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Village of Cumberland
2673 Dunsmuir Avenue
Cumberland, BC V0R 1S0

Attention: Rob Crisfield, Public Works

Reference: Hope Road Sanitary Sewer Catchment Analysis

This letter report will provide a review of the work done to prepare an analysis of the sanitary catchment in the Hope Road area of Cumberland. The catchment is centred on Cumberland Road and includes Primrose Street, portions of Bruce Street and Ulverston Ave, Hope Road and Wellington Street. See Figure 1 for an outline of the catchment as provided by Village staff.



Figure 1 – Hope Road Sanitary Sewer Catchment.

The area of the catchment was determined using the Comox Valley Regional District's iMap site. The zoning was reviewed using the Village of Cumberland's zoning bylaw map. See Figures 2 and 3 below for reference.

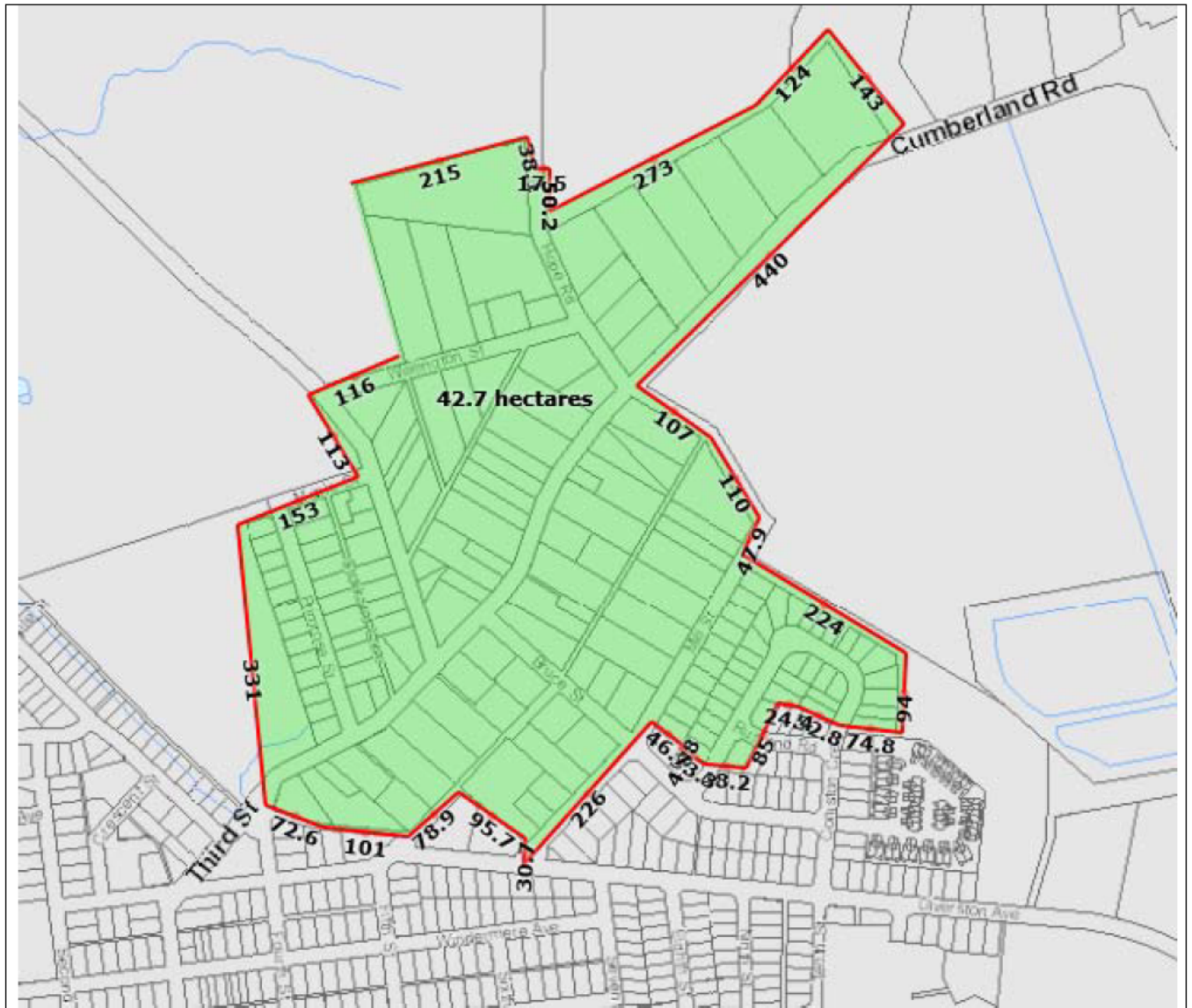


Figure 2 – Catchment Area Measurement using iMap

All design calculations included in this report have been prepared based on the Master Municipal Construction Documents Association Design Guidelines 2014. Population estimates are derived from the 2016 Census data.

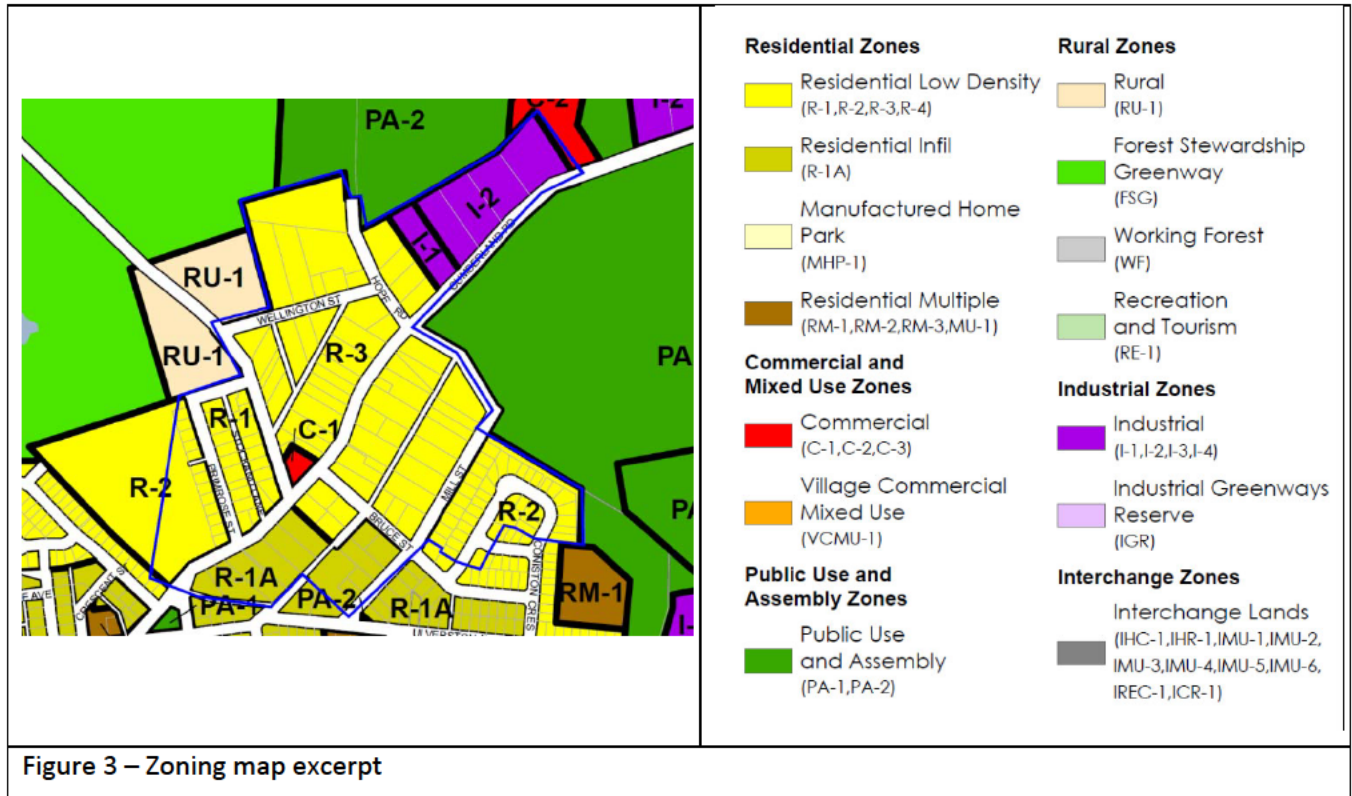


Figure 3 – Zoning map excerpt

The area of each individual zone in the catchment, as well as the number of lots was determined. See Table 1 for a summary of relevant data. The land area noted includes total area to the centreline of fronting roads.

Zone	Lots	Area (ha)
R-1	35	4.45
R-2	42	4.12
R-3	59	21.4
R-1A	14	4.86
C-1	1	0.286
I-1	1	0.914
I-2	4	3.8

Table 1: Summary Information

Industrial and Commercial sanitary sewage loading is estimated at 25,000 l/ha/day. Residential sanitary sewage loading is estimated at 240 l/cap/day based on the fact that all water connections in the Village are metered.

Table 2 presents commercial and industrial average dry weather flow (ADWF). Table 3 presents residential ADWF. Two estimates of residential ADWF are presented, one where an average of 2.4 people per house is assumed, and a second where an additional person is assumed to be in each house to account for secondary suites being occupied.

	l/ha/day	ha	l/day
Commercial	25000	0.286	7150
Industrial	25000	4.714	117850

Table 2: Commercial and Industrial ADWF

Lots	Ppl/lot	Ppl	Flow/cap	Flow - l/day
150	2.4	360	240	86,400
150	3.4	510	240	122,400

Table 3: Residential ADWF

The peaking factor is estimated using the total population rounded to the nearest thousand people. As such, the peaking factor for both scenarios of residential population is 1.55.

Infiltration is estimated assuming that the system consists of “old pipes” and that all roof leaders are disconnected from the sanitary sewer. Per the MMCD 2014 design guidelines, this yields an infiltration rate of 0.12 l/s/ha. This is applied to the entire catchment area of 42.7 ha. The infiltration flow for the catchment is 5.12 l/s.

The total sewage flow for the catchment, based on all assumptions listed above, is calculated as summarized in Table 4.

	2.4 people / residence			3.4 people per residence				
	I/C	Res	Total		I/C	Res	Total	
Flow	125000	86400	211400	L/day	125000	122400	247400	L/day
ADWF	327532.9	l/day	3.79	l/s	383309.6	l/day	4.44	l/s
		PWWF	8.91	l/s		PWWF	9.56	l/s

Table 4: Peak Wet Weather Flow Calculations

Based on the record drawing provided, the critical sections of the Hope Road trunk main were analyzed using the Manning’s Open Channel Flow equation. A roughness coefficient of 0.013 was selected based on the MMCD 2014 Design Guidelines. Table 5 presents the results for the sections of this sewer with the shallowest slopes:

US MH	DS MH	Dia	Slope	m ³ /s	l/s	V – 8.91 l/s (m/s)	V – 9.56 l/s (m/s)
85	84	250	0.24%	0.029	29.1	0.466	0.483
100	91	200	0.39%	0.020	20.5	0.613	0.633
88	87	250	0.09%	0.018	17.8	0.363	0.374

Table 5: Pipe Capacity Calculations

Based on the possible range in flows calculated, the section of sanitary main as presented in the record drawing provided appears to have sufficient flow capacity.



The only concern with this trunk main is that two of the critical sections of main do not achieve the minimum recommended velocity of 0.6 m/s. The section from SMH 85 to 84 and the section from MH 88 to 87 should be inspected regularly to ensure there are no blockages caused by the low velocities that would be present.

Yours truly,
Wedler Engineering LLP

Per:



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