



KERR WOOD LEIDAL
consulting engineers

Section 11

Capital Projects



11. Capital Projects

We have separated the capital projects into the categories of infrastructure upgrades and proposed infrastructure to service new areas. Although we have included portions of the CRD's Northwest Trunk in our model, it should be noted that we have not included any upgrades to the CRD system in our capital projects.

The upgrade and new infrastructure cost estimate unit rates and cost estimates are provided in Appendix F. We have used increased unit rates to account for projects that are in areas of shallow bedrock (Triangle Mountain neighbourhood) or projects along major roads (Sooke Road and Metchosin Road).

In addition to the unit rates provided, we have added 15% engineering and 25% contingency for all linear infrastructure costs. For pump stations we have added 20% engineering and 25% contingency.

11.1 Infrastructure Upgrades

Infrastructure upgrades have been identified where the existing infrastructure does not have adequate capacity. For the existing modelling scenario, all existing infrastructure has adequate capacity. Therefore, all of the proposed upgrades are based on the future modelling scenario only.

The priority for these upgrades will be dependent on the rate of development growth in the contributing catchments. Regardless, we have given these upgrades a priority score of low, medium or high based on capacity compared to flow rates. The capital projects are discussed in the following section.

11.1.1 Gravity Mains

Sooke Road - Acacia Place to Galloping Goose Trail (CRD Connection)

- Existing Infrastructure – 750 m of 600 mm at 0.6%;
- Existing Capacity - 270 L/s;
- Future 100-year PWWF - 375 L/s; and
- Proposed Pipe Size - 750 mm.

This upgrade is required to accommodate the future peak flow rate. However, it should be noted that this peak flow rate exceeds the City's capacity allocation in the CRD system of 347 L/s (there are also additional flows from Colwood downstream of this connection point). Therefore, this upgrade likely will only happen if the City was allocated a capacity significantly greater than the current allocation.

Increasing the City's allocation could occur if the CRD upgraded the NWT or if a WWTP was constructed for the City of Langford flows and Langford's allocated flow could be assigned to Colwood. Considering the selected site for a core area WWTP has little excess capacity, it is very unlikely that the CRD will upgrade the NWT. Considering the land availability and suitable effluent discharge locations, it appears that a WWTP in Colwood to serve the Western Communities is a greater likely than a WWTP in Langford. All of the City Hall and South Colwood WWTP options discussed in Section 9 of this report would result in reduced flows in this section of gravity main.

For the reasons described above, and considering that the current PWWF are significantly less than the capacity of this gravity main, the upgrade priority for this section of sewer is considered **very low**. The preliminary cost estimate for this project is \$3,660,000.



Wishart Road – Sooke Road to Metchosin Road

- Existing Infrastructure – 1,350 m of 600 mm
- Existing Capacity - 210 L/s
- Future 100-year PWWF - 353 L/s
- Proposed Pipe Size - 750 mm

For the same reasons described above for the Sooke Road gravity main section, the upgrade priority for this section of sewer is considered **very low**. The preliminary cost estimate for this project is \$4,230,000.

Wishart Road – Allandale Road to Dressler Road

- Existing Infrastructure – 960 m of 200 to 300 mm
- Existing Capacity – varies
- Future 100-year PWWF - varies
- Proposed Pipe Size - 300 mm and 375 mm

The future peak weather flow provided above includes the flow from the future pump station (Painter Road) forcemain. The peak flow from this lift station is 12.9 L/s. If the Royal Bay development proceeds, and the flows to the future pump station on Painter Road can be directed to the Metchosin Pump Station, the future 100-year PWWF will be reduced by this amount. The PWWF would be only marginally greater than the capacity of this existing main. Therefore, the upgrade priority for this section of sewer is considered **very low**. The preliminary cost estimate for this project is \$1,930,000.

Metchosin Road – Raynorwood Place to Dunsmuir School (end of existing forcemain)

- Existing Infrastructure – no existing forcemain in this section
- Existing Capacity – n/a
- Future 100-year PWWF - 183 L/s
- Proposed Pipe Size – 620 m of 400 mm

This forcemain extension is required due to the limited capacity of the existing 450 mm diameter gravity sewer through this section. It will be less expensive to extend the forcemain compared with upgrading the existing gravity main which is up to 4.5 m deep. This forcemain extension will not be required until the Metchosin Pump Station is upgraded. The Metchosin Pump Station upgrade is considered a low priority, therefore this forcemain extension is also considered **low** priority. The preliminary cost estimate for this project is \$862,000.

11.1.2 Pump Station and Forcemain

Metchosin Pump Station

- Existing Capacity - 128.4 L/s;
- Existing 100-year PWWF - 35 L/s; and
- Future 100-year PWWF - 183 L/s (This assumes that the Hatley Pump Station and the future pump station at Painter Road will be eliminated, and those flows will also contribute to the Metchosin Pump Station).



The upstream population would have to grow by approximately 270% in order for this existing infrastructure to reach capacity. Therefore the upgrade priority for this section of sewer is considered **low**. The preliminary cost estimate for this project is \$1,705,000.

Hatley Pump Station

- Existing Capacity - 5.5 L/s;
- Existing 100-year PWWF - 1.8 L/s; and
- Future 100-year PWWF – 9.5 L/s.

The upstream population would have to grow by approximately 200 % in order for this existing infrastructure to reach capacity. As it has been planned for this pump station to be temporary and could be eliminated once the Royal Bay development proceeds, upgrade priority for this section of sewer is considered **low**. The preliminary cost estimate for this project is \$429,000.

11.1.3 Operations and Maintenance Improvement Projects

Gravity Mains

The City of Colwood sanitary sewer system is relatively new and although a condition assessment is not included as part of this project, we expect that the general condition of the pipe infrastructure is good. The I&I analysis calculated a 100-year I&I rate of 20,000 L/ha/day. Implementing an I&I reduction program would likely not provide a worthwhile benefit.

The existing model scenario indicates that many of the existing pipes do not achieve a desirable scouring velocity even during the PWWF event. This is primarily the result of low flow in the sewers due to the small number of properties connected rather than problems with the existing sewer grades.

Although not part of the City's sewer infrastructure, the flows from DND property do count against the City's allocation in the CRD system. The I&I calculations for the DND Belmont site indicate that the 100-year I&I rate is 187,700 L/ha/day. This results in a peak 100-year I&I flow of 104 L/s. The I&I rates for DND Colwood and Royal Roads University may be similar.

Pump Stations and Forcemains

As part of this project we visited each of the eight existing sanitary sewer pump stations. As with the gravity mains they are relatively new and no major deficiencies were observed.

The City's Public Works representative stated that the newly constructed Sewell Pump Station has only single-phase power and this has resulted in the need to replace one of the motors already. If this station was upgraded to three-phase power, the existing civil and mechanical components would remain. The preliminary cost estimate to upgrade the Sewell Pump Station is \$150,000

11.2 Proposed Infrastructure

The proposed infrastructure for areas of Colwood not currently serviced is illustrated on Figure 7-1. We have estimated the total cost of this infrastructure. A summary of these cost estimates divided into the various neighbourhoods are provided below.



Table 11-1: New Infrastructure Capital Cost Estimates

Neighbourhood	New Gravity Main Cost Estimate	New Forcemain Cost Estimate	New Pump Station Cost Estimate
Metchosin/Latoria	\$907,000	\$1,616,000	\$0
Triangle Mountain	\$5,509,000	\$513,000	\$0
Lagoon/Dunsmuir	\$5,307,000	\$209,000	\$400,000
Central	\$7,488,000	\$320,000	\$200,000
Kelly	\$10,446,000	\$650,000	\$431,000
Colwood Corners	\$360,000	0	0
DND/Royal Roads	\$0	0	0
Total	\$30,018,000	\$3,308,000	\$1,031,000
Engineering	15%	15%	25%
	\$4,503,000	\$496,000	\$258,000
Contingency	25%	25%	25%
	\$7,504,000	\$827,000	\$58,000
Total Cost	\$42,025,000	\$4,632,000	\$1,547,000
	\$48,203,000		



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Section 12

Summary and Recommendations



12. Summary and Recommendations

12.1 Summary

This Sewer Master Plan provides a summary of the existing system and guidance for making decisions regarding the future system. As part of this project an InfoSewer sanitary sewer model has been supplied to the City. This model includes existing and future scenarios. The InfoSewer model has been calibrated and validated for both wastewater flows and I&I. I&I rates for the City's sewers are within reasonable limits for a sewer of its age, however the I&I rates for the DND properties appear very high.

The City appears poised for significant growth including major project sites at Royal Bay, Olympic View Golf Course, and Colwood Corners. Plans have been developed to service the entire City with a sanitary sewer system. These plans provide the guidance for future designs of the proposed sanitary sewer infrastructure.

The existing sanitary sewer system does not have any current capacity issues. Some of the existing sanitary sewers will not have adequate capacity for the future development scenario. The capacity deficiencies will likely not occur for many years in the future and there is no urgency at this time to undertake upgrades.

A CRD wastewater treatment plant in the Western Communities is likely to be developed within the next 20-years. If located at Colwood City Hall or in South Colwood, this WWTP could eliminate many of the identified upgrades.

A sewage heat recovery opportunity as part of the Colwood Corners redevelopment has the highest potential to move forward. Another promising opportunity is if a WWTP is located at Royal Bay, this would allow the Royal Bay development to access treated effluent as a heat source.

12.2 Recommendations

KWL recommends the following:

1. The City use this SMP as a guide for locating, sizing, and operating existing and future sewers.
2. The City update and maintain the infrastructure and population layers in the InfoSewer model. This will provide an indication of when components the City's sewer system are approaching capacity. The model results should be compared periodically with the CRD's measure flows as development proceeds.
3. The City should work with the DND and the CRD to develop a program to reduce I&I rates from the DND properties.
4. Prior to proceeding with sewer servicing of the northwest portion of the City, the City should work with the CRD to relocate the existing Meaford flow meter (Langford flow meter) and the details for connecting to the NWT near the Langford boundary.
5. Consider lowering the future gravity main on Dressler Road near Wishart Road so that this flow can be intercepted and diverted to a Royal Bay WWTP in the future. Consider increasing the size of the future gravity main on Painter Road to accept to divert flows to a Royal Bay WWTP from the Ocean Blvd Pump Station and potential pump station at Wishart and Metchosin Road.



6. The City should continue to discuss with the CRD regarding a WWTP within Colwood. The location of this plant could impact the requirements for upgrades. Discussions with property owners could follow.
7. The City engage with the CRD and the Capital City Centre developer to facilitate a heat recovery opportunity at Colwood Corners.

12.3 Report Submission

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