URBAN SYSTEMS MEMORANDUM



DATE: February 21, 2025
TO: Werner de Schaetzen.
CC: Mark Stafford, P.Eng
FROM: Emily Haas, EIT
FILE: 3275.0022.01
SUBJECT: Woodgrove Development Area Growth Scenarios – Sanitary Upgrades Cost Estimating

# 1.0 INTRODUCTION

The City of Nanaimo (the City) is currently exploring six growth scenarios for varying levels of development and population densification generally located at the Woodgrove Development Area (WDA). This analysis follows five flow paths downstream of the WDA as shown in Figure 1 below, routing through sewers owned and operated by the City before reaching the trunk sewers owned and operated by the Regional District of Nanaimo (RDN).

The City has engaged GeoAdvice to complete a hydraulic modelling review for six scenarios of increasing densification in the WDA, ranging from an additional 5,000 capita to 30,000 capita. Urban Systems has partnered with GeoAdvice to provide high level cost estimates for upgrades to the sanitary infrastructure needed to meet the demands of future population growth for each scenario such that the City and RDN can plan accordingly. This technical memorandum details the unit-rate cost derivations that are applied to develop the cost estimate for each scenario. Additionally, discussions with a local trenchless utility contractor were undertaken to review potential solutions and cost implications for upgrades to the RDN trunk sewer along the shoreline as traditional open-cut trenching may be challenging due to environmental, archaeological or constructability concerns.

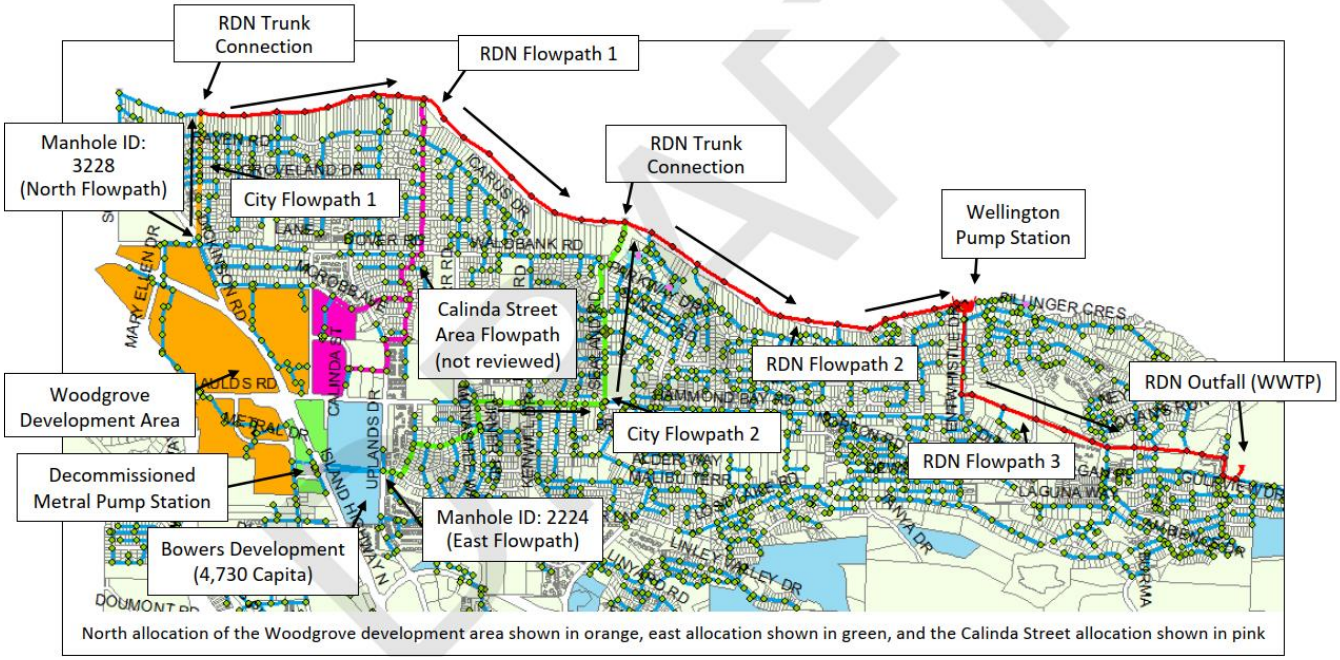



*Figure 1 - Downstream Flowpaths from Woodgrove Development Area*

It should be noted that there are no upgrades required at the RDN Wellington Pump Station (WPS) over and above what was recommended within the 2023 North End Sewer Routing Study, as the flowrates should be within the future upgraded WPS capacity. Refer to that report for more information. RDN Flow Path 3 also requires no upgrading and as such, is not discussed further in this memo.

# 2.0 METHODOLOGY

## 2.1 COST ESTIMATION FOR TRADITIONAL OPEN CUT TRENCH INSTALLATION OF GRAVITY SEWERS

The unit-rate cost used in this analysis was originally derived by Urban Systems for the City as part of the April 2023, Brechin Sewer Master Plan. The unit-rate cost table can be seen in Appendix A and the study can be referenced for more details on the derivation of the unit-rate cost. In February 2024, Urban Systems revised the unit cost estimating methodology (as part of the City's DCC Bylaw update) to include an additional allowance (5% of construction value) to account for bypass pumping during construction.

The unit-rate cost for gravity mains includes the typical components required for design and construction, such as:

- Engineering services for design and construction
- Construction overhead – mobilization, traffic control and bypass pumping
- Site preparation – asphalt cutting, trench excavation and rock breaking
- Sanitary Sewers – supply and install of pipes and manholes, removal of existing pipe, sewer connection and lot service connections
- Surface restoration – trench backfill, granular subbase/base and asphalt pavement
- Contingency allowances for unknown conditions and challenges

To estimate the cost of construction it was assumed an average trench width of 2m cut straight down would be sufficient for the installation of the sewer mains.

To account for the varied depth at which the gravity sewers would be installed at, the unit-rate cost was broken into three installation depth categories to provide a higher accuracy cost estimate:

- Low (< 2m) installation depth
- Moderate (2-4m) installation depth
- Deep installation (4-6m) depth

A multiplier based on road classification was then applied to the unit-rate cost to increase/decrease the cost to better reflect traffic control and construction complexity. This affected flow paths City 1 and City 2, as the proposed upgrades were located on either an urban collector (base condition) or an urban local (multiplier of 0.9). The multipliers were derived by Urban Systems with the City in the April 2023 report previously mentioned. However, the multipliers are not applied to the RDN 1 and RDN 2 flow paths as the sewer main is located along the shoreline and does not have a road classification – to account for this, additional components were added in the cost derivations for flow paths RDN 1 and RDN 2 have been included – these are discussed in more detail in Section 2.2

There are scenarios in which construction costs will increase additionally due to its proximity to mine shafts, structures and railways, as well as pipes that are in high-risk seismic areas. The July 2022 Brechin Sewer Master Plan details the derivation of these multipliers and indicates that RDN 1 and RDN 2 flow paths as high-risk seismic areas. However, these factors have not been applied to the cost estimate at this time due to the need for further analysis for accurate application.

## 2.2 RDN TRUNK SEWER UPGRADES VIA OPEN TRENCH INSTALLATION – OPTION 1A

The RDN Trunk sewer requires upgrades beyond the *2046 PWWF 5-Year I&I 10,000 Additional Capita scenario*. Upgrades to section of trunk sewer presents significant challenges due to its location within a sensitive marine ecosystem.

Review of the original as-built drawings for the North Shoreline Interceptor Trunk sewer indicated several additional considerations not included in a typical gravity sewer unit costing. These include:

- Steel anchor bars and concrete pipe cradles intermittently along the alignment as required to mitigate pipe buoyancy;
- More frequent presence of bedrock or till requiring blasting / breaking / cutting for removal;
- Surface restoration requirements suitable for promoting marine habitat;
- Installation depths below high-tide levels, and in some cases, below mean-tide levels, requiring significant trench dewatering;
- Water tight sealed manholes complete with asphalt coatings, and cradles / ballast mass concrete pours noted at manholes;

Additionally, 407m of trunk sewer was also upsized to from 750mm to 1050 mm to maintain downstream continuity.

To better align the cost estimate with the complex construction conditions several modifications were made to unit cost derivation methodology for RDN 1 and RDN 2 flow paths. It is worth noting that these modifications are without the input of geotechnical, archeological, environmental or ocean engineering which will be required if this work proceeds.

- Service connections have been removed from the unit cost derivation, as they will not be installed along the proposed twinned lines of the RDN trunk sewer, as these connections are typically in smaller upstream branches or already installed along the existing interceptor where needed.
- Assumptions around presence of rock/till have been increased from 20% of alignment to 30% of alignment;
- The costs associated with typical road restoration were replaced with backfill of rip rap and fish habitat gravel to reflect some of the heightened environmental restoration and pipeline protection requirements.
    - Well graded rip rap should be placed in an approximately 1m thick layer atop the backfilled trench to counteract the buoyancy of the trunk sewer if it's not operating surcharged, as well as to provide protection and prevent trench erosion from storm surges wave action.
    - Fish habitat gravel or reclaimed beach gravel should be used to restore the seabed closer to its pre-existing state, promoting the re-establishment of marine habitat.

- To anchor the pipes and prevent floatation once installed, concrete cradles should be installed at the mid-point of every other pipe segment in sections of the alignment where required – estimated to be required for approximately 25% of the overall RDN 1 and RDN 2 flow paths;

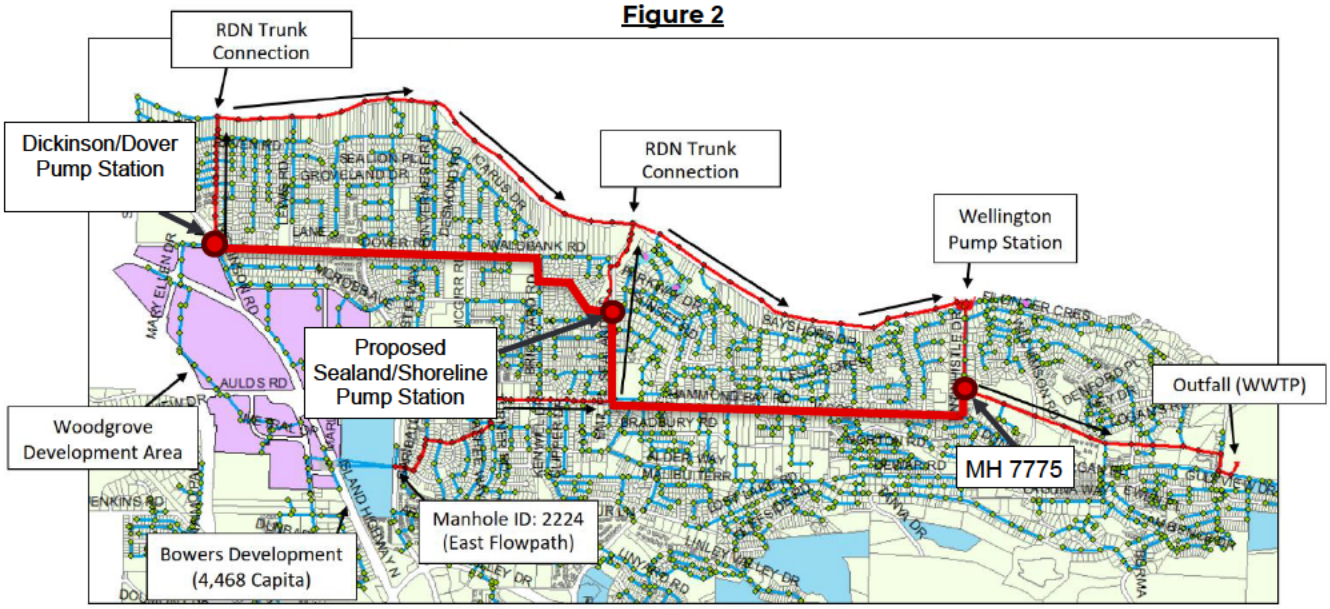
- The cost of manholes has been increased by 10% to account for extra labour and materials involved in ensuring it is water-tight anchored with sufficient ballast or concrete cradle.

An additional 25% contingency allowance has been added for environmental and archaeological considerations. This additional cost buffer is intended to support compliance with regulatory requirements and reflects the inherent risks of working in such a complex and sensitive environment.

## 2.3 FLOW DIVERSION VIA DICKINSON/DOVER PUMP STATION AND FORCEMAIN – OPTION 1B

An alternative option as opposed to upgrading the RDN trunk sewer was considered due to the complexity of the work in the foreshore. The RDN interceptor is predicted to meet capacity under the *2024 PWWF 5-Year I&I 10,000 Additional Capita* scenario. To avoid impacting the sensitive marine environment, the RDN trunk sewer will remain operational and any flows exceeding this scenario will be diverted east along Dover Rd and Hammond Bay Rd via a combination of individual forcemain, common forcemain and gravity sewers, ultimately discharging to MH 7775, see Figure 2 below.

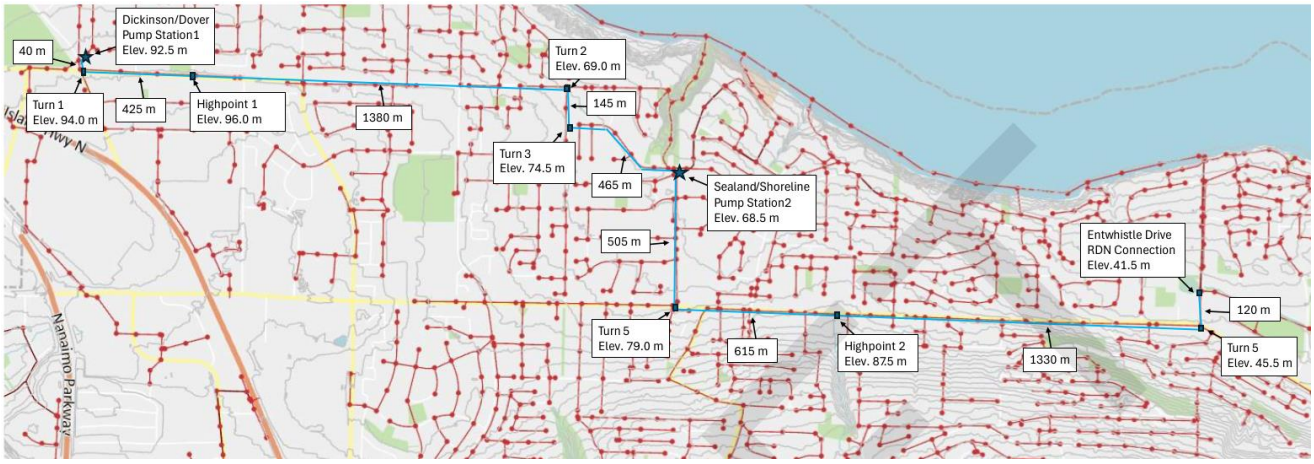
**Figure 2**




This alternative flow path is an extension of Option 2A from the *December 2023 North End Sanitary Sewer Routing Study*, where a pump station was proposed at Sealand Road and Sunset Road. In addition to this, a pump station is proposed at the intersection of Dickinson Rd and Dover Rd to divert all flows from the northern section of the WDA, while the Sealand/Sunset pump station will divert all flows from the southern section of the WDA along with the Sealand/Sunset upstream catchment.

With the proposed flow diversion, the inflow to the Sealand/Sunset pump station (205.7 L/s) still remains under the firm capacity. Therefore, the Class D cost estimate from the *2023 North End Sanitary Sewer Routing* Study for the Sealand/Sunset pump station remains relevant, with the exception of additional costs for forcemain upsizing from the pump station to MH7775 to account for the combined flows from the Dickinson/Dover pump station. Details will be shown in Section 3.0.

The Dickinson/Dover pump station requires a firm capacity of 155.6 L/s and total dynamic head of approximately 9.3m to climb over the highpoint in the alignment at 96m elevation approximately 465m away, resulting in a minimum pump size of 27hp assuming 70% efficiency. Preliminary reviews of Xylems pump catalogue suggest that the N3202 MT3~ (35hp) 643 impeller is the most efficient pump they offer that would be suitable at this station. Approximately of 2,530 meters of forcemain will be installed within the road right of way, maintaining a consistent size of 375 mm, to where it joins a combined forcemain at the Sealand/Shoreline station.




The cost estimate of the pump station is an approximate magnitude of cost derived from lump sum and unit costs of recent similar projects with the following assumptions:

- Pump station will be constructed on existing lot or within road RoW and no land acquisition costs are required.
- Grading and landscaping will be required at the site, but no clearing and grubbing.
- Station will include a FRP wet well and electrical kiosk. Estimates do not include costs for a building.
- Station will include flow meter in standalone below-ground chamber.
- Assumed configuration: duplex lift station, electrical kiosk, generator, wet well, valve chamber, flow meter manhole.
- Assumed voltage is 600V, 3-Phase.
- Assumed labour rate is $85/hr.
- Assumed generator size is 40kW.

The unit cost for the forcemain was derived from the Brechin unit cost previously mentioned, with the following modifications:

- Service connections were excluded from the unit cost derivation, as no service connections will be made along the forcemain. All diverted flow will enter the force main from the proposed pump station.
- Sanitary manholes costs have been removed, as manholes are not required for a forcemain.
- The cost for removal of existing pipe has been removed as this will be an addition to the City's sanitary system, rather than a replacement.
- The bypass pumping contingency has been removed as the RDN flow path will remain operational during construction.

## 2.4 RDN UPGRADES VIA TRENCHLESS INSTALLATION ALONG SHORELINE – OPTION 2

Urban System investigated directional drilling or micro tunnelling as a potential alternative to open cut trench installation for the foreshore pipes (Flow Path RDN1 and RDN2). PW Trenchless was contacted to discuss the feasibility of directional drilling for the RDN trunk sewer upgrade. However, they indicated that the parameters (depth of cover; overall project length) of the project weren't favorable to directional drilling and indicated that micro tunnelling may be more suitable for these segments.

Micro tunnelling could offer advantages of significantly reducing disturbance to the marine environment compared to open cut trench installation if the foreshore alignment is maintained. However, to utilize

microtunelling and avoid extensive surface impacts, the proposed sewer profiles would have to be at considerable depth, operated as surcharged gravity sewers / siphons, and require significant structures at Launching Pits 1 & 2 (refer to Figure 2 below) to hydraulically connect to the existing sewer. The alignments could be simplified as a straight line between Launching / Receiving Pits 1, 2 and 3, eliminating the need for numerous manholes and using a consistent pipe diameter for the entire length, illustrated in Figure 3.

The maintenance approach and considerations will need to be evaluated during a feasibility analysis of the pipe installation options. This may impact access points and should also consider the local limitations for equipment for inspecting and cleaning the sewer.

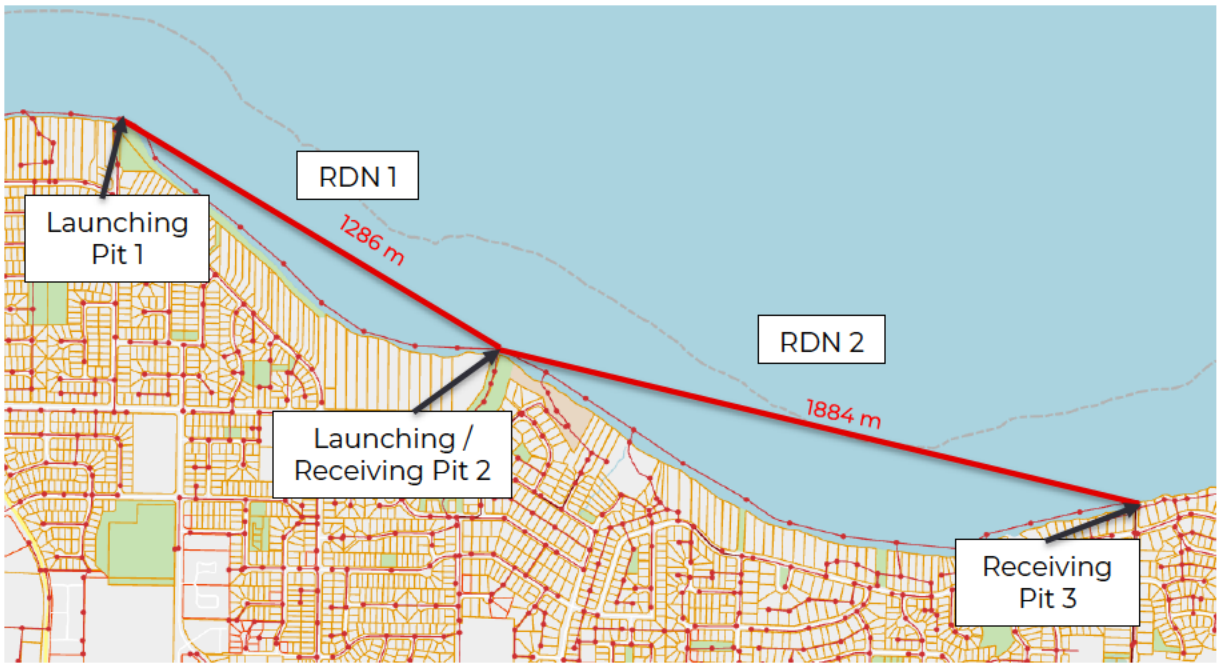



*Figure 3 – Micro tunnelling alignment*

The installation of the trunk sewer via micro tunnelling is estimated at a very high level to be approximately $7000 per meter before engineering & contingency allowance (40%), and a lessened archaeological and environmental allowance (10%). Some level of environmental and archaeological allowance will still be required, as three launching / receiving pits will be needed, as well as the construction of siphon chambers where these pits are excavated, each estimated to cost approximately $300,000.

Similar to open-cut trench installation estimates, the micro tunnelling cost estimate contains the following components required for design and construction:

- Engineering services for design and construction and contingency (40%);
- Environmental and Archaeological allowance (10%)

Generally, these costs are estimated to exceed $12,000/m after contingency allowances are applied and are anticipated to cost in the range of $16M and $27M under the 30,000 capita scenario for flowpaths RDN 1 and RDN 2 respectively – significantly increasing the cost of the project and creating a challenging maintenance scenario into the future.

# 3.0 COST

A high level cost estimate for Option 1A has been broken into flow path and population growth scenario as shown below in Table 2. Additionally, costs (above the base 2046 cost scenario) per-capita added have been calculated to show capital investment in relation to population growth. Note that all cost estimates are based in 2024-Dollars and no inflation has been applied to 2025.

**Table 2: Cost Estimate for RDN Trunk Sewer Upgrade via Open Cut Trench Installation – Option 1A**

| Flow Path | 2046 (No Additional Capita) | 5000 Capita | 10000 Capita | 15000 Capita | 20000 Capita | 25000 Capita | 30000 Capita |
|---|---|---|---|---|---|---|---|
| **City 1** | - | $461,811 | $478,591 | $561,105 | $944,509 | $944,509 | $1,613,790 |
| **City 2** | $1,927,643 | $5,037,158 | $5,742,107 | $5,750,920 | $5,884,248 | $6,050,331 | $6,089,745 |
| **RDN 1** | - | - | - | - | - | - | $6,057,311 |
| **RDN 2** | - | - | - | $5,678,758 | $9,713,745 | $11,385,221 | $12,359,611 |
| **Total** | $1,927,643 | $5,498,996 | $6,220,697 | $11,990,783 | $16,542,502 | $18,380,061 | $26,120,457 |
| **$/cap Added** | **-** | **$714** | **$429** | **$671** | **$731** | **$658** | **$806** |

It can be observed that there is a $148 increase in cost per capita added for the *30 000 additional capita* scenario. This is due to the RDN 1 flow path being triggered for upgrades in this scenario.

Table 3 details the costs associated with Option 1B, which includes the installation of the Dickinson/Dover pump station, Sealand/Shoreline pump station, and forcemain and gravity sewer upsizing.

**Table 3: Cost Estimate for Dickenson/Dover PS and Sealand/Shoreline Upsizing – Option 1B**

| Item Description | Lump Sum Cost |
|---|---|
| Wet well (c/w Pumps and Internal Mechanical Components) | $ 217,500 |
| Valve Chamber (c/w check valves, isolation valves, air valve, bypass) | $ 72,500 |
| Flow Meter (c/w chamber) | $ 75,000 |
| 2530m of 375mm Forcemain ($2184/m) | $ 5,524,400 |
| Electrical Kiosk, Generator, General Electrical, Testing, Commissioning & BC Hydro Service | $ 295,000 |
| Backup Generator | $ 42,000 |
| Civil Utilities (Tie-ins to sanitary system, water service, etc.) | $ 80,000 |
| General Site Works and Access Construction | $ 50,000 |
| **Sub-Total for Dickenson/Dover PS** | $6,356,400 |

| | |
|---|---|
| Sealand/Shoreline PS[1] | $ 1,006,000 |
| 1380m of 375 Forcemain ($1850/m) [1] | $ 2,553,000 |
| 480m of new Gravity Sewer (300mm: Norasea to SMH1574) ($2600/m) [1] | $ 1,248,000 |
| 160 m of Gravity Sewer Upsizing (450mm → 600mm) ($3700/m) [1] | $ 594,000 |
| **Sub-Total for Sealand/Shoreline PS[1]** | **$ 5,401,000** |
| Upsizing 1380m of Common Forcemain (400mm → 600mm) ($325/m)[2] | $ 448,500 |
| Upsizing 160m of Gravity Sewer (600mm → 750mm) ($125/m)[2] | $ 20,000 |
| Upsizing 480m of New Gravity Sewer (300mm → 450mm) ($225/m)[2] | $ 108,000 |
| **Sub-Total for Common Forcemain and Downstream Gravity Upsizing Triggered by New Dickinson Pumpstation[2]** | **$ 576,000** |
| **Project Sub-Total** | $12,333,900 |
| **Contingency Allowance (30%)** | $3,700,200 |
| **Design and Construction Engineering (15% of Construction + Contingency)** | $2,405,100 |
| **TOTAL** | $18,436,200 |
| **TOTAL EXCLUDING Sealand/Shoreline PS Construction and Contingency Allowance** | **$10,364,700** |

[1] See *2023 North End Sanitary Sewer Routing Study* for a Class D cost estimate on the Sealand/Shoreline pump station.
[2] Upsizing allowance only accounts for the cost difference for a larger diameter pipe, as road restoration and other costs already accounted for in Sealand/Shoreline project.

Table 4 below summarizes the total costs for using a combination of micro tunnelling on the RDN flow paths and open cut trench installation for the City 1 and City 2 flow paths.

**Table 4: Cost Estimate for Micro Tunnelling and Open Cut Trench Installation - Option 2**

| Flow Path | 2046 (No Additional Capita) | 5000 Capita | 10000 Capita | 15000 Capita | 20000 Capita | 25000 Capita | 30000 Capita |
|---|---|---|---|---|---|---|---|
| **City 1** | - | $461,811 | $478,591 | $561,105 | $944,509 | $944,509 | $1,613,790 |
| **City 2** | $1,927,643 | $5,037,185 | $5,742,107 | $5,750,920 | $5,884,248 | $6,050,331 | $6,091,584 |
| **RDN 1** | - | - | - | - | - | - | $16,396,500 |
| **RDN 2** | - | $25,434,000 | $25,434,000 | $25,716,600 | $26,281,800 | $26,847,000 | $27,412,200 |
| **Total** | $1,927,643 | $30,932,996 | $31,654,697 | $32,028,625 | $ 33,110,557 | $33,841,840 | $51,514,074 |
| **$/cap Added** | **-** | **$5,801.07** | **$2,972.71** | **$2,006.73** | **$1,559.15** | **$1,276.57** | **$1,652.88** |

It can be observed that flow diversion via new pump stations at Dickinson/Dover and Sealand/Shoreline has the lowest costs (~$18M for the entire strategy) among all the options at the 30 000 additional capita scenario. **If it is assumed that the Sealand/Shoreline PS is planned for construction in the future regardless of this study, the incremental cost of constructing the Dickinson PS theoretically reduces to $10.3M, and is more economical than upgrades to the RDN trunk sewer triggered when 15,000 additional capita are introduced.** This would suggest that if the City is wanting to introduce >15,000 additional capita to the WDA region, then it would be prudent economically to divert flows via this pump station strategy as opposed to the significant downstream gravity upgrades to City and RDN infrastructure. If growth is limited to <10,000 additional capita, then it would be more economical to only upgrade the City infrastructure detailed within GeoAdvice's technical memo and continue routing flows through the RDN trunk. It should also be noted that the Dickinson/Dover pump station was sized and costed for 30,000 additional capita, suggesting that capacity and capital costs could be reduced modestly if capita growth targets were confirmed lower – but the majority (80%) of costs associated with this pump station are the linear-forcemain installation costs, largely driven by extra costs and not necessarily pipe size.

It is important to recognize the variability in pricing especially for large infrastructure projects occurring more than four years from now. The costs presented above are intended solely for the purpose of comparing the different upgrade options and timelines when upgrades would be triggered. Revised cost estimates will be required during the actual project development process.

## 4.0 RECOMMENDATIONS

The unit rates presented reflect 2024 construction costs with recent market prices and inflationary changes. To account for the construction complexity of the RDN North Shore trunk sewer and high-risk seismic zones, further analysis is advised including input from geotechnical, ocean, environmental and archeological consultants.

Sincerely,

**URBAN SYSTEMS LTD.**

Emily Haas, EIT
Civil Engineer

Mark Stafford, P.Eng
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cc: Steve Brubacher, P.Eng, Urban Systems

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Enclosure

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# APPENDIX A – UNIT-RATE COST TABLE FROM BRECHIN SEWER MASTER PLAN (2023)

Reference: 2022 Unit Rates Sheet

**SANITARY PIPE COST PER METRE (0-2m depth) DERIVATION**

Added By-Pass Pumping (2024-02-21)

ASSUMPTIONS: Average trench width of 2m cut straight down (utilize 6' trench box)

| Item | Description | Unit | Quantity | 100mm to 450mm | | 525mm and 600mm | | 675mm and 750mm | | 900mm and 1050mm | | 1200mm-1500mm | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Unit Price | Total | Unit Price | Total | Unit Price | Total | Unit Price | Total | Unit Price | Total |
| **A.** | **SITE PREPARATION** | | | | | | | | | | | | |
| 1.01 | Asphalt cutting | lin.m. | 2 | 7.00 | $14.00 | 7.00 | $14.00 | 7.00 | $14.00 | 2 | 7.00 | $14.00 | 2 | 7.00 | $14.00 |
| 1.02 | Imported Fill | cu.m. | 4 | 50.00 | $200.00 | 50.00 | $200.00 | 50.00 | $200.00 | 4 | 50.00 | $200.00 | 4 | 50.00 | $200.00 |
| | **SUBTOTAL - SECTION A** | | | | **$214** | | **$214** | | **$214** | | | **$214** | | | **$214** |
| **B.** | **ROAD WORK RESTORATION** | | | | | | | | | | | | |
| 2.01 | Granular subbase (200mm depth) | sq.m. | 2 | 11.20 | $22.40 | 11.20 | $22.40 | 11.20 | $22.40 | 2 | 11.20 | $22.40 | 2 | 11.20 | $22.40 |
| 2.02 | 100mm Asphalt & 150mm Base | sq.m. | 2 | 150.00 | $300.00 | 150.00 | $300.00 | 150.00 | $300.00 | 2 | 150.00 | $300.00 | 2 | 150.00 | $300.00 |
| | **SUBTOTAL - SECTION B** | | | | **$322** | | **$322** | | **$322** | | | **$322** | | | **$322** |
| **C.** | **SANITARY SEWERS** | | | | | | | | | | | | |
| 3.01 | Manhole complete incl. removal of existing (1 per 50m) | ea. | 0.02 | 5,420.00 | $108.40 | 6,800.00 | $136.00 | 10,800.00 | $216.00 | 0.02 | 10,800.00 | $216.00 | 0.02 | 13,400.00 | $268.00 |
| 3.02 | Removal of existing pipe | lin.m. | 1 | 60.00 | $60.00 | 75.00 | $75.00 | 75.00 | $75.00 | 1 | 75.00 | $75.00 | 1 | 100.00 | $100.00 |
| 3.03 | Connection to existing (assume 2 directions) | ea. | 0.02 | 5,400.00 | $108.00 | 11,600.00 | $232.00 | 11,600.00 | $232.00 | 0.02 | 11,600.00 | $232.00 | 0.02 | 11,600.00 | $232.00 |
| 3.04 | 100mm Lot service connection c/w 200mm IC (1 per 10m) | ea. | 0.1 | 3,050.00 | $305.00 | 3,050.00 | $305.00 | 3,050.00 | $305.00 | 0.1 | 3,050.00 | $305.00 | 0.1 | 3,050.00 | $305.00 |
| | **SUBTOTAL - SECTION C** | | | | **$581** | | **$748** | | **$828** | | | **$828** | | | **$905** |
| | **SUMMARY** | | | | **$1,117.80** | | **$1,284.40** | | **$1,364.40** | | | **$1,364.40** | | | **$1,441.40** |

| Pipe Size (mm) | 200 | 250 | 300 | 350 | 375 | 400 | 450 | 525 | 600 | 675 | 750 | 900 | 1050 | 1200 | 1350 | 1500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pipe Cost | **$375.00** | **$400.00** | **$475.00** | **$538.00** | **$600.00** | **$650.00** | **$700.00** | **$850.00** | **$975.00** | **$1,038.00** | **$1,100.00** | **$1,300.00** | **$1,500.00** | **$1,900.00** | **$2,000.00** | **$2,100.00** |
| Extra Costs | $1,117.80 | $1,117.80 | $1,117.80 | $1,117.80 | $1,117.80 | $1,117.80 | $1,117.80 | $1,284.40 | $1,284.40 | $1,364.40 | $1,364.40 | $1,364.40 | $1,364.40 | $1,441.40 | $1,441.40 | $1,441.40 |
| Subtotal | $1,492.80 | $1,517.80 | $1,592.80 | $1,655.80 | $1,717.80 | $1,767.80 | $1,817.80 | $2,134.40 | $2,259.40 | $2,402.40 | $2,464.40 | $2,664.40 | $2,864.40 | $3,341.40 | $3,441.40 | $3,541.40 |
| Bypass Pumping (5%) | $74.64 | $75.89 | $79.64 | $82.79 | $85.89 | $88.39 | $90.89 | $106.72 | $112.97 | $120.12 | $123.22 | $133.22 | $143.22 | $167.07 | $172.07 | $177.07 |
| Engineering and Contingency (30%) | $470.23 | $478.11 | $501.73 | $521.58 | $541.11 | $556.86 | $572.61 | $672.34 | $711.71 | $756.76 | $776.29 | $839.29 | $902.29 | $1,052.54 | $1,084.04 | $1,115.54 |
| Subtotal | $2,037.67 | $2,071.80 | $2,174.17 | $2,260.17 | $2,344.80 | $2,413.05 | $2,481.30 | $2,913.46 | $3,084.08 | $3,279.28 | $3,363.91 | $3,636.91 | $3,909.91 | $4,561.01 | $4,697.51 | $4,834.01 |
| Supply Chain Cost Increase (15%) | $305.65 | $310.77 | $326.13 | $339.03 | $351.72 | $361.96 | $372.19 | $437.02 | $462.61 | $491.89 | $504.59 | $545.54 | $586.49 | $684.15 | $704.63 | $725.10 |
| Inflation (10%) | $203.77 | $207.18 | $217.42 | $226.02 | $234.48 | $241.30 | $248.13 | $291.35 | $308.41 | $327.93 | $336.39 | $363.69 | $390.99 | $456.10 | $469.75 | $483.40 |
| **TOTAL UNIT COST** | **$2,547.09** | **$2,589.75** | **$2,717.72** | **$2,825.21** | **$2,931.00** | **$3,016.31** | **$3,101.62** | **$3,641.82** | **$3,855.10** | **$4,099.10** | **$4,204.88** | **$4,546.13** | **$4,887.38** | **$5,701.26** | **$5,871.89** | **$6,042.51** |

Note: Manhole Price Breakdown:

| Pipe Size | Frame/ Base/ Cover / Removal | Vertical Metres $ per m | Total |
|---|---|---|---|
| 100-450mm | $3,900.00 | $760.00 | $5,420.00 |
| 525-600mm | $4,800.00 | $1,000.00 | $6,800.00 |
| 675-750mm | $7,800.00 | $1,500.00 | $10,800.00 |
| 900-1050mm | $7,800.00 | $1,500.00 | $10,800.00 |
| 1200-1500mm | $9,800.00 | $1,800.00 | $13,400.00 |

Reference: 2022 Unit Rates Sheet

Added By-Pass Pumping (2024-02-21)

**SANITARY PIPE COST PER METRE (2-4m depth) DERIVATION**

ASSUMPTIONS: Average trench width of 2m with 8' trench box

Top 1.6m at 1:1 slope, with total width of 5.2m

| Item | Description | Unit | Quantity | 100mm to 450mm Unit Price | 100mm to 450mm Total | 525mm and 600mm Unit Price | 525mm and 600mm Total | 675mm and 750mm Unit Price | 675mm and 750mm Total | 900mm and 1050mm Unit Price | 900mm and 1050mm Total | 1200mm-1500mm Unit Price | 1200mm-1500mm Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **A.** | **SITE PREPARATION** | | | | | | | | | | | | |
| 1.01 | Asphalt cutting | lin.m. | 2 | 7.00 | $14.00 | 7.00 | $14.00 | 7.00 | $14.00 | 7.00 | $14.00 | 7.00 | $14.00 |
| 1.02 | Imported Fill | cu.m. | 11 | 50.00 | $550.00 | 50.00 | $550.00 | 50.00 | $550.00 | 50.00 | $550.00 | 50.00 | $550.00 |
| | **SUBTOTAL - SECTION A** | | | | **$564** | | **$564** | | **$564** | | **$564** | | **$564** |
| **B.** | **ROAD WORK RESTORATION** | | | | | | | | | | | | |
| 2.01 | Granular subbase (200mm depth) | sq.m. | 5 | 11.20 | $56.00 | 11.20 | $56.00 | 11.20 | $56.00 | 11.20 | $56.00 | 11.20 | $56.00 |
| 2.02 | 100mm Asphalt & 150mm Base | sq.m. | 5 | 150.00 | $750.00 | 150.00 | $750.00 | 150.00 | $750.00 | 150.00 | $750.00 | 150.00 | $750.00 |
| | **SUBTOTAL - SECTION B** | | | | **$806** | | **$806** | | **$806** | | **$806** | | **$806** |
| **C.** | **SANITARY SEWERS** | | | | | | | | | | | | |
| 3.01 | Manhole complete (1 per 50m) | ea. | 0.02 | 6,180.00 | $123.60 | 7,800.00 | $156.00 | 12,300.00 | $246.00 | 12,300.00 | $246.00 | 15,200.00 | $304.00 |
| 3.02 | Removal of existing pipe | lin.m. | 1 | 60.00 | $60.00 | 75.00 | $75.00 | 75.00 | $75.00 | 75.00 | $75.00 | 100.00 | $100.00 |
| 3.03 | Connection to existing (assume 2 directions) | ea. | 0.02 | 5,400.00 | $108.00 | 11,600.00 | $232.00 | 11,600.00 | $232.00 | 11,600.00 | $232.00 | 11,600.00 | $232.00 |
| 3.04 | 100mm Lot service connection c/w 200mm IC (1 per 10m) | ea. | 0.1 | 3,050.00 | $305.00 | 3,050.00 | $305.00 | 3,050.00 | $305.00 | 3,050.00 | $305.00 | 3,050.00 | $305.00 |
| | **SUBTOTAL - SECTION C** | | | | **$597** | | **$768** | | **$858** | | **$858** | | **$941** |
| | **SUMMARY** | | | | **$1,966.60** | | **$2,138.00** | | **$2,228.00** | | **$2,228.00** | | **$2,311.00** |

| Pipe Size (mm) | 200 | 250 | 300 | 350 | 375 | 400 | 450 | 525 | 600 | 675 | 750 | 900 | 1050 | 1200 | 1350 | 1500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pipe Cost | **$375.00** | **$400.00** | **$475.00** | **$538.00** | **$600.00** | **$650.00** | **$700.00** | **$850.00** | **$975.00** | **$1,038.00** | **$1,100.00** | **$1,300.00** | **$1,500.00** | **$1,900.00** | **$2,000.00** | **$2,100.00** |
| Extra Costs | $1,966.60 | $1,966.60 | $1,966.60 | $1,966.60 | $1,966.60 | $1,966.60 | $1,966.60 | $2,138.00 | $2,138.00 | $2,228.00 | $2,228.00 | $2,228.00 | $2,228.00 | $2,311.00 | $2,311.00 | $2,311.00 |
| Subtotal | $2,341.60 | $2,366.60 | $2,441.60 | $2,504.60 | $2,566.60 | $2,616.60 | $2,666.60 | $2,988.00 | $3,113.00 | $3,266.00 | $3,328.00 | $3,528.00 | $3,728.00 | $4,211.00 | $4,311.00 | $4,411.00 |
| Bypass Pumping (5%) | $117.08 | $118.33 | $122.08 | $125.23 | $128.33 | $130.83 | $133.33 | $149.40 | $155.65 | $163.30 | $166.40 | $176.40 | $186.40 | $210.55 | $215.55 | $220.55 |
| Engineering and Contingency (30%) | $737.60 | $745.48 | $769.10 | $788.95 | $808.48 | $824.23 | $839.98 | $941.22 | $980.60 | $1,028.79 | $1,048.32 | $1,111.32 | $1,174.32 | $1,326.47 | $1,357.97 | $1,389.47 |
| Subtotal | $3,196.28 | $3,230.41 | $3,332.78 | $3,418.78 | $3,503.41 | $3,571.66 | $3,639.91 | $4,078.62 | $4,249.25 | $4,458.09 | $4,542.72 | $4,815.72 | $5,088.72 | $5,748.02 | $5,884.52 | $6,021.02 |
| Supply Chain Cost Increase (15%) | $479.44 | $484.56 | $499.92 | $512.82 | $525.51 | $535.75 | $545.99 | $611.79 | $637.39 | $668.71 | $681.41 | $722.36 | $763.31 | $862.20 | $882.68 | $903.15 |
| Inflation (10%) | $319.63 | $323.04 | $333.28 | $341.88 | $350.34 | $357.17 | $363.99 | $407.86 | $424.92 | $445.81 | $454.27 | $481.57 | $508.87 | $574.80 | $588.45 | $602.10 |
| **TOTAL UNIT COST** | **$3,995.36** | **$4,038.01** | **$4,165.98** | **$4,273.47** | **$4,379.26** | **$4,464.57** | **$4,549.89** | **$5,098.28** | **$5,311.56** | **$5,572.61** | **$5,678.40** | **$6,019.65** | **$6,360.90** | **$7,185.02** | **$7,355.64** | **$7,526.27** |

Note: Manhole Price Breakdown:

| Pipe Size | Frame/ Base/ Cover / Removal | Vertical Metres $ per m | Total |
|---|---|---|---|
| 100-450mm | $3,900.00 | $760.00 | $6,180.00 |
| 525-600mm | $4,800.00 | $1,000.00 | $7,800.00 |
| 675-750mm | $7,800.00 | $1,500.00 | $12,300.00 |
| 900-1050mm | $7,800.00 | $1,500.00 | $12,300.00 |
| 1200-1500mm | $9,800.00 | $1,800.00 | $15,200.00 |

Reference: 2022 Unit Rates Sheet

**SANITARY PIPE COST PER METRE (4-6m depth) DERIVATION**

Added By-Pass Pumping (2024-02-21)

ASSUMPTIONS: Average trench width of 2m with 8' and 6' trench boxes

Top 1.8m at 1:1 slope, with total width of 5.6m

| Item | Description | Unit | 100mm to 450mm Quantity | 100mm to 450mm Unit Price | 100mm to 450mm Total | 525mm and 600mm Unit Price | 525mm and 600mm Total | 675mm and 750mm Unit Price | 675mm and 750mm Total | 900mm and 1050mm Quantity | 900mm and 1050mm Unit Price | 900mm and 1050mm Total | 1200mm-1500mm Quantity | 1200mm-1500mm Unit Price | 1200mm-1500mm Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **A.** | **SITE PREPARATION** | | | | | | | | | | | | | | |
| 1.01 | Asphalt cutting | lin.m. | 2 | 7.00 | $14.00 | 7.00 | $14.00 | 7.00 | $14.00 | 2 | 7.00 | $14.00 | 2 | 7.00 | $14.00 |
| 1.02 | Imported Fill | cu.m. | 15 | 50.00 | $750.00 | 50.00 | $750.00 | 50.00 | $750.00 | 15 | 50.00 | $750.00 | 15 | 50.00 | $750.00 |
| | **SUBTOTAL - SECTION A** | | | | **$764** | | **$764** | | **$764** | | | **$764** | | | **$764** |
| **B.** | **ROAD WORK RESTORATION** | | | | | | | | | | | | | | |
| 2.01 | Granular subbase (200mm depth) | sq.m. | 6 | 11.20 | $67.20 | 11.20 | $67.20 | 11.20 | $67.20 | 6 | 11.20 | $67.20 | 6 | 11.20 | $67.20 |
| 2.02 | 100mm Asphalt & 150mm Base | sq.m. | 6 | 150.00 | $900.00 | 150.00 | $900.00 | 150.00 | $900.00 | 6 | 150.00 | $900.00 | 6 | 150.00 | $900.00 |
| | **SUBTOTAL - SECTION B** | | | | **$967** | | **$967** | | **$967** | | | **$967** | | | **$967** |
| **C.** | **SANITARY SEWERS** | | | | | | | | | | | | | | |
| 3.01 | Manhole complete (1 per 50m) | ea. | 0.02 | 7,700.00 | $154.00 | 9,800.00 | $196.00 | 15,300.00 | $306.00 | 0.02 | 15,300.00 | $306.00 | 0.02 | 18,800.00 | $376.00 |
| 3.02 | Removal of existing pipe | lin.m. | 1 | 60.00 | $60.00 | 75.00 | $75.00 | 75.00 | $75.00 | 1 | 75.00 | $75.00 | 1 | 100.00 | $100.00 |
| 3.03 | Connection to existing (assume 2 directions) | ea. | 0.02 | 5,400.00 | $108.00 | 11,600.00 | $232.00 | 11,600.00 | $232.00 | 0.02 | 11,600.00 | $232.00 | 0.02 | 11,600.00 | $232.00 |
| 3.04 | 100mm Lot service connection c/w 200mm IC (1 per 10m) | ea. | 0.1 | 3,050.00 | $305.00 | 3,050.00 | $305.00 | 3,050.00 | $305.00 | 0.1 | 3,050.00 | $305.00 | 0.1 | 3,050.00 | $305.00 |
| | **SUBTOTAL - SECTION C** | | | | **$627** | | **$808** | | **$918** | | | **$918** | | | **$1,013** |
| | **SUMMARY** | | | | **$2,358.20** | | **$2,539.20** | | **$2,649.20** | | | **$2,649.20** | | | **$2,744.20** |

| Pipe Size (mm) | 200 | 250 | 300 | 350 | 375 | 400 | 450 | 525 | 600 | 675 | 750 | 900 | 1050 | 1200 | 1350 | 1500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pipe Cost | **$375.00** | **$400.00** | **$475.00** | **$538.00** | **$600.00** | **$650.00** | **$700.00** | **$850.00** | **$975.00** | **$1,038.00** | **$1,100.00** | **$1,300.00** | **$1,500.00** | **$1,900.00** | **$2,000.00** | **$2,100.00** |
| Extra Costs | $2,358.20 | $2,358.20 | $2,358.20 | $2,358.20 | $2,358.20 | $2,358.20 | $2,358.20 | $2,539.20 | $2,539.20 | $2,649.20 | $2,649.20 | $2,649.20 | $2,649.20 | $2,744.20 | $2,744.20 | $2,744.20 |
| Subtotal | $2,733.20 | $2,758.20 | $2,833.20 | $2,896.20 | $2,958.20 | $3,008.20 | $3,058.20 | $3,389.20 | $3,514.20 | $3,687.20 | $3,749.20 | $3,949.20 | $4,149.20 | $4,644.20 | $4,744.20 | $4,844.20 |
| Bypass Pumping (5%) | $136.66 | $137.91 | $141.66 | $144.81 | $147.91 | $150.41 | $152.91 | $169.46 | $175.71 | $184.36 | $187.46 | $197.46 | $207.46 | $232.21 | $237.21 | $242.21 |
| Engineering and Contingency (30%) | $860.96 | $868.83 | $892.46 | $912.30 | $931.83 | $947.58 | $963.33 | $1,067.60 | $1,106.97 | $1,161.47 | $1,181.00 | $1,244.00 | $1,307.00 | $1,462.92 | $1,494.42 | $1,525.92 |
| Subtotal | $3,730.82 | $3,764.94 | $3,867.32 | $3,953.31 | $4,037.94 | $4,106.19 | $4,174.44 | $4,626.26 | $4,796.88 | $5,033.03 | $5,117.66 | $5,390.66 | $5,663.66 | $6,339.33 | $6,475.83 | $6,612.33 |
| Supply Chain Cost Increase (15%) | $559.62 | $564.74 | $580.10 | $593.00 | $605.69 | $615.93 | $626.17 | $693.94 | $719.53 | $754.95 | $767.65 | $808.60 | $849.55 | $950.90 | $971.37 | $991.85 |
| Inflation (10%) | $373.08 | $376.49 | $386.73 | $395.33 | $403.79 | $410.62 | $417.44 | $462.63 | $479.69 | $503.30 | $511.77 | $539.07 | $566.37 | $633.93 | $647.58 | $661.23 |
| **TOTAL UNIT COST** | **$4,663.52** | **$4,706.18** | **$4,834.15** | **$4,941.64** | **$5,047.43** | **$5,132.74** | **$5,218.05** | **$5,782.82** | **$5,996.10** | **$6,291.29** | **$6,397.07** | **$6,738.32** | **$7,079.57** | **$7,924.17** | **$8,094.79** | **$8,265.42** |

Note: Manhole Price Breakdown:

| Pipe Size | Frame/ Base/ Cover / Removal | Vertical Metres $ per m | Total |
|---|---|---|---|
| 100-450mm | $3,900.00 | $760.00 | $7,700.00 |
| 525-600mm | $4,800.00 | $1,000.00 | $9,800.00 |
| 675-750mm | $7,800.00 | $1,500.00 | $15,300.00 |
| 900-1050mm | $7,800.00 | $1,500.00 | $15,300.00 |
| 1200-1500mm | $9,800.00 | $1,800.00 | $18,800.00 |

# APPENDIX B – UNIT COST FOR OPEN TRENCH INSTALLATION

Reference: 2022 Unit Rates Sheet

**SANITARY PIPE COST PER METRE (0-2m depth) DERIVATION**

Added By-Pass Pumping (2024-02-21)

ASSUMPTIONS: Average trench width of 2m cut straight down (utilize 6' trench box)

| | | | | 100mm to 450mm | | 525mm and 600mm | | 675mm and 750mm | | 900mm and 1050mm | | 1200mm-1500mm | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Item** | **Description** | **Unit** | **Quantity** | **Unit Price** | **Total** | **Unit Price** | **Total** | **Unit Price** | **Total** | **Unit Price** | **Total** | **Unit Price** | **Total** |
| **A.** | **SITE PREPARATION** | | | | | | | | | | | | |
| 1.01 | Asphalt cutting | lin.m. | 2 | 7.00 | $14.00 | 7.00 | $14.00 | 7.00 | $14.00 | 7.00 | $14.00 | 7.00 | $14.00 |
| 1.02 | Common Excavation & Offsite Disposal | cu.m. | 4 | 32.00 | $128.00 | 32.00 | $128.00 | 32.00 | $128.00 | 32.00 | $128.00 | 32.00 | $128.00 |
| 1.03 | Rock Excavation (20%) | cu.m. | 0.8 | 450.00 | $360.00 | 450.00 | $360.00 | 450.00 | $360.00 | 450.00 | $360.00 | 450.00 | $360.00 |
| | **SUBTOTAL - SECTION A** | | | | **$502** | | **$502** | | **$502** | | **$502** | | **$502** |
| **B.** | **ROAD WORK RESTORATION** | | | | | | | | | | | | |
| 2.01 | Trench Backfill (Including Pipe Bedding and compaction) | cu.m | 3.2 | 57.60 | $184.32 | 57.60 | $184.32 | 57.60 | $184.32 | 57.60 | $184.32 | 57.60 | $184.32 |
| 2.02 | Granular subbase (200mm depth) | cu.m | 0.4 | 60.45 | $24.18 | 60.45 | $24.18 | 60.45 | $24.18 | 60.45 | $24.18 | 60.45 | $24.18 |
| 2.03 | Granular Base (150mm depth) | cu.m | 0.3 | 73.20 | $21.96 | 73.20 | $21.96 | 73.20 | $21.96 | 73.20 | $21.96 | 73.20 | $21.96 |
| 2.04 | 50mm Asphalt | sq.m. | 2 | 60.00 | $120.00 | 60.00 | $120.00 | 60.00 | $120.00 | 60.00 | $120.00 | 60.00 | $120.00 |
| | **SUBTOTAL - SECTION B** | | | | **$350** | | **$350** | | **$350** | | **$350** | | **$350** |
| **C.** | **SANITARY SEWERS** | | | | | | | | | | | | |
| 3.01 | Manhole complete incl. removal of existing (1 per 50m) | ea. | 0.02 | 5,420.00 | $108.40 | 6,800.00 | $136.00 | 10,800.00 | $216.00 | 10,800.00 | $216.00 | 13,400.00 | $268.00 |
| 3.02 | Removal of existing pipe | lin.m. | 1 | 60.00 | $60.00 | 75.00 | $75.00 | 75.00 | $75.00 | 75.00 | $75.00 | 100.00 | $100.00 |
| 3.03 | Connection to existing (assume 2 directions) | ea. | 0.02 | 5,400.00 | $108.00 | 11,600.00 | $232.00 | 11,600.00 | $232.00 | 11,600.00 | $232.00 | 11,600.00 | $232.00 |
| 3.04 | 100mm Lot service connection c/w 200mm IC (1 per 10m) | ea. | 0.1 | 3,050.00 | $305.00 | 3,050.00 | $305.00 | 3,050.00 | $305.00 | 3,050.00 | $305.00 | 3,050.00 | $305.00 |
| | **SUBTOTAL - SECTION C** | | | | **$581** | | **$748** | | **$828** | | **$828** | | **$905** |
| | **SUMMARY** | | | | **$1,433.86** | | **$1,600.46** | | **$1,680.46** | | **$1,680.46** | | **$1,757.46** |

| Pipe Size (mm) | 200 | 250 | 300 | 350 | 375 | 400 | 450 | 525 | 600 | 675 | 750 | 900 | 1050 | 1200 | 1350 | 1500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pipe Cost | **$375.00** | **$400.00** | **$475.00** | **$538.00** | **$600.00** | **$650.00** | **$700.00** | **$850.00** | **$975.00** | **$1,038.00** | **$1,100.00** | **$1,300.00** | **$1,500.00** | **$1,900.00** | **$2,000.00** | **$2,100.00** |
| Extra Costs | $1,433.86 | $1,433.86 | $1,433.86 | $1,433.86 | $1,433.86 | $1,433.86 | $1,433.86 | $1,600.46 | $1,600.46 | $1,680.46 | $1,680.46 | $1,680.46 | $1,680.46 | $1,757.46 | $1,757.46 | $1,757.46 |
| Subtotal | $1,808.86 | $1,833.86 | $1,908.86 | $1,971.86 | $2,033.86 | $2,083.86 | $2,133.86 | $2,450.46 | $2,575.46 | $2,718.46 | $2,780.46 | $2,980.46 | $3,180.46 | $3,657.46 | $3,757.46 | $3,857.46 |
| Bypass Pumping (5%) | $90.44 | $91.69 | $95.44 | $98.59 | $101.69 | $104.19 | $106.69 | $122.52 | $128.77 | $135.92 | $139.02 | $149.02 | $159.02 | $182.87 | $187.87 | $192.87 |
| Engineering and Contingency (30%) | $759.72 | $770.22 | $801.72 | $828.18 | $854.22 | $875.22 | $896.22 | $1,029.19 | $1,081.69 | $1,141.75 | $1,167.79 | $1,251.79 | $1,335.79 | $1,536.13 | $1,578.13 | $1,620.13 |
| Subtotal | $2,659.02 | $2,695.77 | $2,806.02 | $2,898.63 | $2,989.77 | $3,063.27 | $3,136.77 | $3,602.18 | $3,785.93 | $3,996.14 | $4,087.28 | $4,381.28 | $4,675.28 | $5,376.47 | $5,523.47 | $5,670.47 |
| **TOTAL UNIT COST** | **$2,659.02** | **$2,695.77** | **$2,806.02** | **$2,898.63** | **$2,989.77** | **$3,063.27** | **$3,136.77** | **$3,602.18** | **$3,785.93** | **$3,996.14** | **$4,087.28** | **$4,381.28** | **$4,675.28** | **$5,376.47** | **$5,523.47** | **$5,670.47** |

Reference: 2022 Unit Rates Sheet

Added By-Pass Pumping (2024-02-21)

**SANITARY PIPE COST PER METRE (2-4m depth) DERIVATION**

ASSUMPTIONS: Average trench width of 2m cut straight down (utilize 6' trench box)

| Item | Description | Unit | Quantity | 100mm to 450mm | | 525mm and 600mm | | 675mm and 750mm | | 900mm and 1050mm | | 1200mm-1500mm | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Unit Price | Total | Unit Price | Total | Unit Price | Total | Unit Price | Total | Unit Price | Total |
| **A.** | **SITE PREPARATION** | | | | | | | | | | | | |
| 1.01 | Asphalt cutting | lin.m. | 2 | 7.00 | $14.00 | 7.00 | $14.00 | 7.00 | $14.00 | 7.00 | $14.00 | 7.00 | $14.00 |
| 1.02 | Common Excavation & Offsite Disposal | cu.m. | 8 | 32.00 | $256.00 | 32.00 | $256.00 | 32.00 | $256.00 | 32.00 | $256.00 | 32.00 | $256.00 |
| 1.03 | Rock Excavation (20%) | cu.m. | 1.6 | 450.00 | $720.00 | 450.00 | $720.00 | 450.00 | $720.00 | 450.00 | $720.00 | 450.00 | $720.00 |
| | **SUBTOTAL - SECTION A** | | | | **$990** | | **$990** | | **$990** | | **$990** | | **$990** |
| **B.** | **ROAD WORK RESTORATION** | | | | | | | | | | | | |
| 2.01 | Trench Backfill (Including Pipe Bedding and compaction) | cu.m | 7.2 | 57.60 | $414.72 | 57.60 | $414.72 | 57.60 | $414.72 | 57.60 | $414.72 | 57.60 | $414.72 |
| 2.02 | Granular subbase (200mm depth) | cu.m | 0.4 | 60.45 | $24.18 | 60.45 | $24.18 | 60.45 | $24.18 | 60.45 | $24.18 | 60.45 | $24.18 |
| 2.03 | Granular Base (150mm depth) | cu.m | 0.3 | 73.20 | $21.96 | 73.20 | $21.96 | 73.20 | $21.96 | 73.20 | $21.96 | 73.20 | $21.96 |
| 2.04 | 50mm Asphalt | sq.m. | 2 | 60.00 | $120.00 | 60.00 | $120.00 | 60.00 | $120.00 | 60.00 | $120.00 | 60.00 | $120.00 |
| | **SUBTOTAL - SECTION B** | | | | **$581** | | **$581** | | **$581** | | **$581** | | **$581** |
| **C.** | **SANITARY SEWERS** | | | | | | | | | | | | |
| 3.01 | Manhole complete incl. removal of existing (1 per 50m) | ea. | 0.02 | 5,420.00 | $108.40 | 6,800.00 | $136.00 | 10,800.00 | $216.00 | 10,800.00 | $216.00 | 13,400.00 | $268.00 |
| 3.02 | Removal of existing pipe | lin.m. | 1 | 60.00 | $60.00 | 75.00 | $75.00 | 75.00 | $75.00 | 75.00 | $75.00 | 100.00 | $100.00 |
| 3.03 | Connection to existing (assume 2 directions) | ea. | 0.02 | 5,400.00 | $108.00 | 11,600.00 | $232.00 | 11,600.00 | $232.00 | 11,600.00 | $232.00 | 11,600.00 | $232.00 |
| 3.04 | 100mm Lot service connection c/w 200mm IC (1 per 10m) | ea. | 0.1 | 3,050.00 | $305.00 | 3,050.00 | $305.00 | 3,050.00 | $305.00 | 3,050.00 | $305.00 | 3,050.00 | $305.00 |
| | **SUBTOTAL - SECTION C** | | | | **$581** | | **$748** | | **$828** | | **$828** | | **$905** |
| | **SUMMARY** | | | | **$2,152.26** | | **$2,318.86** | | **$2,398.86** | | **$2,398.86** | | **$2,475.86** |

| Pipe Size (mm) | 200 | 250 | 300 | 350 | 375 | 400 | 450 | 525 | 600 | 675 | 750 | 900 | 1050 | 1200 | 1350 | 1500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pipe Cost | **$375.00** | **$400.00** | **$475.00** | **$538.00** | **$600.00** | **$650.00** | **$700.00** | **$850.00** | **$975.00** | **$1,038.00** | **$1,100.00** | **$1,300.00** | **$1,500.00** | **$1,900.00** | **$2,000.00** | **$2,100.00** |
| Extra Costs | $2,152.26 | $2,152.26 | $2,152.26 | $2,152.26 | $2,152.26 | $2,152.26 | $2,152.26 | $2,318.86 | $2,318.86 | $2,398.86 | $2,398.86 | $2,398.86 | $2,398.86 | $2,475.86 | $2,475.86 | $2,475.86 |
| Subtotal | $2,527.26 | $2,552.26 | $2,627.26 | $2,690.26 | $2,752.26 | $2,802.26 | $2,852.26 | $3,168.86 | $3,293.86 | $3,436.86 | $3,498.86 | $3,698.86 | $3,898.86 | $4,375.86 | $4,475.86 | $4,575.86 |
| Bypass Pumping (5%) | $126.36 | $127.61 | $131.36 | $134.51 | $137.61 | $140.11 | $142.61 | $158.44 | $164.69 | $171.84 | $174.94 | $184.94 | $194.94 | $218.79 | $223.79 | $228.79 |
| Engineering and Contingency (30%) | $1,061.45 | $1,071.95 | $1,103.45 | $1,129.91 | $1,155.95 | $1,176.95 | $1,197.95 | $1,330.92 | $1,383.42 | $1,443.48 | $1,469.52 | $1,553.52 | $1,637.52 | $1,837.86 | $1,879.86 | $1,921.86 |
| Subtotal | $3,715.07 | $3,751.82 | $3,862.07 | $3,954.68 | $4,045.82 | $4,119.32 | $4,192.82 | $4,658.22 | $4,841.97 | $5,052.18 | $5,143.32 | $5,437.32 | $5,731.32 | $6,432.51 | $6,579.51 | $6,726.51 |
| **TOTAL UNIT COST** | **$3,715.07** | **$3,751.82** | **$3,862.07** | **$3,954.68** | **$4,045.82** | **$4,119.32** | **$4,192.82** | **$4,658.22** | **$4,841.97** | **$5,052.18** | **$5,143.32** | **$5,437.32** | **$5,731.32** | **$6,432.51** | **$6,579.51** | **$6,726.51** |

Note: Manhole Price Breakdown:

| Pipe Size | Frame/ Base/ Cover / Removal | Vertical Metres $ per m | Total |
|---|---|---|---|
| 100-450mm | $3,900.00 | $760.00 | $5,420.00 |
| 525-600mm | $4,800.00 | $1,000.00 | $6,800.00 |
| 675-750mm | $7,800.00 | $1,500.00 | $10,800.00 |
| 900-1050mm | $7,800.00 | $1,500.00 | $10,800.00 |
| 1200-1500mm | $9,800.00 | $1,800.00 | $13,400.00 |

Reference: 2022 Unit Rates Sheet

Added By-Pass Pumping (2024-02-21)

**SANITARY PIPE COST PER METRE (4-6m depth) DERIVATION**

ASSUMPTIONS: Average trench width of 2m cut straight down (utilize 6' trench box)

| Item | Description | Unit | Quantity | 100mm to 450mm | | 525mm and 600mm | | 675mm and 750mm | | 900mm and 1050mm | | 1200mm-1500mm | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Unit Price | Total | Unit Price | Total | Unit Price | Total | Unit Price | Total | Unit Price | Total |
| **A.** | **SITE PREPARATION** | | | | | | | | | | | | |
| 1.01 | Asphalt cutting | lin.m. | 2 | 7.00 | $14.00 | 7.00 | $14.00 | 7.00 | $14.00 | 7.00 | $14.00 | 7.00 | $14.00 |
| 1.02 | Common Excavation & Offsite Disposal | cu.m. | 12 | 32.00 | $384.00 | 32.00 | $384.00 | 32.00 | $384.00 | 32.00 | $384.00 | 32.00 | $384.00 |
| 1.03 | Rock Excavation (20%) | cu.m. | 2.4 | 450.00 | $1,080.00 | 450.00 | $1,080.00 | 450.00 | $1,080.00 | 450.00 | $1,080.00 | 450.00 | $1,080.00 |
| | **SUBTOTAL - SECTION A** | | | | **$1,478** | | **$1,478** | | **$1,478** | | **$1,478** | | **$1,478** |
| **B.** | **ROAD WORK RESTORATION** | | | | | | | | | | | | |
| 2.01 | Trench Backfill (Including Pipe Bedding and compaction) | cu.m | 11.2 | 57.60 | $645.12 | 57.60 | $645.12 | 57.60 | $645.12 | 57.60 | $645.12 | 57.60 | $645.12 |
| 2.02 | Granular subbase (200mm depth) | cu.m | 0.4 | 60.45 | $24.18 | 60.45 | $24.18 | 60.45 | $24.18 | 60.45 | $24.18 | 60.45 | $24.18 |
| 2.03 | Granular Base (150mm depth) | cu.m | 0.3 | 73.20 | $21.96 | 73.20 | $21.96 | 73.20 | $21.96 | 73.20 | $21.96 | 73.20 | $21.96 |
| 2.04 | 50mm Asphalt | sq.m. | 2 | 60.00 | $120.00 | 60.00 | $120.00 | 60.00 | $120.00 | 60.00 | $120.00 | 60.00 | $120.00 |
| | **SUBTOTAL - SECTION B** | | | | **$811** | | **$811** | | **$811** | | **$811** | | **$811** |
| **C.** | **SANITARY SEWERS** | | | | | | | | | | | | |
| 3.01 | Manhole complete incl. removal of existing (1 per 50m) | ea. | 0.02 | 5,420.00 | $108.40 | 6,800.00 | $136.00 | 10,800.00 | $216.00 | 10,800.00 | $216.00 | 13,400.00 | $268.00 |
| 3.02 | Removal of existing pipe | lin.m. | 1 | 60.00 | $60.00 | 75.00 | $75.00 | 75.00 | $75.00 | 75.00 | $75.00 | 100.00 | $100.00 |
| 3.03 | Connection to existing (assume 2 directions) | ea. | 0.02 | 5,400.00 | $108.00 | 11,600.00 | $232.00 | 11,600.00 | $232.00 | 11,600.00 | $232.00 | 11,600.00 | $232.00 |
| 3.04 | 100mm Lot service connection c/w 200mm IC (1 per 10m) | ea. | 0.1 | 3,050.00 | $305.00 | 3,050.00 | $305.00 | 3,050.00 | $305.00 | 3,050.00 | $305.00 | 3,050.00 | $305.00 |
| | **SUBTOTAL - SECTION C** | | | | **$581** | | **$748** | | **$828** | | **$828** | | **$905** |
| | **SUMMARY** | | | | **$2,870.66** | | **$3,037.26** | | **$3,117.26** | | **$3,117.26** | | **$3,194.26** |

| Pipe Size (mm) | 200 | 250 | 300 | 350 | 375 | 400 | 450 | 525 | 600 | 675 | 750 | 900 | 1050 | 1200 | 1350 | 1500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pipe Cost | **$375.00** | **$400.00** | **$475.00** | **$538.00** | **$600.00** | **$650.00** | **$700.00** | **$850.00** | **$975.00** | **$1,038.00** | **$1,100.00** | **$1,300.00** | **$1,500.00** | **$1,900.00** | **$2,000.00** | **$2,100.00** |
| Extra Costs | $2,870.66 | $2,870.66 | $2,870.66 | $2,870.66 | $2,870.66 | $2,870.66 | $2,870.66 | $3,037.26 | $3,037.26 | $3,117.26 | $3,117.26 | $3,117.26 | $3,117.26 | $3,194.26 | $3,194.26 | $3,194.26 |
| Subtotal | $3,245.66 | $3,270.66 | $3,345.66 | $3,408.66 | $3,470.66 | $3,520.66 | $3,570.66 | $3,887.26 | $4,012.26 | $4,155.26 | $4,217.26 | $4,417.26 | $4,617.26 | $5,094.26 | $5,194.26 | $5,294.26 |
| Bypass Pumping (5%) | $162.28 | $163.53 | $167.28 | $170.43 | $173.53 | $176.03 | $178.53 | $194.36 | $200.61 | $207.76 | $210.86 | $220.86 | $230.86 | $254.71 | $259.71 | $264.71 |
| Engineering and Contingency (40%) | $1,363.18 | $1,373.68 | $1,405.18 | $1,431.64 | $1,457.68 | $1,478.68 | $1,499.68 | $1,632.65 | $1,685.15 | $1,745.21 | $1,771.25 | $1,855.25 | $1,939.25 | $2,139.59 | $2,181.59 | $2,223.59 |
| Subtotal | $4,771.12 | $4,807.87 | $4,918.12 | $5,010.73 | $5,101.87 | $5,175.37 | $5,248.87 | $5,714.27 | $5,898.02 | $6,108.23 | $6,199.37 | $6,493.37 | $6,787.37 | $7,488.56 | $7,635.56 | $7,782.56 |
| **TOTAL UNIT COST** | **$4,771.12** | **$4,807.87** | **$4,918.12** | **$5,010.73** | **$5,101.87** | **$5,175.37** | **$5,248.87** | **$5,714.27** | **$5,898.02** | **$6,108.23** | **$6,199.37** | **$6,493.37** | **$6,787.37** | **$7,488.56** | **$7,635.56** | **$7,782.56** |

Note: Manhole Price Breakdown:

| Pipe Size | Frame/ Base/ Cover / Removal | Vertical Metres $ per m | Total |
|---|---|---|---|
| 100-450mm | $3,900.00 | $760.00 | $5,420.00 |
| 525-600mm | $4,800.00 | $1,000.00 | $6,800.00 |
| 675-750mm | $7,800.00 | $1,500.00 | $10,800.00 |
| 900-1050mm | $7,800.00 | $1,500.00 | $10,800.00 |
| 1200-1500mm | $9,800.00 | $1,800.00 | $13,400.00 |

# APPENDIX C – UNIT COST OF TRENCHLESS INSTALLATION ALONG SHORELINE

Reference: 2022 Unit Rates Sheet

Added By-Pass Pumping (2024-02-21)

**SANITARY PIPE COST PER METRE (0-2m depth) FOR RDN FLOW PATH DERIVATION**

ASSUMPTIONS: Average trench width of 2m cut straight down (utilize 6' trench box)

| Item | Description | Unit | Quantity | 100mm to 450mm Unit Price | 100mm to 450mm Total | 525mm and 600mm Unit Price | 525mm and 600mm Total | 675mm and 750mm Unit Price | 675mm and 750mm Total | 900mm and 1050mm Unit Price | 900mm and 1050mm Total | 1200mm-1500mm Unit Price | 1200mm-1500mm Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **A.** | **SITE PREPARATION** | | | | | | | | | | | | |
| 1.01 | Excavation | sq.m | 4 | 30.00 | $120.00 | 30.00 | $120.00 | 30.00 | $120.00 | 30.00 | $120.00 | 30.00 | $120.00 |
| 1.02 | Dewatering (Estimated needed for approximately 20% of alignment) | l.m | 0.2 | 1,000.00 | $200.00 | 1,000.00 | $200.00 | 1,000.00 | $200.00 | 1,000.00 | $200.00 | 1,000.00 | $200.00 |
| 1.03 | Rock Excavation (30%) | cu.m | 1.2 | 450.00 | $540.00 | 450.00 | $540.00 | 450.00 | $540.00 | 450.00 | $540.00 | 450.00 | $540.00 |
| | **SUBTOTAL - SECTION A** | | | | **$860** | | **$860** | | **$860** | | **$860** | | **$860** |
| **B.** | **TRENCH RESTORATION** | | | | | | | | | | | | |
| 2.01 | Granular Back Fill (2m width) | sq.m. | 2 | 28.00 | $56.00 | 28.00 | $56.00 | 28.00 | $56.00 | 28.00 | $56.00 | 28.00 | $56.00 |
| 2.02 | Fish Habitat Gravel (0.2m depth, 2m width) | sq.m. | 0.4 | 300.00 | $120.00 | 300.00 | $120.00 | 300.00 | $120.00 | 300.00 | $120.00 | 300.00 | $120.00 |
| 2.03 | Rip Rap Cover (1m depth, 2m width) | sq.m. | 1.0 | 20.00 | $20.00 | 20.00 | $20.00 | 20.00 | $20.00 | 20.00 | $40.00 | 20.00 | $40.00 |
| | **SUBTOTAL - SECTION B** | | | | **$196** | | **$196** | | **$196** | | **$216** | | **$216** |
| **C.** | **SANITARY SEWERS** | | | | | | | | | | | | |
| 3.01 | Removal of existing pipe | lin.m. | 1 | 60.00 | $60.00 | 75.00 | $75.00 | 75.00 | $75.00 | 75.00 | $75.00 | 100.00 | $100.00 |
| 3.02 | Manhole complete incl. water tight installation and mass concrete (1 per 50m) | ea. | 0.02 | 6,504.00 | $130.08 | 8,160.00 | $163.20 | 12,960.00 | $259.20 | 12,960.00 | $259.20 | 16,080.00 | $321.60 |
| 3.03 | Concrete Cradle (Needed every other pipe segment for 25% of alignment) | ea. | 0.05 | 5,000.00 | $256.15 | 5,000.00 | $256.15 | 5,000.00 | $256.15 | 5,000.00 | $256.15 | 5,000.00 | $256.15 |
| 3.04 | Siphon Chamber Connections to Existing NSLI (3 total over 3km alignment) | ls | 0.001 | 50,000.00 | $50.00 | 50,000.00 | $50.00 | 50,000.00 | $50.00 | 50,000.00 | $50.00 | 50,000.00 | $50.00 |
| | **SUBTOTAL - SECTION C** | | | | **$496** | | **$544** | | **$640** | | **$640** | | **$728** |
| | **SUMMARY** | | | | **$1,552.23** | | **$1,600.35** | | **$1,696.35** | | **$1,716.35** | | **$1,803.75** |

| Pipe Size (mm) | 200 | 250 | 300 | 350 | 375 | 400 | 450 | 525 | 600 | 675 | 750 | 900 | 1050 | 1200 | 1350 | 1500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pipe Cost | **$375.00** | **$400.00** | **$475.00** | **$538.00** | **$600.00** | **$650.00** | **$700.00** | **$850.00** | **$975.00** | **$1,038.00** | **$1,100.00** | **$1,300.00** | **$1,500.00** | **$1,900.00** | **$2,000.00** | **$2,100.00** |
| Extra Costs | $1,552.23 | $1,552.23 | $1,552.23 | $1,552.23 | $1,552.23 | $1,552.23 | $1,552.23 | $1,600.35 | $1,600.35 | $1,696.35 | $1,696.35 | $1,716.35 | $1,716.35 | $1,803.75 | $1,803.75 | $1,803.75 |
| Subtotal | $1,927.23 | $1,952.23 | $2,027.23 | $2,090.23 | $2,152.23 | $2,202.23 | $2,252.23 | $2,450.35 | $2,575.35 | $2,734.35 | $2,796.35 | $3,016.35 | $3,216.35 | $3,703.75 | $3,803.75 | $3,903.75 |
| Bypass Pumping (5%) | $96.36 | $97.61 | $101.36 | $104.51 | $107.61 | $110.11 | $112.61 | $122.52 | $128.77 | $136.72 | $139.82 | $150.82 | $160.82 | $185.19 | $190.19 | $195.19 |
| Environmental/Archeological (25%) | $481.81 | $488.06 | $506.81 | $522.56 | $538.06 | $550.56 | $563.06 | $612.59 | $643.84 | $683.59 | $699.09 | $754.09 | $804.09 | $925.94 | $950.94 | $975.94 |
| Engineering and Contingency (40%) | $1,002.16 | $1,015.16 | $1,054.16 | $1,086.92 | $1,119.16 | $1,145.16 | $1,171.16 | $1,274.18 | $1,339.18 | $1,421.86 | $1,454.10 | $1,568.50 | $1,672.50 | $1,925.95 | $1,977.95 | $2,029.95 |
| Subtotal | $3,507.55 | $3,553.05 | $3,689.55 | $3,804.21 | $3,917.05 | $4,008.05 | $4,099.05 | $4,459.63 | $4,687.13 | $4,976.51 | $5,089.35 | $5,489.75 | $5,853.75 | $6,740.82 | $6,922.82 | $7,104.82 |
| **TOTAL UNIT COST** | **$3,507.55** | **$3,553.05** | **$3,689.55** | **$3,804.21** | **$3,917.05** | **$4,008.05** | **$4,099.05** | **$4,459.63** | **$4,687.13** | **$4,976.51** | **$5,089.35** | **$5,489.75** | **$5,853.75** | **$6,740.82** | **$6,922.82** | **$7,104.82** |

Note: Manhole Price Breakdown:

| Pipe Size | Frame/ Base/ Cover / Removal | Vertical Metres $ per m | Total |
|---|---|---|---|
| 100-450mm | $3,900.00 | $760.00 | $5,420.00 |
| 525-600mm | $4,800.00 | $1,000.00 | $6,800.00 |
| 675-750mm | $7,800.00 | $1,500.00 | $10,800.00 |
| 900-1050mm | $7,800.00 | $1,500.00 | $10,800.00 |
| 1200-1500mm | $9,800.00 | $1,800.00 | $13,400.00 |

Reference: 2022 Unit Rates Sheet

Added By-Pass Pumping (2024-02-21)

**SANITARY PIPE COST PER METRE (2-4m depth) FOR RDN FLOW PATHS DERIVATION**

ASSUMPTIONS: Average trench width of 2m with 8' trench box

Top 1.6m at 1:1 slope, with total width of 5.2m

| Item | Description | Unit | Quantity | 100mm to 450mm | | 525mm and 600mm | | 675mm and 750mm | | 900mm and 1050mm | | 1200mm-1500mm | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Unit Price | Total | Unit Price | Total | Unit Price | Total | Unit Price | Total | Unit Price | Total |
| **A.** | **SITE PREPARATION** | | | | | | | | | | | | |
| 1.02 | Excavation | sq.m. | 8 | 30.00 | $240.00 | 30.00 | $240.00 | 30.00 | $240.00 | 30.00 | $330.00 | 30.00 | $330.00 |
| 1.02 | Dewatering (Estimated needed for approximately 20% of alignment) | l.m | 0.2 | 1,000.00 | $200.00 | 1,000.00 | $200.00 | 1,000.00 | $200.00 | 1,000.00 | $200.00 | 1,000.00 | $200.00 |
| 1.03 | Rock Excavation (30%) | cu.m | 2.4 | 450.00 | $1,080.00 | 450.00 | $1,080.00 | 450.00 | $1,080.00 | 450.00 | $1,080.00 | 450.00 | $1,080.00 |
| | **SUBTOTAL - SECTION A** | | | | **$1,520** | | **$1,520** | | **$1,520** | | **$1,610** | | **$1,610** |
| **B.** | **ROAD WORK RESTORATION** | | | | | | | | | | | | |
| 2.01 | Granular Back Fill (2m width) | sq.m. | 5.6 | 11.20 | $62.72 | 11.20 | $62.72 | 11.20 | $62.72 | 11.20 | $224.00 | 11.20 | $224.00 |
| 2.02 | Fish Habitat Gravel (0.2m depth, 2m width) | sq.m. | 0.4 | 300.00 | $120.00 | 300.00 | $120.00 | 300.00 | $120.00 | 300.00 | $300.00 | 300.00 | $300.00 |
| 2.01 | Rip Rap Cover (1m depth, 2m width) | sq.m. | 2.0 | 20.00 | $40.00 | 20.00 | $40.00 | 20.00 | $40.00 | 20.00 | $100.00 | 20.00 | $100.00 |
| | **SUBTOTAL - SECTION B** | | | | **$223** | | **$223** | | **$223** | | **$624** | | **$624** |
| **C.** | **SANITARY SEWERS** | | | | | | | | | | | | |
| 3.01 | Removal of existing pipe | lin.m. | 1 | 60.00 | $60.00 | 75.00 | $75.00 | 75.00 | $75.00 | 75.00 | $75.00 | 100.00 | $100.00 |
| 3.01 | Manhole complete incl. water tight installation and mass concrete (1 per 50m) | ea. | 0.02 | 6,504.00 | $130.08 | 8,580.00 | $171.60 | 13,530.00 | $270.60 | 13,530.00 | $270.60 | 16,720.00 | $334.40 |
| 3.02 | Concrete Cradle (Needed every other pipe segment for 25% of alignment) | lin.m. | 0.05 | 5,000.00 | $256.15 | 5,000.00 | $256.15 | 5,000.00 | $256.15 | 5,000.00 | $256.15 | 5,000.00 | $256.15 |
| 3.03 | Siphon Chamber Connections to Existing NSLI (3 total over 3km alignment) | ea. | 0.001 | 50,000.00 | $50.00 | 11,600.00 | $11.60 | 11,600.00 | $11.60 | 11,600.00 | $232.00 | 11,600.00 | $232.00 |
| | **SUBTOTAL - SECTION C** | | | | **$496** | | **$514** | | **$613** | | **$834** | | **$923** |
| | **SUMMARY** | | | | **$2,238.95** | | **$2,257.07** | | **$2,356.07** | | **$3,067.75** | | **$3,156.55** |

| Pipe Size (mm) | 200 | 250 | 300 | 350 | 375 | 400 | 450 | 525 | 600 | 675 | 750 | 900 | 1050 | 1200 | 1350 | 1500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pipe Cost | **$375.00** | **$400.00** | **$475.00** | **$538.00** | **$600.00** | **$650.00** | **$700.00** | **$850.00** | **$975.00** | **$1,038.00** | **$1,100.00** | **$1,300.00** | **$1,500.00** | **$1,900.00** | **$2,000.00** | **$2,100.00** |
| Extra Costs | $2,238.95 | $2,238.95 | $2,238.95 | $2,238.95 | $2,238.95 | $2,238.95 | $2,238.95 | $2,257.07 | $2,257.07 | $2,356.07 | $2,356.07 | $3,067.75 | $3,067.75 | $3,156.55 | $3,156.55 | $3,156.55 |
| Subtotal | $2,613.95 | $2,638.95 | $2,713.95 | $2,776.95 | $2,838.95 | $2,888.95 | $2,938.95 | $3,107.07 | $3,232.07 | $3,394.07 | $3,456.07 | $4,367.75 | $4,567.75 | $5,056.55 | $5,156.55 | $5,256.55 |
| Bypass Pumping (5%) | $130.70 | $131.95 | $135.70 | $138.85 | $141.95 | $144.45 | $146.95 | $155.35 | $161.60 | $169.70 | $172.80 | $218.39 | $228.39 | $252.83 | $257.83 | $262.83 |
| Environmental/Archeological (20%) | $522.79 | $527.79 | $542.79 | $555.39 | $567.79 | $577.79 | $587.79 | $621.41 | $646.41 | $678.81 | $691.21 | $873.55 | $913.55 | $1,011.31 | $1,031.31 | $1,051.31 |
| Engineering and Contingency (40%) | $1,097.86 | $1,108.36 | $1,139.86 | $1,166.32 | $1,192.36 | $1,213.36 | $1,234.36 | $1,304.97 | $1,357.47 | $1,425.51 | $1,451.55 | $1,834.45 | $1,918.45 | $2,123.75 | $2,165.75 | $2,207.75 |
| Subtotal | $4,365.29 | $4,407.04 | $4,532.29 | $4,637.50 | $4,741.04 | $4,824.54 | $4,908.04 | $5,188.80 | $5,397.55 | $5,668.09 | $5,771.63 | $7,294.14 | $7,628.14 | $8,444.43 | $8,611.43 | $8,778.43 |
| **TOTAL UNIT COST** | **$4,365.29** | **$4,407.04** | **$4,532.29** | **$4,637.50** | **$4,741.04** | **$4,824.54** | **$4,908.04** | **$5,188.80** | **$5,397.55** | **$5,668.09** | **$5,771.63** | **$7,294.14** | **$7,628.14** | **$8,444.43** | **$8,611.43** | **$8,778.43** |

Note: Manhole Price Breakdown:

| Pipe Size | Frame/ Base/ Cover / Removal | Vertical Metres $ per m | Total |
|---|---|---|---|
| 100-450mm | $3,900.00 | $760.00 | $6,180.00 |
| 525-600mm | $4,800.00 | $1,000.00 | $7,800.00 |
| 675-750mm | $7,800.00 | $1,500.00 | $12,300.00 |
| 900-1050mm | $7,800.00 | $1,500.00 | $12,300.00 |
| 1200-1500mm | $9,800.00 | $1,800.00 | $15,200.00 |

# APPENDIX D – PUMP STATION COST ESTIMATE TEMPLATES

USL Project: 3275.0022.01

# Medium Sanitary Pump Station
# 20hp<= HP < 50hp

**Class D Cost Estimate**

**Description**

This estimate has been prepared to establish budgetary costs for long range financial planning purposes only. The derived cost is an approximate magnitude of cost derived from lump sum and unit costs from recent similar projects. Design and construction engineering and contingency are included in this estimate.

| Item | Description | Unit | Total Quantity | Unit Price | | Total |
|---|---|---|---|---|---|---|
| **A.** | **PUMP STATION** | | | | | |
| 1.1 | Wet well (c/w Pumps and Internal Mechanical Components) | L.S. | 1 | 217,500.00 | **$** | **217,500** |
| 1.2 | Valve Chamber (c/w check valves, isolation valves, air valve, bypass) | L.S. | 1 | 72,500.00 | **$** | **72,500** |
| 1.3 | Flow Meter (c/w chamber) | L.S. | 1 | 75,000.00 | **$** | **75,000** |
| | **TOTAL SECTION A** | | | | **$** | **365,000** |
| **B.** | **ELECTRICAL** | | | | | |
| 2.1 | Electrical Kiosk (c/w Controls, Motor Starters, Power Distribution, Automatic Transfer Switch, Termination Compartment) | L.S. | 1 | 145,000.00 | **$** | **145,000** |
| 2.2 | Generator | L.S. | 1 | 42,000.00 | **$** | **42,000** |
| 2.3 | General Site Work (Wet Well, Valve Chamber, Luminaire/Antenna Pole) | L.S. | 1 | 54,000.00 | **$** | **54,000** |
| 2.4 | BC Hydro Service Utility | L.S. | 1 | 14,000.00 | **$** | **14,000** |
| 2.5 | Testing/Commissioning/Permits | L.S. | 1 | 40,000.00 | **$** | **40,000** |
| | **TOTAL SECTION B** | | | | **$** | **295,000** |
| **C.** | **CIVIL UTILITIES** | | | | | |
| 3.1 | Connection to Existing Forcemain | L.S. | 1 | 50,000.00 | **$** | **50,000** |
| 3.2 | Connection to Existing Gravity Main | L.S. | 1 | 20,000.00 | **$** | **20,000** |
| 3.3 | Water Service and Washdown | L.S. | 1 | 10,000.00 | **$** | **10,000** |
| | **TOTAL SECTION B** | | | | **$** | **80,000** |
| **D.** | **SITE WORKS AND ACCESS** | | | | | |
| 4.1 | Earthworks, Site Grading, Paving and Landscaping | L.S. | 1 | 40,000.00 | **$** | **40,000** |
| 4.2 | Fencing and Bollards | L.S. | 1 | 10,000.00 | **$** | **10,000** |
| | **TOTAL SECTION D** | | | | **$** | **50,000** |

## SUMMARY

| | | | | | |
|---|---|---|---|---|---|
| **A.** | **PUMP STATION** | | | $ | 365,000 |
| **B.** | **ELECTRICAL** | | | $ | 295,000 |
| **C.** | **CIVIL UTILITIES** | | | $ | 80,000 |
| **D.** | **SITE WORKS AND ACCESS** | | | $ | 50,000 |
| | | | **SUB-TOTAL:** | **$** | **790,000** |
| | Inflation Rate (2021-2024) | | | | 16.23% |
| | Inflation Cost | | | $ | 128,217 |
| | | | **SUB-TOTAL:** | **$** | **918,217** |
| | Contingency (30% of Const.) | L.S. | 1 | $ | 275,465 |
| | Design and Construction Engineering (15% of Const.) | L.S. | 1 | $ | 179,052 |
| | | | **SUB-TOTAL:** | **$** | **454,517** |
| | **TOTAL ESTIMATED CONSTRUCTION COST (EXCLUDING TAXES)** | | | **$** | **1,373,000** |

## ASSUMPTIONS

- Pump station will be constructed on existing lot or within road RoW and no land acquisition costs are required.
- Grading and landscaping will be required at the site, but no clearing and grubbing.
- Rock blasting is not required at the site.
- Station will include a FRP wet well and electrical kiosk. Estimates do not include costs for a building.
- Station will include glow meter in standalone below-ground chamber.
- Assumed configuration: Duplex Lift Station, Electrical Kiosk, Generator, Wet Well, Valve Chamber, Flow Meter Manhole
- Assumed voltage is 600V, 3-Phase.
- Assumed labour rate is $85/hr.
- Assumed Generator Size is 60kW.