



City of Port Moody

Report/Recommendation to Council

Date: November 10, 2020
Submitted by: Engineering and Operations Department – Project Delivery Services Division
Subject: Funding Request – Shoreline Trail Sanitary Sewer Project

Purpose

To report back on options for rehabilitating the shoreline trail sanitary sewers and pathway. This report will also clarify whether any cost savings are possible for an open-cut method construction approach for both sewer mains.

Recommended Resolution(s)

THAT the report dated November 10, 2020 from the Engineering and Operations Department – Project Delivery Services Division regarding Funding Request – Shoreline Trail Sanitary Sewer Project be received for information.

Executive Summary

This report presents the explored option to replace the gravity and low-pressure sanitary sewer mains via open-cut methodology in conjunction with the construction of a 4.8m wide pathway for the Shoreline Trail Sanitary Sewer Project.

Staff presented a list of explored options and recommended options for the rehabilitation of the two sewers that are located in Shoreline Park (north) from Murray Street to Old Orchard Park to Council on November 3, 2020 (**Attachment 1**). Council directed staff to report back with another option to replace both sewers via open-cut methodology concurrently with the construction of a 4.8m wide pathway.

Through this project's design process, multiple options were explored for each sewer and trail asset. The explored options and associated costs can be seen on Table 1 below. The additional Option AB which would replace both sewers concurrently via open-cut methodology is also included in Table 1.

Table 1: List of Options considered for the project

Options	Cost
Gravity Main	
Option 1 – 100% Trenchless	\$2.1M
Option 2 – 100% Open-Cut	~\$6.0M
Option AB – Open-Cut done concurrently with the Low Pressure Sewer Main	\$3.5M
Low Pressure Sewer Main	
Option 1 – 100% Trenchless	\$8.0M
Option 2 – 100% Open-Cut	\$6.0M
Option 3 – Re-alignment onto loco Road	\$10.8M
Option 4 A – Hybrid (75% trenchless + 25% open-cut)	\$7.8M
Option 4 B – Hybrid (60% trenchless + 40% open-cut)	\$7.3M
Option 4 C – Hybrid (40% trenchless + 60% open-cut)	\$6.9M
Option AB – Open-Cut done concurrently with the Gravity Sewer Main	\$6.0M
Pathway	
Option 1 – 3.3m wide full depth rehab	\$3.5M
Option 2 – 4.8m wide full depth rehab	\$4.7M
Option 3 – surface rehab only	\$1.9M
Other upgrades including signage, benches, etc.	\$0.6M

In addition to technical merits, each option was evaluated against environmental and archaeological constraints. Additionally, each option was also weighed against the survey feedback received after a public engagement event conducted in August, 2020. The survey feedback indicated that the environment is an important factor to the public when determining a rehabilitation approach.

The cost of the recommended approach to rehabilitate the sewers via trenchless methodology and to construct a 3.3m wide pathway with additional improvements is \$14.2M. The cost to replace the sewers via open-cut methodology and to construct a 4.8m wide pathway with additional improvements is \$14.8M. Given that the explored option to replace both sewers concurrently via open-cut methodology does not yield cost savings over the recommended approach, and has significant environmental impacts, staff recommend rehabilitating the sewers via trenchless methodology. It should be noted that concurrently replacing the sewers do not have any cost savings for the pathway portion of the project, as the excavation and fill costs of the open-cut methodology was already factored into the to the \$4.7M cost estimate for the 4.8m

wide pathway. Additionally, sewer funds from the sanitary sewer reserve cannot be used to construct the pathway, and must only be used for sanitary sewer projects.

Background

The City's sanitary sewer network contains two sewer mains, located in Shoreline Park (north). The mains generally run parallel to the pathway and are considered critical sewer infrastructure in the network. The subject mains – a gravity and a low-pressure siphon – were built in 1970 and 1988 respectively, and serve a large portion of the north shore areas of the City, including neighbourhoods such as Ioco, April Road, Pleasantside, Twin Creeks, and Heritage Mountain.

Studies conducted in 2016 have concluded that the low-pressure main and the gravity main should be replaced in the 2020-2021 timeframe. Since the sewers are generally located in close proximity to the paved bike and pedestrian pathway, staff also plan to upgrade the path to accommodate multi-use with a wider trail where feasible based on physical and environmental constraints. The pathway is currently in disrepair and contains many tripping hazards and drainage issues.

Staff presented the recommended options for repair of the sewers and the pathway to Council on November 3, 2020. The recommended options include repairing the two sewers via trenchless methodology and constructing a 3.3m wide pathway with full depth restoration. The following was moved and seconded at that meeting:

CW20/104

Moved and seconded

THAT \$5.21M be allocated from the Sanitary Sewer Reserve and \$4.1M be allocated from Density Bonus Reserve to construct the recommended upgrades (Option 1 for Sewer and Option 1 for Pathway) to the two sanitary sewer mains under Shoreline Trail and existing Shoreline Trail paved pathway as recommended in the report dated October 7, 2020 from the Engineering and Operations Department – Project Delivery Services Division regarding Funding Request – Shoreline Trail Sanitary Sewer Project.

Council passed the following resolution to postpone the consideration of the above, directing staff to report back to Council with potential cost savings and extent of environmental impact to replace both the sewers via open-cut methodology and construct a 4.8m wide pathway, and to report back with more detail on the \$600K additional improvements proposed for the trail.

CW20/105

Moved, seconded, and CARRIED

THAT the foregoing motion be postponed until staff report back to Council with potential cost savings and extent of environmental impacts from using the Open- Cut method of construction to replace the gravity sewer main, low pressure sewer main and 4.8m wide trail, full-depth restoration concurrently;

AND THAT staff include the pricing for the pathway improvements as a separate line item;

AND THAT staff provide a detailed cost breakdown for the \$0.6M trail upgrade.

This report will explore the option of an open-cut method to replace both sanitary sewers and a 4.8m wide pathway.

Discussion

Gravity Main - Open-Cut Approach

The gravity main is located mostly on the north side of the pathway but crosses over the low pressure main and the trail at certain locations. The main is a 400mm Asbestos Cement (AC) main constructed in 1970. Staff explored an open-cut method to replace the gravity main in its original location. A number of factors were considered during the analysis including:

1. Constructability;
2. Proximity to Canadian Pacific Railway (CPR);
3. Environmental Impact;
4. Archaeological Impact; and
5. Cost.

Constructability is a large concern with opting for an open-cut option for the gravity main. The main is located within the City right of way (ROW) for much of its length, but there are certain sections where it crosses over the CPR ROW. The City currently holds agreements with CPR that allows the main to be located within their ROW. The main also contains sewer service connections that were constructed underneath the CPR ROW to collect sewage discharge from the houses located south of Ioco Road. If an open-cut method is chosen, these service connections will need to be physically located through excavation and tied in with the new gravity sewer main which would require significant oversight and permits from CPR.

The gravity main is also deep in certain locations (approximately 4m), which would require extensive excavations, resulting in larger environmental and archaeological impacts. Additional archaeological monitoring during excavation will be required, which would increase overall costs.

Additionally, certain sections are not suitable for an open-cut approach. In total, these sections equate to approximately half of the length of the gravity main. The unsuitable sections include a section near the Old Orchard Park, where an existing watermain is located between the gravity main and the low-pressure main, and a common trench is not feasible. Other unsuitable sections include sections under major watercourses such as Noons Creek and Suterbrook Creek, adjacent to the Pacific great blue heron colony, and a section near the head of the Burrard Inlet where there are steep slopes that may increase the risk of slope failure during construction.

Environmental impacts include vegetation removal of approximately 6.0m width footprint and the removal of an additional 80 trees, some of which are in the CPR ROW. A snapshot of the construction footprint of a section of the project area (near the heron colony) can be seen in the attached map **Attachment 2 – Sample showing Environmental Impact and Construction Footprint**.

Low-Pressure Main - Open-Cut Approach

The Low-Pressure Main is a 600mm SD-41 PVC sewer main constructed in 1988. The main was originally contemplated to be replaced via open-cut methods. Due to the significant environmental impact that included the removal of approximately 200 trees, this method was ultimately not recommended.

Staff and the design consultant explored this option again with consideration given to replacing the low-pressure main and the gravity main in the same trench.

The low-pressure main is located mostly on the south side of the gravity main, but crosses over at some locations. There is about a 2m horizontal gap between the two sewers, which would enable the construction of the new low-pressure sewer between the gravity main and the existing low-pressure main. While a 2m gap is just enough to construct the new main, this arrangement would increase the risk of damaging the existing low-pressure main during construction. The existing low-pressure main will be live and conveying sewage during construction.

4.8m wide full depth pathway

A 4.8m wide full depth pathway was explored to provide a separated mode multi-use path. This option would provide a 1.8m paved width designated for pedestrian traffic and 2.7m paved width designated for cyclists. The remaining 0.3m width would be for a gravel sloped shoulder established on the downslope side for structural stability. This option was ultimately not recommended due to the following reasons:

- Environmental impacts (e.g., permanent loss of vegetation/habitat, the removal of trees within the heron colony 'no disturbance' buffer zone);
- Separated mode multi-use paths sometimes have a tendency to increase tensions between cyclists and pedestrians as each group can become protective of their lane if physical separation is not provided (i.e. separated only by pavement markings); and
- It will likely encourage faster cycling through the pathway by commuter cyclists and, given that there is no physical barrier between the pedestrians and cyclists, could create concerns of safety risks.

The 4.8m wide pathway can be constructed on top of the 6m cleared area required for the joint open-cut method for both sewer mains. However, having the pathway follow this construction alignment would mean that the pathway will shift more towards CPR's right of way and new agreements will need to be in place with CPR in order to shift the pathway onto their ROW. Additionally, it would also mean that the proposed new pathway will be out of place with the current locations of the pedestrian bridges. The current pathway will also be abandoned in place at some locations which may need to be environmentally restored. This additional cost impact has not been determined in detail by staff, but it is expected to be in the order of several hundred thousand dollars.

Environmental Impact

There are significant long-term environmental impacts for an open-cut approach for the sewers and constructing a 4.8m wide trail. Anticipated environmental impacts include but are not limited to the following:

- Temporary and permanent vegetation removal in all excavation areas, laydown areas, and turnarounds, including the removal of approximately 280 trees;
- Long-term impacts to the ecosystem associate with tree and habitat loss;
- Trenching across non-fish-bearing watercourses;
- Travel along the alignment by construction vehicles; and
- Erosion and sediment migration into watercourses.

The urban forest and terrestrial and aquatic habitat supports over 150 species of birds, small mammals including shrews, moles, and squirrels and at least four species of bats; large mammals such as black-tailed deer, black bear, and coyote; multiple species of amphibians; and culturally and environmentally significant fish species. The habitat in this area supports multiple species of conservation concern, including cutthroat trout and Pacific great blue heron, and provides an important corridor and connectivity between upland terrestrial habitat and the marine environment.

The open-cut approach and construction of a 4.8m wide trail will result in significant impacts to vegetation and trees in the area, including the permanent loss of vegetation and habitat. This approach will require tree removal within and around the provincial 'no disturbance' avoidance buffers for heron colonies, would not meet the Provincial best management practices and guidelines, and may result in negative impacts to the colony. Heron nesting habitat in the region is already limited, and maintaining healthy nesting habitat near important feeding areas is considered necessary for the conservation of the species

This approach will require the greatest areas of excavation and construction activity in proximity to wildlife habitat compared to the other options. The noise disturbance resulting from this approach is also expected to be louder and for longer duration, compared to trenchless options. As a result, the proposed works associated with the open-cut approach and trail widening may result in temporary changes to movement patterns and behaviour of wildlife in the area. In addition, work around the wetlands and aquatic habitat near the heron colony could also negatively impact other wildlife including amphibians and/or small mammals.

Other environmental impacts include the number of truck trips for an open-cut approach and estimated greenhouse gas emissions. For example, the calculated truck trips for an open-cut approach is approximately 400 and the corresponding construction Greenhouse Gases (GHGs) is 90 tCO₂e (tonnes of carbon dioxide equivalent). In contrast, the calculated truck trips for a trenchless approach is 115, and the corresponding construction GHGs is 60 tCO₂e. Additional truck trips and vehicles may increase the risk of a spill of oil, fuels, or excavated materials into sensitive habitats.

Additionally, an open-cut approach and its associated footprint and impact would contravene a number of the City's guiding policies including:

- Tree Management on City Property
 - Aims to minimize tree removals for City projects.
- Official Community Plan
 - Various policies that direct the City to preserve sensitive ecosystems and support carbon sequestration through various means including tree protection.
- Environmentally Sensitive Area (ESA) Management Strategy
 - Objectives for the Shoreline Park ESA outlined in the strategy include protecting biodiversity, riparian habitat, and the forested nature of the area.
- Parks and Rec Master Plan
 - Directs park planning to consider ESAs and integrate environmental considerations.
- Climate Action Plan
 - The plan includes two goals that focus on restoring/strengthen our natural environment and urban forests to help species adapt to the effects of climate change and continue to maximize the benefits provided by urban forests.

These guiding policies ensures that the construction footprints and overall environmental impacts are minimized during and post-construction for City projects.

Cost

If the replacement of the both sanitary sewers were done using an open-cut methodology and the construction of the 4.8m trail is undertaken concurrently, the estimated total cost is \$14.8M. This cost accounts for trenchless approach in some areas, archaeological monitoring, additional excavation costs, environmental monitoring, and erosion and sediment control during construction.

The cost of the open-cut methodology option for both sanitary mains with a 4.8m wide trail discussed in this report against the option as recommend in the staff report dated November 10, 2020 is shown below in Table 2.

Table 2 – Cost comparison between Option AB and the recommended options

	Open-Cut Methodology Both Mains Concurrent & 4.8m wide trail	100% Trenchless Methodology Both Mains & 3.3m wide trail (Staff Recommended Option)
Gravity Sewer Main	\$3.5M	\$2.1M
Low Pressure Sewer Main	\$6.0M	\$8.0M
Trail	\$4.7M	\$3.5M
Trail enhancements such as furniture, signage, wayfinding, etc.	\$0.6M	\$0.6M
Total	\$14.8M	\$14.2M

Additional Pathway Improvements

Additional pathway improvements include the installation of benches, perches, environmental features, and wayfinding signs. The number of perches and benches were based on grade change locations; however, the City can reduce the number of perches and benches to suit available budget. A full breakdown of the cost for the additional pathway improvements can be found in **Attachment 3** – Cost breakdown for additional pathway improvements.

Other Option(s)

The recommended option is what has currently been moved and seconded. Other options are laid out below.

1. THAT \$4.61M be allocated from the Sanitary Sewer Reserve and \$5.3M be allocated from Density Bonusing Reserve to construct Option AB for Gravity and Low-Pressure Sewers and Option 2 for Pathway.
2. THAT \$3.21 M be allocated from the Sanitary Sewer Reserve and \$5.3M be allocated be allocated form Density Bonusing Reserve to construct Option 1 for Gravity Sewer, Option 2 for Low-Pressure Sewer and Option 2 for Pathway.
3. THAT \$5.01M be allocated from the Sanitary Sewer Reserve and \$4.1M be allocated from Density Bonusing Reserve to construct Option 1 for Gravity, Option 4A for Low-Pressure Sewer and Option 1 for Pathway.
4. THAT \$4.51M be allocated from the Sanitary Sewer Reserve and \$4.1M be allocated from Density Bonusing Reserve to construct Option 1 for Gravity, Option 4B for Low-Pressure Sewer and Option 1 for Pathway.
5. THAT construction be phased over multiple years and \$2.45M be allocated from the Sanitary Sewer Reserve for Phase 2, Option 1 Sewer construction and \$2.16M be allocated from Density Bonusing Reserve for Phase 1 and \$2.23M be allocated from Density Bonusing Reserve for Phase 2 to construct recommended option for the pathway

A full list of options and their impacts including estimated costs can be found in **Attachment 4** – Options Analysis and **Attachment 5** – Estimated Project Costs. It is important to note that even with concurrent construction, an open-cut approach for the sewer will have adverse impact on the environment and have a net increase in costs. Phasing the project will also have an adverse impact on both the public with repeated construction interruptions as well as cost, as costs are likely to increase over the next four years.

Financial Implications

There are significant financial implications associated with this project. A summary of each option and its associated costs is shown in Table 3. The recommended options are highlighted in orange. The option explored in this report - Option AB Concurrent replacement of sewers via open-cut methodology - is highlighted in yellow.

Table 3 – Financial Impact of each option

Asset	Option	Estimated Cost	Estimated Project Cost for Option AB and 4.8m path	Estimated Project Cost for Recommended Options
Gravity Sewer Main	Option 1 - Trenchless CIPP Lining	\$2.1M		\$2.1M
	Option 2 - 100% Open Cut	~\$6.0M		
	Option AB - Concurrent replacement with LPS via Open Cut	\$3.5M	\$3.5M	
Low Pressure Sewer Main	Option 1 - 100% Trenchless CIPP Lining	\$8.0M		\$8.0M
	Option 2 - 100% Open Cut	\$6.0M		
	Option 3A - 100% Open Cut and re-align to loco Road	\$9.3M		
	Option 3B - 100% Open Cut and re-align to loco Road	\$10.8M		
	Option 4A - Hybrid existing alignment (75% trenchless +25% open-cut)	\$7.8M		
	Option 4B - Hybrid existing alignment (60% trenchless + 40% open-cut)	\$7.3M		
	Option 4C - Hybrid existing alignment (40% trenchless +60% open-cut)	\$6.9M		
	Option AB - Concurrent Replacement with gravity sewer via Open Cut	\$6.0M	\$6.0M	
Trail	Option 1 - 3.3m wide, full depth rehab	\$3.5M		\$3.5M
	Option 2 - 4.8m wide, full depth rehab	\$4.7M	\$4.7M	
	Option 3 - Surface rehab only	\$1.9M		
	Upgrades such as new furniture, signage, etc.	\$0.6M	\$0.6M	\$0.6M
TOTAL			\$14.8M	\$14.2M
**Includes 20% contingency amount to account for unknown risks **				
Recommended Options				
Option AB - Open cut replacement of sewers and 4.8m wide path				

As can be seen from Table 3, Option AB which will replace the sewers via open-cut methodology and establish a 4.8m wide pathway is estimated to cost \$0.6M more than the recommended option. It is important to note that while there are savings with a common trench open-cut approach to replace both the sewers, overall costs still exceed those of the recommended approach.

Therefore, staff recommend rehabilitating the sanitary sewers via a trenchless approach at a cost of \$10.1M. Currently, \$8.52M has been budgeted for the sanitary sewer (both gravity and low-pressure) mains to be replaced or rehabilitated in the 2020-2024 5-year capital plan. An additional budget of \$1.58M is required to complete the sewers as per the recommended options. Therefore, staff request that the 2021 budget be increased to \$5.21M from the sanitary sewer reserve to cover the additional budget required for the completion of the sanitary sewer portion of the project. Staff have confirmed that the additional cost of \$1.58M can be accommodated through the sewer reserve.

The pathway upgrade was earmarked in the approved 2020-2024 capital budget with a value of \$400,000 in 2021, but without an approved funding source. Therefore, an additional budget of \$4.1M will be required to complete the works on the path. The additional budget is proposed to be allocated from Density Bonusing reserve. It should be noted that staff are in the process of actively searching and applying for grants for the pathway portion of the project.

It is also important to note that sewer funds from the sanitary sewer reserve cannot be used to construct the pathway and must only be used for sanitary sewer projects. Some costs such as excavation and fill costs have already been allocated to the sewer portions of the project. Therefore a budget of \$4.7M will be required to be allocated from the Density Bonusing reserve if Council chooses to construct a 4.8m wide pathway (Option 2 Pathway).

Communications and Civic Engagement Initiatives

Kerr Wood Leidal Associates, along with City staff, engaged multiple stakeholder groups, held a public engagement event, and conducted an online survey to inform and gather feedback on the upgrades planned for the pathway. A public engagement summary was presented to Council at the November 3, 2020 Special Council Meeting. If the construction project proceeds, a communication plan will be developed to inform stakeholders, trail-users, and the general public.

Council Strategic Plan Objectives

This project aligns with Council's Strategic Plan priorities of Service Excellence and Healthy City.

Attachment(s)

1. Report considered at the November 3, 2020 Special Council (COTW) Meeting.
2. Sample showing the Environmental Impact and Construction Footprint.
3. Cost breakdown – additional pathway improvements.
4. Options Analysis.
5. Estimated Project Costs.

Report Author

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Report Approval Details

Document Title:	Funding Request – Shoreline Trail Sanitary Sewer Project.docx
Attachments:	- Attachment 1 – Report Considered on November 3, 2020.pdf - Attachment 2 - Sample Showing Environmental Impact and Construction Footprint.pdf - Attachment 3 - Cost Breakdown for additional pathway improvements.pdf - Attachment 4 - Options Analysis.pdf - Attachment 5 - Estimated Project Costs.pdf
Final Approval Date:	Nov 17, 2020

This report and all of its attachments were approved and signed as outlined below:

Kim Law, Manager of Project Delivery Services - Nov 16, 2020 - 12:41 PM

Jeff Moi, General Manager of Engineering and Operations - Nov 16, 2020 - 2:42 PM

Dorothy Shermer, Corporate Officer - Nov 16, 2020 - 7:58 PM

Ron Higo, General Manager, Community Services - Nov 17, 2020 - 8:38 AM

Rosemary Lodge, Manager of Communications and Engagement - Nov 17, 2020 - 3:52 PM

Paul Rockwood, General Manager of Finance and Technology - Nov 17, 2020 - 3:56 PM

Tim Savoie, City Manager - Nov 17, 2020 - 10:25 PM