



Technical Memorandum

DATE: September 25, 2023

TO: Marianne Wade, MCIP RPP
City of Courtenay

FROM: Melissa Zhang, PEng

RE: MANSFIELD AND SANDPIPER CATCHMENT DEVELOPMENT SANITARY SERVICING
City of Courtenay
Our File 2980.018-300

Introduction

Kerr Wood Leidal Associates Ltd. (KWL) was retained by the City of Courtenay (the City) for engineering services regarding the hydraulic modelling analysis of a list of new developments (provided by the City) in the Sandpiper Lift Station (LS) and the Mansfield LS catchments in the short-term. Previous studies suggest that the Mansfield LS is approaching capacity and requires capacity upgrades in the short-term. It is understood that capacity upgrades to the Mansfield LS are currently being undertaken by a developer. The goal of this analysis is to identify whether additional capacity would exist in the Mansfield LS, with the existing development projects that are currently active and the upgrades that are being undertaken to the City's Mansfield LS in the coming months (under the existing scenario), so that a cost-sharing mechanism can be established for latecomers.

South Courtenay Local Area Plan Area Development Projects and Future Population Update

An existing development plan in the South Courtenay Local Area Plan (LAP) area, including both current and future development sub-areas and estimated build out population, was provided by the City in 2021 for Sanitary Sewer Servicing Assessment (KWL project No. 2980.009). Subsequently, an update to the development plan was provided by the City in July 2022 for this study, which included a few new sub-areas that were not included in the 2021 plan as well as population updates to a few known 'future' sub-areas. Of the eight (8) updated sub-areas, five (5) are upstream of Sandpiper LS (which in turn pumps into the Mansfield LS), while the other three (3) are in the Mansfield LS sanitary catchment. Table 1 summarizes the changes in development area and population for the listed eight development projects. Figure 1 illustrates the updated eight development areas.



Table 1: South Courtenay Buildout Population – Updated July 2022

Sub-Area	Sub-Area July 2022 Update	Upstream of Sandpiper LS	Development Status	Area (ha)	Updated Area (ha)	Population and Equivalent	Updated Population and Equivalent	Dwelling Count
Buckstone (The Ridge)			May 2021	10.3		387		
Buckstone (The Ridge)			Short-term (2022)	8.9		351		
Buckstone Phase 4 (SFD)	Development Status update	Yes	Under Construction		3.275		55.2	20
South Courtenay connections			May 2021	3.8		19		
Rhys Rd (Large Lot Res.)			Short-term (2022)	7.6		11		
4100 Fraser Rd (SFD)	Development Status update	Yes	Under Construction	2.5	2.52	52	63	26
3375 Harbourview Blvd (MFD)	Development Status update	Yes	DP Application -Construction Pending	4.2	1.142	70	88.4	33 (estimated per 2.7 ppu)
4070 Fraser Rd (SFD)	Development Status and Area update	Yes	Construction Not Started - Active Subdivision Application	2.4	1.18	32	29	11 (estimated per 2.7 ppu)
4120 Fraser Rd			Future	5.5		116		
3391 Fraser Rd			Future	10.1		213		
3599 Comox Logging Rd			Future	4.4		92		
3524 Beachwood Rd			Future	4.6		97		
Comox Logging Rd (16.4ha)			Future	16.4		345		
Comox Logging Rd/Livingstone Rd			Future	50.3		1,059		
Beachwood Rd Lot (2.41ha)			Future	2.4		65		
Lockwell Rd			Future	6.2		131		



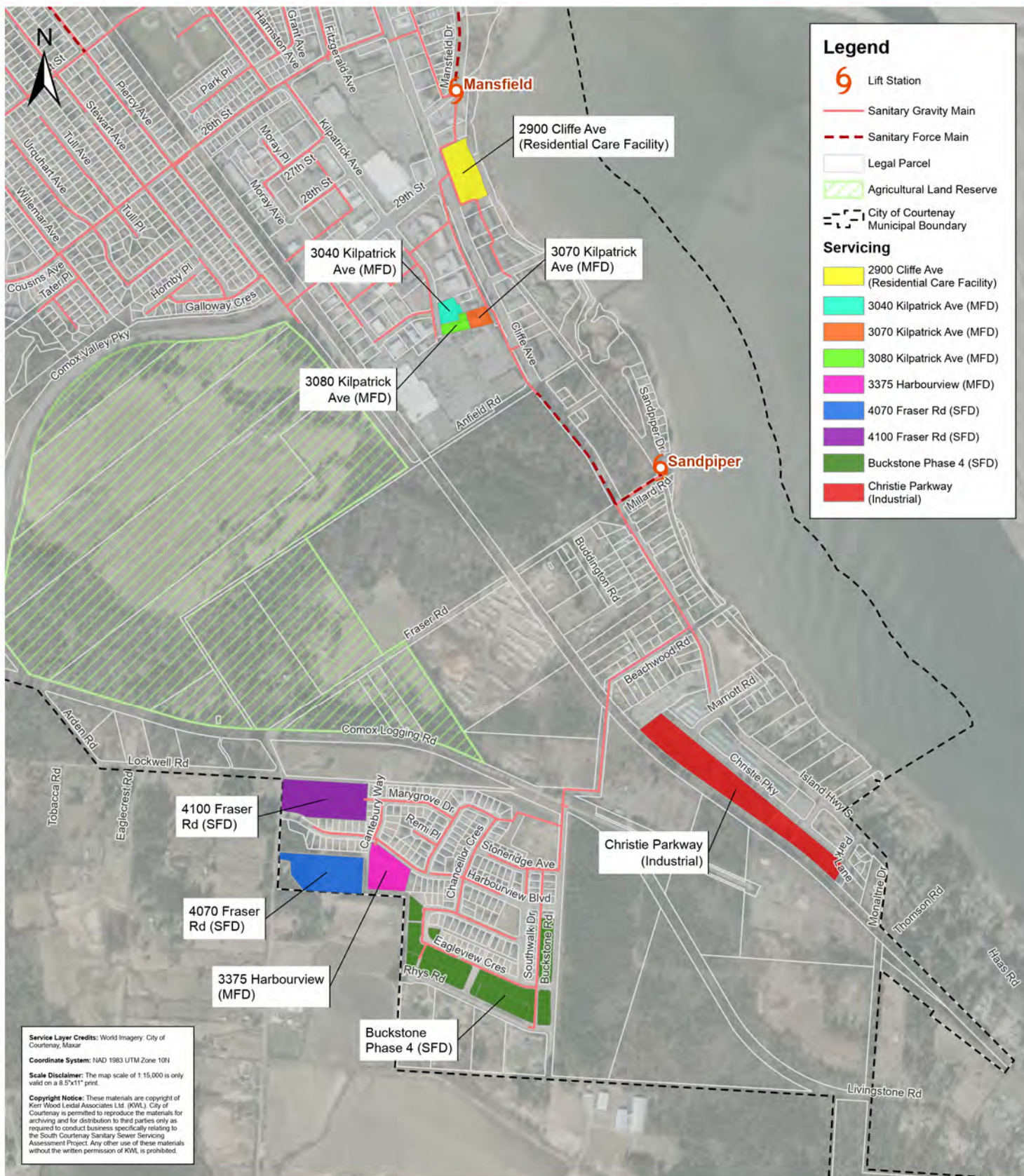
Sub-Area	Sub-Area July 2022 Update	Upstream of Sandpiper LS	Development Status	Area (ha)	Updated Area (ha)	Population and Equivalent	Updated Population and Equivalent	Dwelling Count
South Courtenay (15.3ha)			Future	15.3		322		
Existing homes on septic			Future	18.2		219		
Christie Parkway (Industrial)	New Development	Yes	Construction Not Started - Active Subdivision Application		4.070		221	About 50 PE/ha
3070 & 3080 Kilpatrick Ave (MFD)	New Development	No	Completed in 2019 / 2020		0.630		277	115 (estimated per 2.4 ppu)
3040 Kilpatrick (MFD)	New Development	No	Development Undertaking Improvements to Mansfield LS		0.380		86	41
2900 Cliffe Ave (Residential Care Building)	New development	No	Near to Completion / Occupancy		1.455		310	85 suites and 120 care beds
			Total	469.8	178.7	3,584	4,556.6	

City of Courtenay

Mansfield and Sandpiper Catchment Development Sanitary Servicing



KERR WOOD LEIDAL
consulting engineers



Project No. 2890-018

Date September 2022

Scale 1:15,000

0 75 150 300 Metres

South Courtenay Sub-Areas

Figure 1



Loading Parameters

For modelling purposes, sanitary loading, including base sanitary flow (BSF), groundwater infiltration (GWI), and rainfall-dependant inflow & Infiltration (RDII) from the updated sub-areas/developments have been based on the loading parameters developed in the recent *South Courtenay Sandpipe LS Upgrade Options Analysis* study (KWL project No. 2980.009). These loading parameters are summarized in Table 2.

Table 2: Loading Parameters

BSF (L/cap/day)	GWI Rate (L/ha/day)	5-Year 24-Hour RDII Rate (L/ha/day)	5-Year 24-Hour Total I&I Rate (L/ha/day)
167	3,500	17,300	20,800

Hydraulic Modelling and Capacity Analysis

Hydraulic Model Update

In the Courtenay Sanitary Sewer Model, the existing scenario has been updated to reflect the existing serviced population in the Sandpiper catchment based on the information received as part of the South Courtenay Sanitary Sewer Servicing Assessment (KWL project No. 2980.009) as well as the changes summarized in Table 1. (i.e., development area and design population). In addition, upgrades to the Mansfield LS currently being undertaken by a developer have also been reflected in the updated existing scenario. For the Mansfield LS catchment, other than the changes noted in Table 1, the existing population established in the original model (completed by GeoAdvice) has remained unchanged. This updated scenario is thereafter referenced as the 'existing + 8 new developments' scenario.

For Inflow and infiltration (I&I) updates, for the eight (8) new development areas in both the Sandpiper LS catchment and the Mansfield LS catchment, if an existing serviced parcel is to be re-developed or the new development is on a parcel that has its I&I already being considered under the original model scenario, no additional I&I has been added to that parcel. If an existing vacant land is to be developed, additional I&I has been calculated based on the loading parameters mentioned above.

For population updates, the populations have been updated to match the estimated population provided in Table 1. Note: population has not been updated for any of the developments whose Development Status is either 'Short-term (2022)' or 'Future'.

For Mansfield LS, a new pump curve (Flygt N3127HT, 10 hp) has been added to the model to reflect the upgrade work currently being undertaken by the developer at the Mansfield LS.



Capacity Assessment Results

Model run results of the 'existing + 8 new developments' scenario indicate that:

1. Upon completion of the eight (8) new developments, the Mansfield LS is expected to receive a peak wet weather flow (PWWF) of approx. 25.7 L/s; the Sandpiper LS is expected to receive a PWWF of approx. 9.5 L/s;
2. Hydraulic modelling suggests that the upgraded Mansfield LS will have a capacity of approx. 31.5 L/s, compared to the existing capacity of 17 to 20 L/s. The modelled capacity (31.5 L/s) is generally consistent with the design capacity (approx. 28.7 L/s under high head conditions, and 32.5 L/s under low head conditions). For assessment purposes, 28.7 L/s has been used to estimate available capacity to accommodate additional flows from future development (latecomers); and
3. Based on the above, the upgraded Mansfield LS is estimated to have 3.0 L/s excess capacity for future developments (latecomers).

Other New Developments

The City advised that, in addition to the eight developments listed in Table 1, the following properties with the Mansfield LS catchment have been identified as potential future developments. Contributing sanitary flows are based on development plans where available and estimated development potential as identified by the City.

The developers of Beachwood / Marriott and 3210 Cliffe Ave have made requests. The City provided development estimates for 2940 Cliffe Ave and 2800 Cliffe Ave.

Table 3 provides a summary of the developments and their estimated sanitary loadings.

Table 3: Other New Developments Sanitary Loading

Location	Lot Area (ha)	Existing Population	Proposed Land Use Type	Dwelling Unit	Equivalent Population	Additional Peak Sanitary Flow (L/s)	Additional I&I (L/s)	Additional PWWF (L/s)
Beachwood /Marriott	2.556	0	MF + SF Residential	70 TH + 12 SF	252	0.86	0.62	1.48
2940 Cliffe Ave	0.297	2.7	MF Residential	28 APT	67	0.22	0	0.22
3210 Cliffe Ave	0.242	2.7	MF Residential	54 APT	130	0.43	0.06	0.49
2800 Cliffe Ave	0.798	2.0	Mixed Use	59 APT	189	0.64	0	0.64
Total								2.8

The population has been estimated based on the following density assumptions:

1. Single Family (SF) Residential: 3.6 pop/unit;
2. Townhouse (TH) Residential: 2.7 pop/unit; 3.5 pop/unit with secondary suite;
3. Apartment (APT) Residential: 2.4 pop/unit; and
4. Non-Residential in Mixed Use: 60 PE/ha

Estimated total additional peak wet weather flow from the above four developments is 2.8 L/s, marginally below the 3.0 L/s excess capacity for future developments (latecomers).



Summary and Recommendations

The South Courtenay Sanitary Sewer Model, existing scenario, has been updated to include the most recent eight (8) new developments and the Mansfield LS upgrade in 2022. The upgraded Mansfield LS is expected to have a minimum capacity of 28.7 L/s, with a PWWF of approximately 25.7 L/s. Therefore, the upgraded Mansfield LS is estimated to have 3.0 L/s excess capacity for future developments (latecomers).

Upon the City's request, KWL estimated sanitary loadings from an additional four developments that will contribute flows to the Mansfield LS. Estimated total additional peak wet weather flow from the four developments is 2.8 L/s, marginally below the 3.0 L/s excess capacity for future developments (latecomers).

KERR WOOD LEIDAL ASSOCIATES LTD.

Prepared by:

Reviewed by:

Melissa Zhang, P.Eng.
Project Manager


Andrew Boyland, P.Eng.
Senior Reviewer

YMZ/nkm



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Revision History

Revision #	Date	Status	Revision Description	Author
1	September 25, 2023	Final	Update to include additional comments by City	YMZ
0	September 1, 2023	Final	Update to include loading calculations for additional 4 developments per the City's request	YMZ
A	October 03, 2022	DRAFT		YMZ