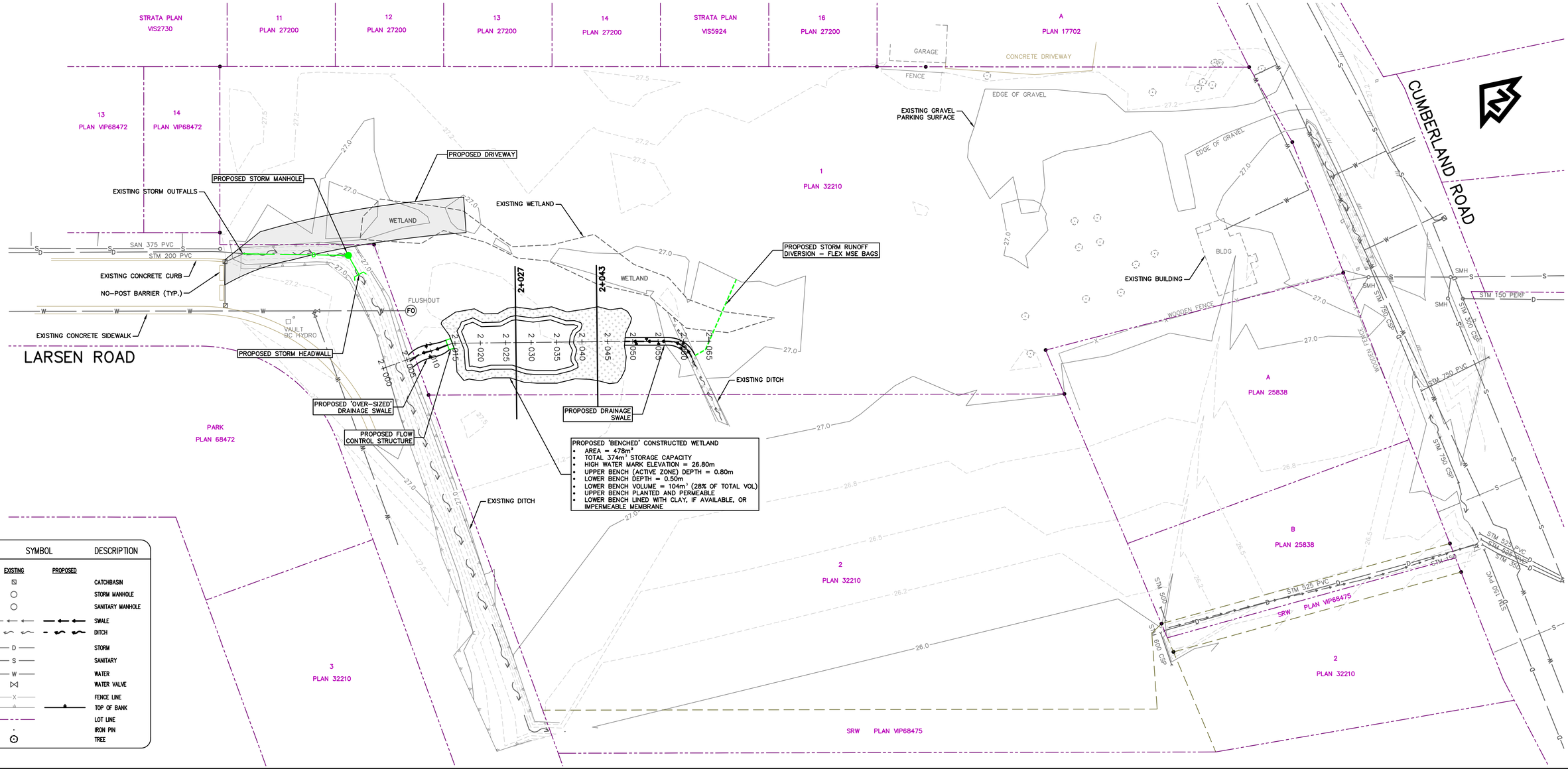
APPENDIX B
Number V21-0453/A-01, Rev B. December 7, 2020



PROFILE
SCALE 1:150H,1:150V



SECTIONS
SCALE 1:150H,1:150V



SYMBOL	DESCRIPTION
EXISTING / PROPOSED	
	CATCHBASIN
	STORM MANHOLE
	SANITARY MANHOLE
	SWALE
	DITCH
D	STORM
S	SANITARY
W	WATER
	WATER VALVE
X	FENCE LINE
	TOP OF BANK
	LOT LINE
	IRON PIN
	TREE

LEGAL:

BM/
TBM:

REV	DESCRIPTION	YYYY-MM-DD	BY
A	ISSUED FOR REVIEW	2020-11-10	TJD
B	ISSUED FOR REVIEW	2020-12-07	TJD

A.R. GOWER
29335
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
2021-05-18

PROJ. MGR.	ARG
DESIGN/DRAWN	TJD
PEER REVIEWED	–
HORIZ. SCALE	1:400
VERT. SCALE	–

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- Surrey 1.604.588.1919

1265024 BC LTD.
BARELAND STRATA SUBDIVISION – 1915 CUMBERLAND ROAD
1915 CUMBERLAND ROAD, COURTENAY, BC

SITE PLAN – PROPOSED CONSTRUCTED WETLAND

DRAWING NO. V21-0453/A-01 OF –1–
LOCAL GOVERNMENT FILE –
PHASE
REVISION B

N:\21\V21-0453A – 1265024 BC Ltd. – Wetland Design – 1915 Cumberland Rd\Design\– Current Drawing Files\V21-0453A.dwg 2020/12/07 06:17:02 PM tduerden

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