



Windsor Stormwater Management Plan

Final Report



221101.01 • August 2025

02	Final Report	A. Ehrenholz	1-Aug-2025	A. Baillie
01	Issued for Review	A. Ehrenholz	6-June-2025	A. Baillie
Rev.	Issue	Reviewed By:	Date	Issued By:
		This document was prepared for the party indicated herein. The material and information in the document reflect CBCL Limited's opinion and best judgment based on the information available at the time of preparation. Any use of this document or reliance on its content by third parties is the responsibility of the third party. CBCL Limited accepts no responsibility for any damages suffered as a result of third-party use of this document.		

August 1, 2025

Todd Richard
Director of Public Works
West Hants Regional Municipality
76 Morison Drive, PO Box 3000
Windsor, NS B0N 2T0

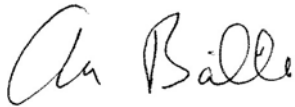
Dear Mr. Richards:

RE: Town of Windsor Final Stormwater Management Plan

We are pleased to submit the Stormwater Management Plan for Windsor, for your consideration. This report summarizes the relevant background information and existing conditions in Windsor, the conceptual options that were modelled in PC SWMM, potential construction phasing options, and opinions of probable cost for the proposed infrastructure upgrades. Should you have any questions, require clarifications, or wish to discuss any aspects of this letter, please contact Alan Ehrenholz or Aaron Baillie. We look forward to continuing to work with you on this project with you.

Yours very truly,

CBCL Limited



Prepared by:
Aaron Baillie, P.Eng.
Manager Municipal Engineering
Direct: 902-492-6750
E-Mail: aaronb@cbcl.ca



Bobby Pettigrew P.Eng.
Sen. Water Resource Engineer
Direct: 343-655-1964
E-Mail: bpettigrew@cbcl.ca



Reviewed by:
Alan Ehrenholz, P.Eng.
Group Lead Linear Infrastructure
Direct: 604-317-9720
E-Mail: aehrenholz@cbcl.ca

Project No.: 221101.01

This document was prepared for the party indicated herein. The material and information in the document reflects CBCL Limited's opinion and best judgment based on the information available at the time of preparation. Any use of this document or reliance on its content by third parties is the responsibility of the third party. CBCL Limited accepts no responsibility for any damages suffered as a result of third-party use of this document.

Contents

1	Background Information.....	1
1.1	Survey Program.....	2
1.2	Flow Metering.....	3
1.3	Modeling Approach	4
1.3.1	Hydrology	4
1.3.2	Hydraulics.....	6
1.3.3	Calibration.....	7
1.4	Design Criteria.....	8
2	Existing Conditions	9
2.1	Modeling Approach	9
2.2	Sewershed	10
2.2.1	Sewershed 1 (Haliburton)	10
2.2.2	Sewershed 2 (Albert Street).....	11
2.2.3	Sewershed 3 (Cunnabel Creek)	13
2.2.4	Sewershed 4 (Gerrish Street).....	17
2.3	Regional Interceptor.....	18
3	Conceptual Design.....	20
3.1	Summary of Previous Options.....	20
3.1.1	Remove Flow from Cunnabel Creek.....	20
3.1.2	Replacement of Existing System	20
3.1.3	Spilt Flow Between Albert Street and Cunnabel Creek	20
3.2	Stannus Street Options.....	21
3.2.1	Option 1 – Albert Street Diversion and Storage	24
3.2.2	Option 2 – King Street Diversion.....	29
3.2.3	Option 3 – Stannus Storage and Pumping	29
3.2.4	Option 4 – Stannus Storage and Pumping with Connection to Cunnabel Creek Combined Sewer.....	33
3.2.5	Option 5 – Stannus Street Stormwater Connection to Tregothic Marsh	37

3.3	Integrated Option Evaluation.....	43
3.3.1	Integrated Option 1 – Albert Street Diversion with Option 3/4 – Stannus Street Storage and Pumping	43
3.3.2	Integrated Option 2 – Albert Street Diversion with Option 5 – Stannus Street Stormwater Connection to Tregothic Marsh	47
3.3.3	Summary of HGL Performance	50
3.3.4	Recommendation and Next Steps.....	51
4	Construction Phasing	54
4.1	Area 1.....	55
4.1.1	Area 1A.....	55
4.1.2	Area 1B	56
4.1.3	Area 1C.....	56
4.2	Area 2.....	56
4.2.1	Area 2A.....	56
4.2.2	Area 2B	57
4.2.3	Area 2C.....	57
4.3	Area 3.....	58
4.4	Area 4.....	58
4.5	Area 5.....	58
4.6	Area 6.....	59
4.7	Area 7.....	59
4.8	Area 8.....	59
4.9	Area 9.....	60
4.10	Area 10	60
4.11	Area 11	60
5	Opinion of Probable Cost	61
6	Conclusion	64

Appendices

- A Drawings and Figures
- B Class C Opinion of Probable Cost

1 Background Information

Windsor is currently subject to flooding issues during large rainfall events. During one such event on July 27, 2021, Windsor experienced significant flooding as shown below in Figure 1.1.

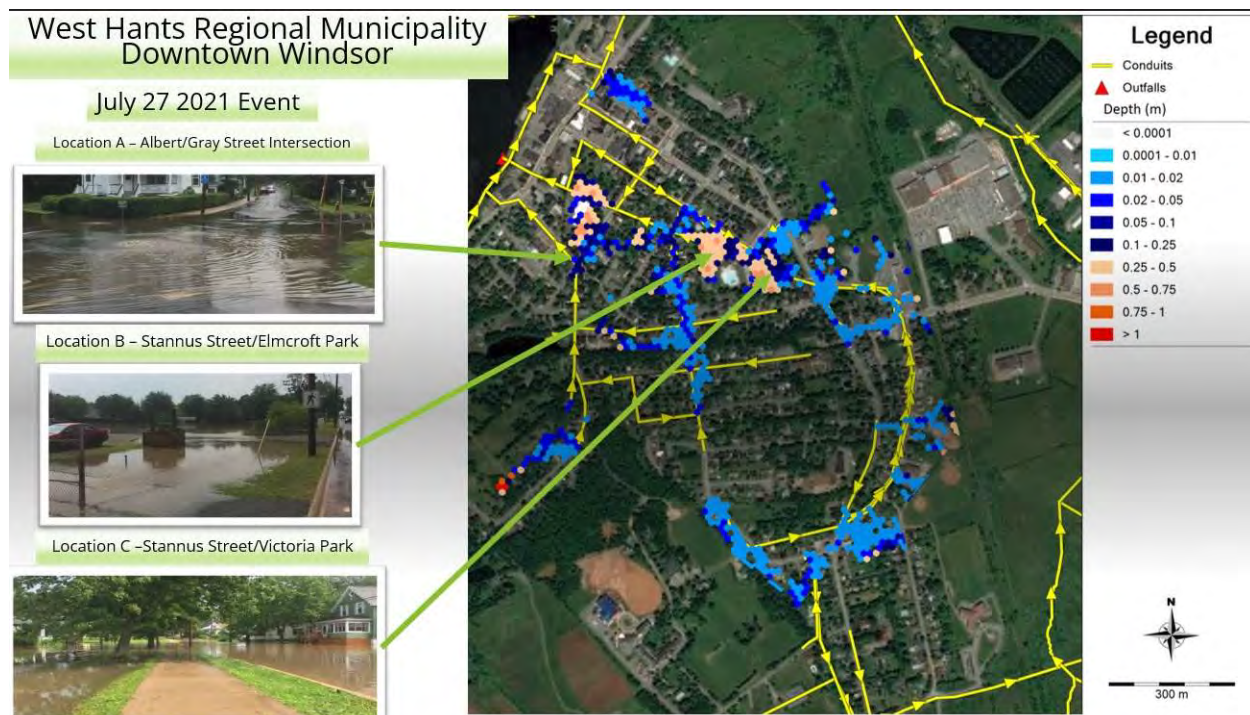


Figure 1.1: Flooding in Windsor on July 27, 2021

This event, along with similar events, resulted in the Municipality issuing a request for proposals to retain an engineering firm to investigate the problem and develop a plan to separate the combined sewer system. CBCL Limited (CBCL) was retained to complete this plan. The development of the plan included a large field investigation program to confirm system operation, pipe sizes, pipe slopes, and existing flows.

This information was used to develop a calibrated model of the existing combined system. This model was used to predict flooding levels for current and future storms to evaluate how the system would perform if it were separated. During this process it became obvious that separating the combined system would not stop the flooding issues in Stannus Street area due to other external factors such as water levels in the receiving water, Lake Pisiquid.

Several options were investigated but all options needed further study to confirm performance, constructability, and cost.

CBCL was retained to complete the additional investigations to better define the issues preventing stormwater drainage and to develop a concept option that would mitigate the current flooding issues noted in Figure 1.1. This report describes the existing problem and the stormwater management plan that is proposed to mitigate the flooding. The December 2023 Windsor Stormwater Plan describes the field data collection program, development of the model, options considered, performance of the options, and opinion of probable construction costs.

1.1 Survey Program

The project began with significant effort put towards data collection. This began with a review of existing record drawings and GIS data, after which a gap analysis was completed. Following this analysis, a data collection program was completed to fill in the gaps in existing information and supplement existing data where required. The program was completed by WHRM and CBCL during the summer and fall of 2022. The data collection program developed was an intensive and well-coordinated effort. Approximately 180 manholes were surveyed, and information on pipe material, depth to inverts, flow direction, type of sewer (combined, storm, sanitary) and pipe diameter was collected.

Additional field investigation was completed in the summer and fall of 2024 to review operations of the combined sewer, confirm pipe sizes, inverts, and connection points at key locations, confirm overland flow paths, and ensure all required information for the development of the conceptual models was acquired.

See Figure 1.2 on the following page to see the extents of the survey program.



Figure 1.2: CBCL Field Survey Program

This survey program provided invaluable understanding of the existing system, which then informed the flow metering program.

1.2 Flow Metering

Flow monitoring was undertaken during a two-month period in 2024 from early April to late May. During this period twelve (12) rainfall events occurred, with a 12-hour interevent period. None of the events were greater than a 1 in 2-year return period.

Eight (8) flow meters were installed at key locations across the combined sewer network. Locations are shown in Figure 1.3. The values obtained at Flow Meter 4 were unsuitable on review and a regression analysis was completed to produce realistic values for the monitor location based on the results of the other monitors.



Figure 1.3: Flow Monitoring Program

Once the flow monitoring program was completed, CBCL developed the existing condition model.

1.3 Modeling Approach

The Windsor model was developed using PCSWMM, a modelling program developed by Computational Hydraulics International (CHI) that integrates Version 5 of the Storm Water Management Model (SWMM) with a GIS engine. SWMM is a hydrologic and 1D-2D hydraulic model produced by the United States Environmental Protection Agency to study urban drainage systems. This software can perform unsteady flow calculations to simulate water backup, pooling, and pipe and culvert hydraulics.

1.3.1 Hydrology

1.3.1.1 Watershed Delineation and Parameters

Four main watersheds were delineated, refer to Figure 1.4. Sub catchments were delineated using a digital elevation model (DEM) and the watershed delineation tool in PCSWMM. The DEM consisted of LiDAR data downloaded from the provincial GeoNova site. Within urban areas the sub catchment delineation was refined based on infrastructure and

localized topography, such as curbs and gutters and small roadside ditch systems, conveying flow to catch basins that would not be captured in the DEM only based watershed delineation.

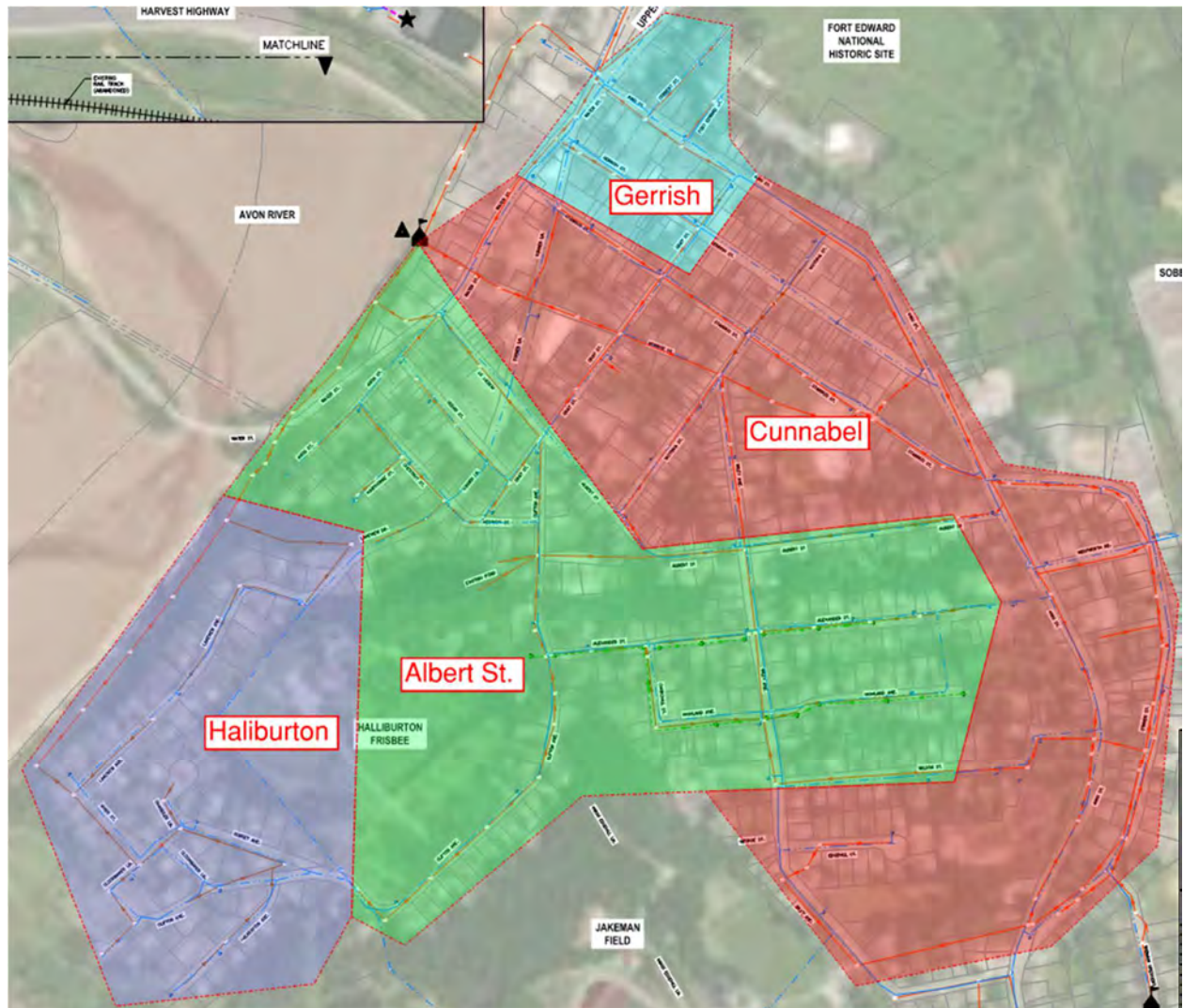


Figure 1.4: Existing Catchment Areas

Sub catchment characteristics were determined from the DEM and the 2015 land cover mapping from Agriculture and Agri-food Canada, which includes:

- ▶ Area.
- ▶ Width.
- ▶ Flow length.
- ▶ Basin slope.
- ▶ Imperviousness.
- ▶ Roughness for pervious and impervious areas.

The Green-Ampt Infiltration method was selected for infiltration calculations. Soil information for the study area was obtained from the National Soil Data Base available

through Agriculture and Agri-Foods Canada in shapefile format. The Soil Survey of Hants County Nova Scotia report and shapefile were used to determine soil characteristics for the sub catchment areas. Original soil characteristics modelled for the soil include:

- ▶ Suction head: 210.06mm.
- ▶ Hydraulic Conductivity: 1.02mm/hr.
- ▶ Initial Deficit: 0.277.

The Hydraulic Conductivity soil parameter was used for calibration and varies across the model.

1.3.1.2 Storm Distribution

The WHRM municipal services specification manual, issued in September 2022, prescribes storm sewer systems shall be designed based on a storm frequency of 1 in 5-years, except in areas designated for commercial or industrial development where a design storm frequency of 1 in 10-years should be used. Roadways, road cross culverts, watercourse crossings, and other major drainage systems should have a capacity to convey stormwater from a design storm frequency of 1 in 100-years.

Intensity Duration Frequency (IDF) curves for the Kentville station are available and are based on over 44 years of historical rainfall data. The Kentville IDF curves were used in Phase 2 to provide continuation to the modelling undertaken in Phase 1 of the project as the rainfall produced is slightly more conservative than the new IDF curves prepared for the municipal guidelines.

A Chicago distribution was used to produce 24-hour design rainfall events at 5-minute increments using the IDF curves for the Kentville CDA station for 1 in 5-year, 1 in 10-year, and 1 in 100-year storm events. As per the Phase 1 analysis, consideration for climate change was incorporated by means of a 30% increase in precipitation intensity for the year 2090. This 30% value is consistent with CBCL's experience throughout Atlantic Canada in applying climate change parameters.

1.3.2 Hydraulics

A combined 1D-2D model of the existing underground storm sewer system, including existing separated and combined systems in the Windsor Downtown, was developed to identify locations where existing infrastructure is at or under capacity for the 1 in 5-year design storm. Collected survey data and invert elevation information described above, in addition to reviewing historical record drawings, was used to develop the modelled network. The existing conditions model covered approximately 103 Hectares, including approximately 102 manholes, 8,900m of sewer, and 1 sewage lift station. The 2D aspect of modelling was incorporated to show the extents of surface flooding when the existing system was at capacity.

1.3.2.1 Coastal Boundary Conditions

Within the Windsor model, tide levels had negligible impact on the water levels in the system due to the relative difference in elevation. For efficiencies in run times of the model, the tide timeseries was removed from the model outfalls.

1.3.3 Calibration

The model was calibrated to both the dry weather flow periods and the wet weather flow periods. Calibration involved changes to the average sanitary flow rate and development of a flow pattern during dry weather periods, and changes to the hydraulic conductivity and width parameters of the hydrology during the wet weather events.

Since none of the recorded wet weather events were of significance compared to the IDF return period events, the rainfall period on April 11, 2024, to April 15, 2024, was selected for calibration. The peak rainfall intensity during this period was 6.1 mm/hr and a total of 17.5mm of rain fell.

The results of the calibration are provided in Table 1.1 for peak flow rate and Table 1.2 for volume.

Table 1.1: Calibration Comparison (Peak Flow Rates)

Monitor	Metered Peak Flow (l/s)	Modelled Peak Flow (l/s)	Difference
1	62.94	64.46	2%
2	63.33	75.3	19%
3	13.23	13.69	3%
4	73.56	101.8	38%
5	141.1	165.1	17%
6	136.2	147	8%
7	60.82	67.59	11%
8	152.1	255.9	68%

Guidance issued by the CIWEM UDG Code of Practice for the Hydraulic Modelling of Urban Drainage Systems 2017, which is typically recognized in the industry, suggests that suitable calibration is achieved when the peak flow rate is within +25% to -15% of the recorded rates. The majority of the sites are within this band with the exception of flow monitors 4 and 8. Flow monitor 4 was subject to regression analysis and may not be reflective of actual rates while monitor 8 is downstream of the system and could be affected by other factors not accounted for in the modelling. It does not affect flows in the area of interest within the Windsor urban area.

Table 1.2: Calibration Comparison (Volumes)

Monitor	Metered Volume (m ³)	Modelled Volume (m ³)	Difference
1	2683	2452	-9%
2	3378	3154	-7%
3	403.6	774.9	92%
4	3281	5376	64%
5	7421	12320	66%
6	9442	11610	23%
7	2632	2171	-18%
8	4384	18890	331%

Guidance issued by the CIWEM UDG Code of Practice for the Hydraulic Modelling of Urban Drainage Systems 2017, which is typically recognized in the industry suggests that suitable calibration is achieved when the volume is within +20% to -10% of the recorded rates. Sites 4 and 8 are outside of this zone, consistent with the peak flow analysis. Site 5 is downstream of both sites 6 and 7, however, outside of the peak of the event, flows at site 5 downstream are recorded as lower than the upstream flows. This is difficult to represent in the model but may be indicative of constraints in the pipe system which is causing the reduction in flow. Sites 6 and 7 are within the margin of error for calibration.

Site 3 is not fully captured in the model and was not able to be fully calibrated.

1.4 Design Criteria

The typical design standards and best practices state that piped stormwater systems should be able to contain the 1 in 5-year storm event with flows above this, accommodated with surface drainage pathways that discharge into a receiving body. This will be the design criteria for most of the system. Due to the topography in Sewershed 3 (Section 2.2.3) an overland flow pathway cannot be established for flows above 1 in 5-year and therefore the piped system will need to be accommodated for a 1 in 100-year event, including climate change projections for this area.

2 Existing Conditions

2.1 Modeling Approach

Using the calibrated model discussed above, the existing combined system in Windsor was modelled with a 1 in 5-year design storm. While surcharging of the existing combined sewer system does not occur throughout the entire system, notable surcharging and flooding does occur at the intersection of Gray and Albert Street, throughout Stannus Street, Elmcroft Park, and King Street for the 1 in 5-year design storm. The modeled extents of surcharging and flooding for a 1 in 5-year storm are similar to the flooding and surcharging which was observed during the July 2021 event. Model results for the 1 in 5-year design storm in the Windsor area are presented in Figure 2.1 on the following page.

Flooding can occur as a result of many factors, some of which include:

- ▶ Undercapacity sewers for the selected design storm (i.e., insufficient slope or diameter of pipe).
- ▶ Back-graded pipes.
- ▶ Low topographic elevations with respect to the tidal level.
- ▶ Among others.

Multiple simulations have been run to investigate the potential factors resulting in flood risk at various locations within the Windsor area. The results of the 1 in 5-year design rainfall event on the existing system are summarized in the following section.

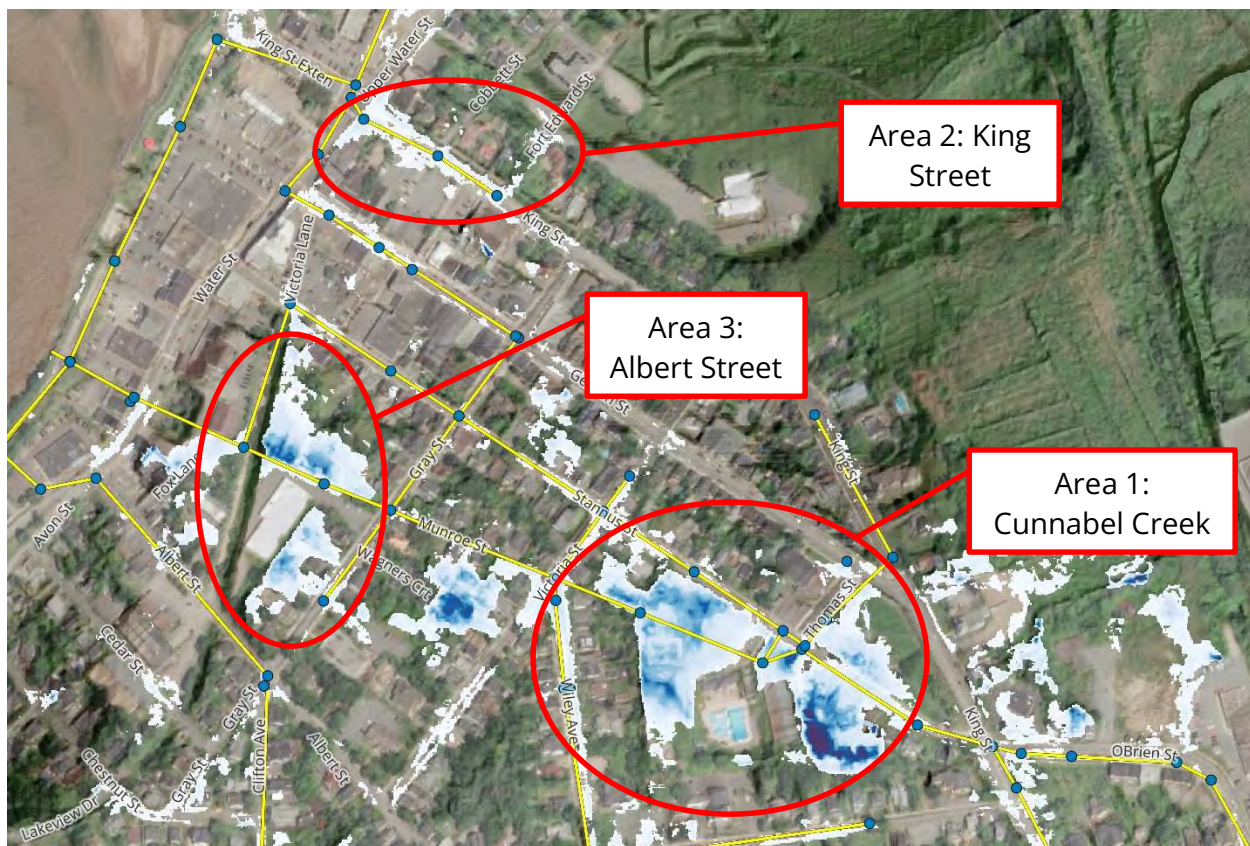


Figure 2.1: Simulated Surface Flooding during the 1 in 5-year Design Storm

Windsor has 4 sewer sheds which all drain into a common collect that runs parallel to Lake Pisiquid. Figure 2.2 provides an overview of the entire combined sewer system with additional information provided on each sewer shed provided.

2.2 Sewershed

The existing system has been divided into 4 main sewer sheds, discussed below. Drawing 1 in Appendix A provides a complete map of the existing system; the following section provides individual sewershed maps and descriptions.

2.2.1 Sewershed 1 (Haliburton)

This is a small sewershed, approximately 222,500 m², servicing approximately 60 homes. The existing system is mostly separated, consisting of open ditch stormwater collection and dedicated sanitary sewer. There are some stormwater connections to the sanitary system, however, they are limited, and the sanitary system isn't intended to be a combined system. The system consists of 200mm gravity pipe that drains to the regional interceptor adjacent to Lake Pisiquid. Figure 2.2 provides an overview of this sewershed.

There are no reported issues in this area. Separation of this area can be completed but it is not a high priority.

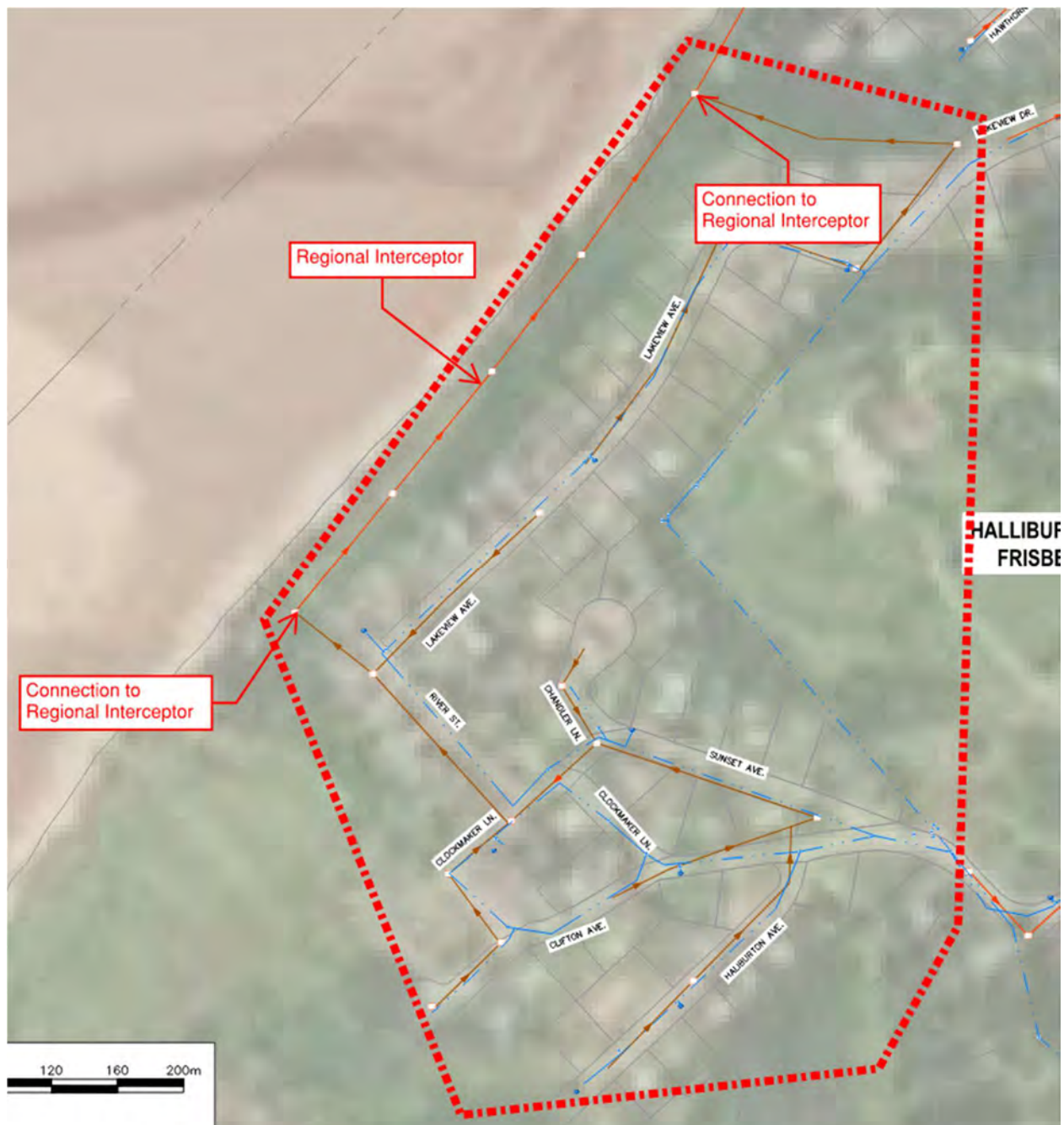


Figure 2.2: Sewer Shed Overview

2.2.2 Sewershed 2 (Albert Street)

The Albert Street sewershed is a major sewershed with an area of approximately 425,000 m² and services approximately 200 homes. Highland Avenue, Alexander Street, and Albert Street have been separated and then connect back into the combined system on Wiley Avenue. This system connects to a major 900mm diameter collector main that runs along

Albert Street and connects to the regional interceptor adjacent to Lake Pisiquid. Figure 2.3 provides an overview of this sewershed.

The major issue reported in this sewershed is flooding at the intersection of Gray Street and Albert Street which is a result of overland flow and surcharging of the combined sewer system in this area. The water flows overland to Sewershed 3, Cunnabel Creek. Overland flow also continues down Wiley Avenue into the Cunnabel Creek sewershed. A plan and profile view of the combined sewer currently installed in Albert Street, from Water Street to the intersection of Willow Street and Clifton Avenue, during a 1 in 5-year design storm is shown in Figure 2.4.

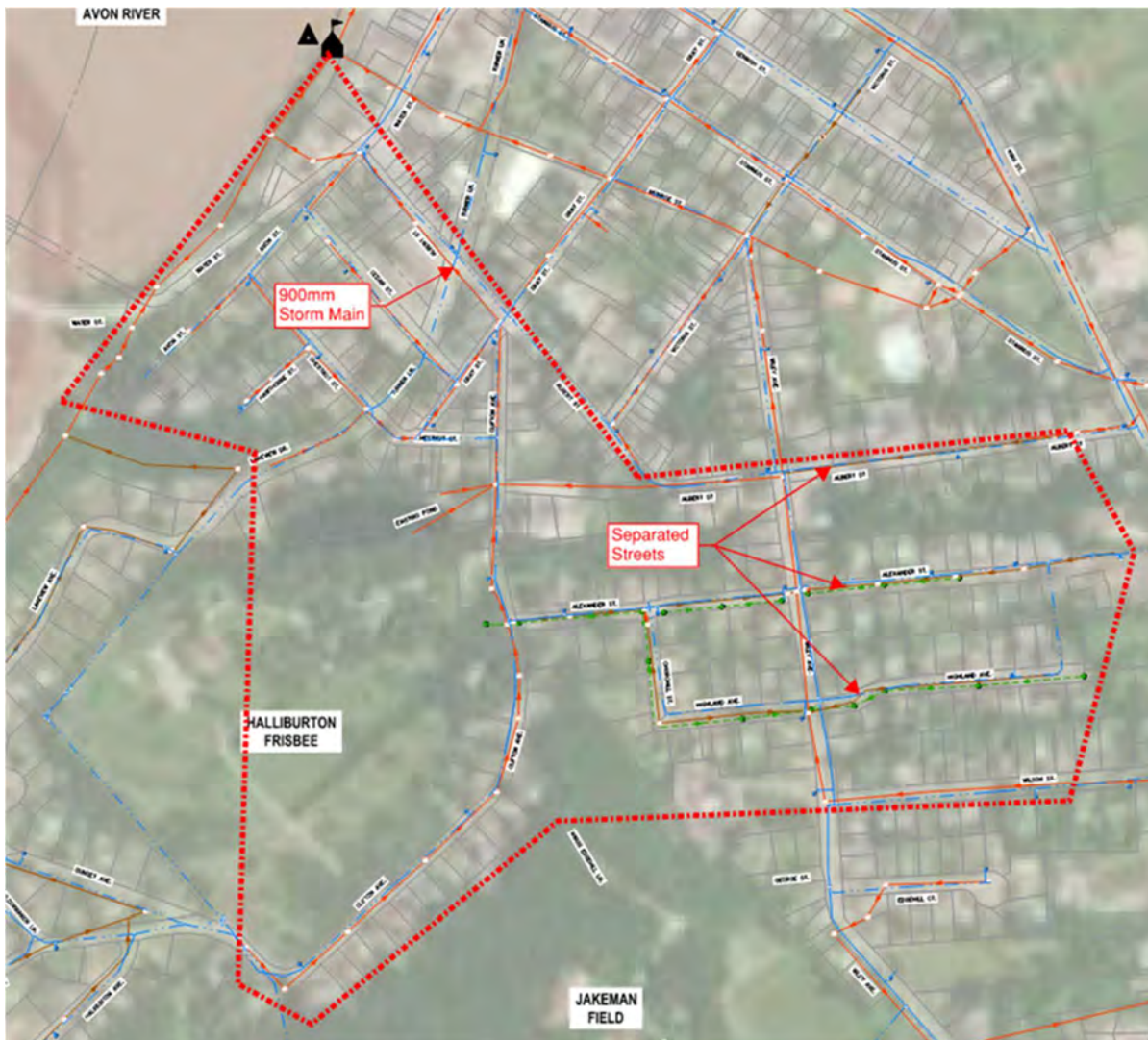


Figure 2.3: Sewer Shed Overview



Figure 2.4: Plan and Profile View of the Sewer on Albert Street during the Existing Conditions 1 in 5 Year Design Storm

The manhole circled in red is at the intersection of Gray and Albert Street illustrates the theoretical water elevation in the system at this location, which is showing as surcharging out of the combined sewer. Once the flow reaches the surface it travels along Gray Street and collects in the lower area near the curling club,

2.2.3 Sewershed 3 (Cunnabel Creek)

The Cunnabel Creek Sewershed is a major sewershed with an area of approximately 441,000 m² and servicing approximately 220 homes. Historically there was a creek, called Cunnabel Creek, which drained the area to Lake Pisiquid. Over the years as development occurred this creek was infilled and piped to the Lake and is now know as the Cunnabel Creek combined sewer which is connected to Pump Station 1 (PS1). PS1 pumps the combined sewer into a 1500 diameter regional interceptor. In large rain events, however, PS1 overflows as there is not sufficient capacity pumping capacity or capacity in the regional interceptor. Figure 2.5 provides an overview of the existing collection system.

The lower section of the sewershed is flat and at low elevation relative to the projected high-high water elevation of Lake Pisiquid (6m), and the surrounding topography generally slopes to this area. These site characteristics result in the area being the natural receiving environment for overland flow which cannot drain to a natural receiving environment. This combination, in addition to the Cunnabel Creek combined sewer capacity limitation, results

in surface flooding and surcharging of the combined sewer. Figure 2.6 shows the area below the 6m contour, the high lands around the area.



Figure 2.5: Sewershed Overview

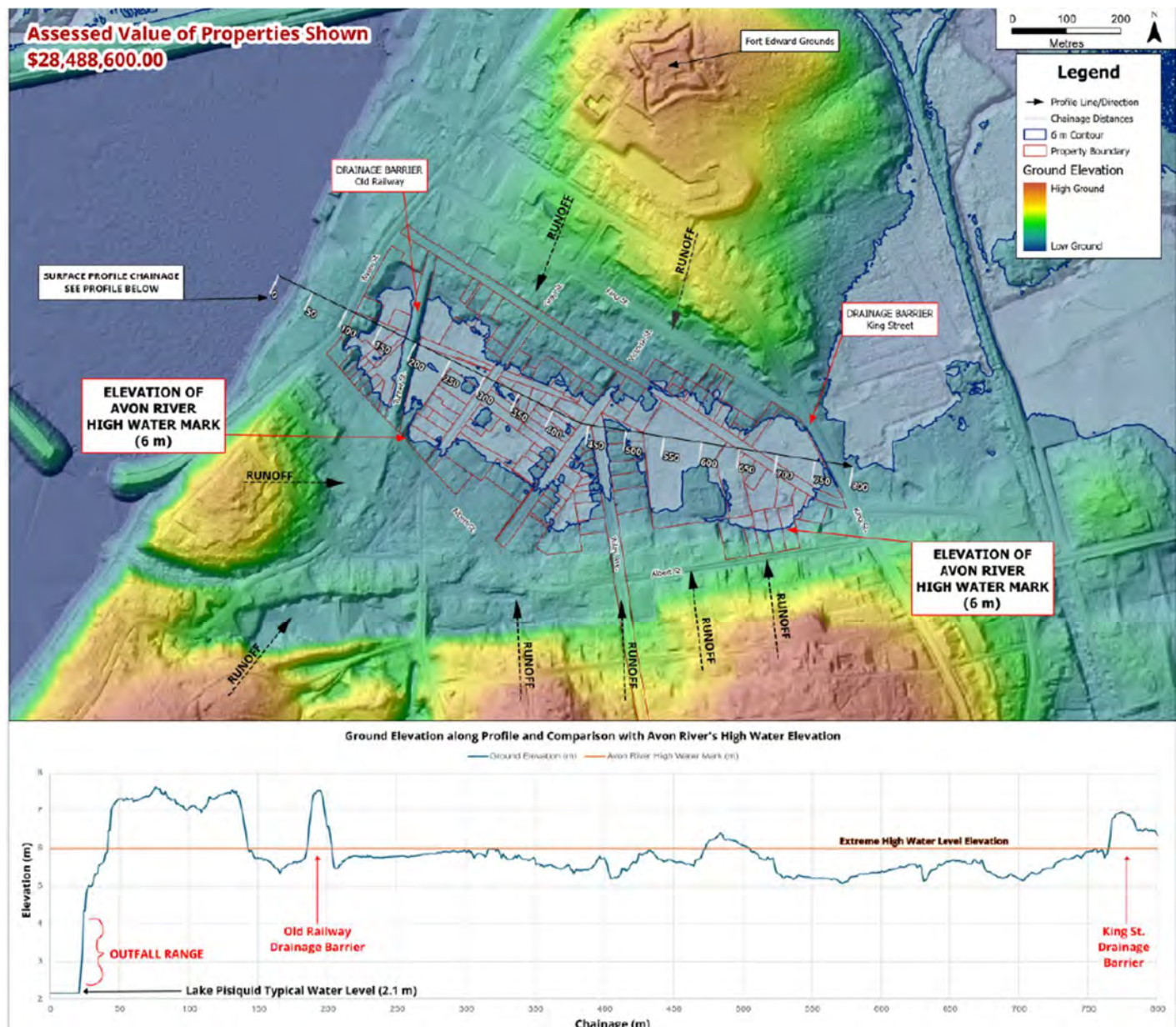


Figure 2.6: 6m Elevation Contour and Old Railway Corridor

During large storms the capacity of the Cunnabel Creek combined sewer is met with upstream piped flows entering the system from O'Brien and King Street. The overland flow entering the area has no natural drainage pathway out of the area and collects and floods the area until there is capacity in the combined sewer to drain the area. In addition to the collection of overland flow the combined sewer does surcharge in this area. A profile view of the combined sewer currently installed in Cunnabel Creek, from Water Street to the intersection of O'Brien and King Street during a 1 in 5-year storm is shown in Figure 2.7, and Figure 2.8 illustrates the modeled flooding limits for a 1:100 year storm with climate change.

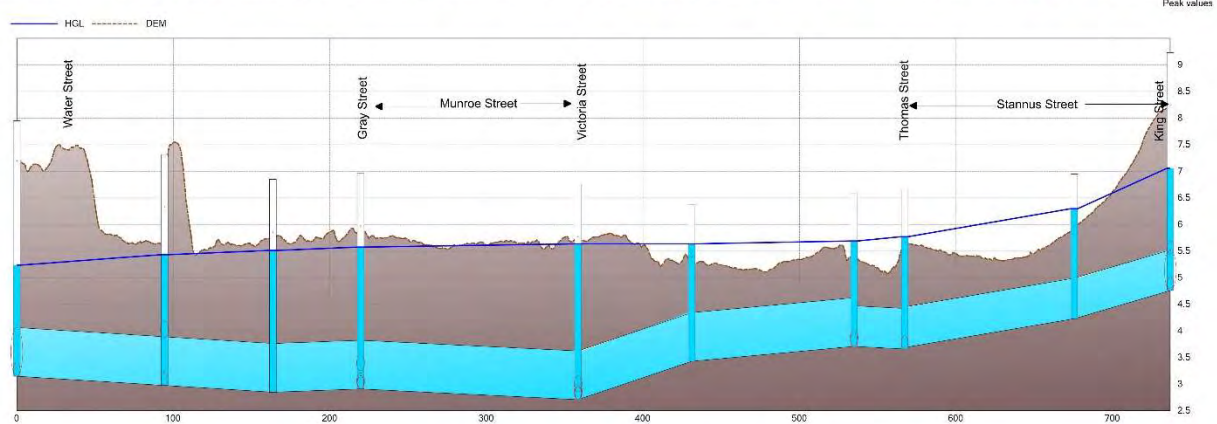
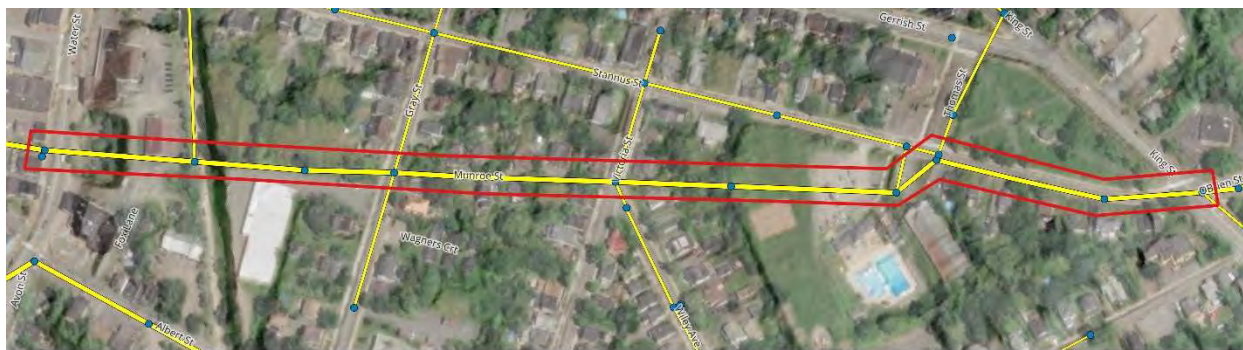


Figure 2.7: Plan and Profile View of the Cunnabel Creek Area during the Existing Conditions 1 in 5-Year Design Storm

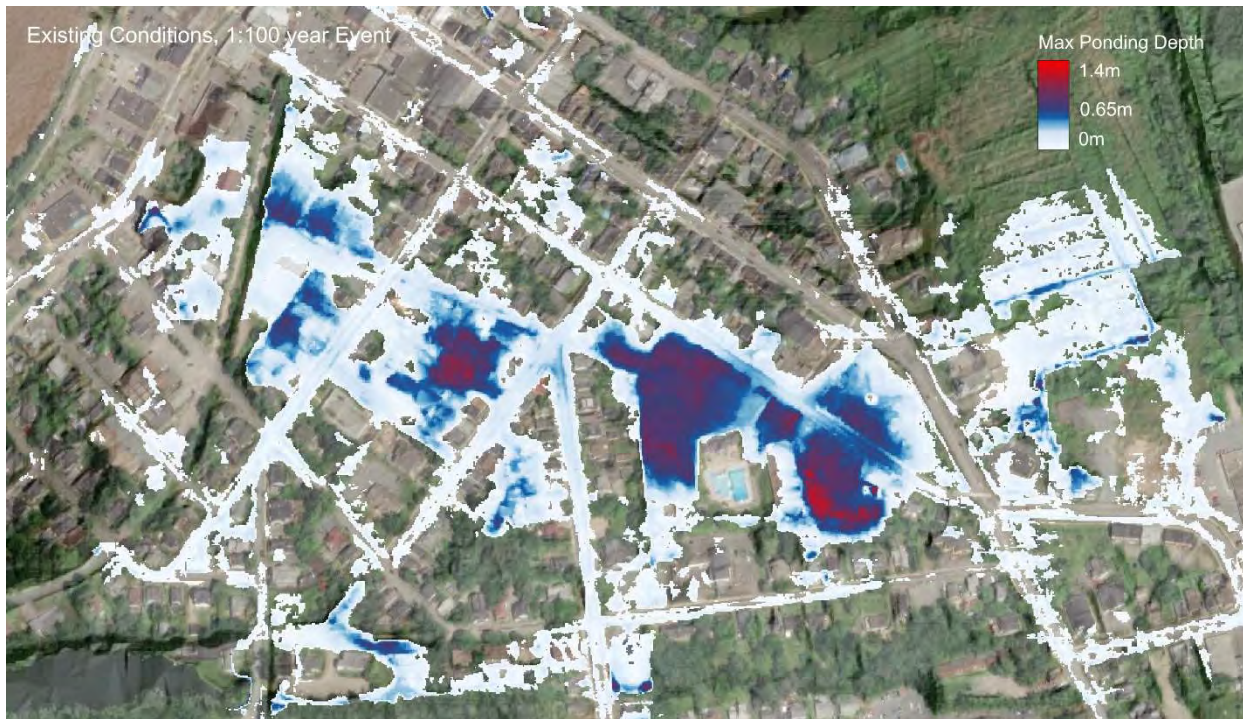


Figure 2.8: Existing Conditions in 1 in 100-year Storm with Climate Change

The Cunnabel Creek Right-of-Way (ROW) is the existing main corridor for combined sewer through this sewershed. CBCL reviewed drawings provided by WHRM for the Cunnabel Creek ROW from Water Street to Elmcroft Park. A drawing dated in 1915, provided in Appendix A, showed a variable width ROW, ranging from 9.15m wide at Water Street, to 3.05m near Elmcroft Park. A review of Nova Scotia property mapping information, aerial imagery, and on-site photos taken by WHRM staff, show that there are houses near the 6.10m ROW on Munroe Street. It appears that one house is infringing on the ROW along Munroe Street, and there are multiple sheds/small buildings on the ROW east of Victoria Street. In addition, the drawing from 1915 did not show a ROW from Water Street to the Avon River, and there are currently two commercial properties approximately 6.0m apart that would make constructing a large diameter structure to the outfall difficult. Any option reusing this corridor will need to take this into consideration.

2.2.4 Sewershed 4 (Gerrish Street)

This is small sewershed, 58,000 m², servicing approximately 50 homes and businesses. The system consists of 200mm gravity pipe that drain to the regional interceptor adjacent to Lake Pisiquid. Figure 2.9 provides an overview of this sewershed.

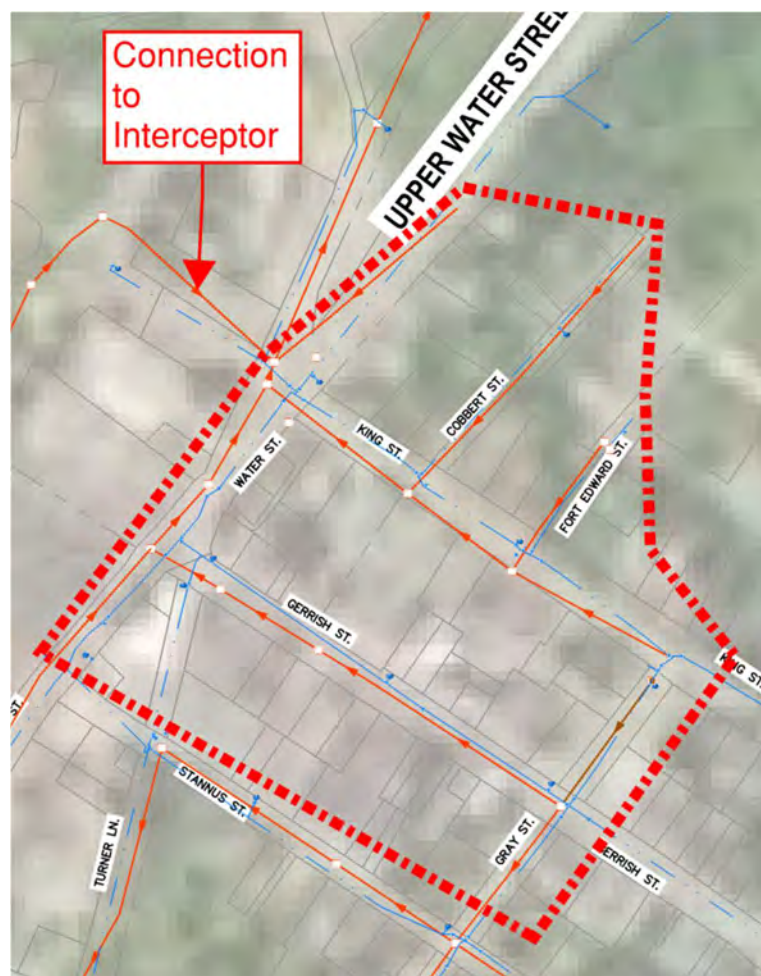


Figure 2.9: Sewer Shed Overview

There is a localized area on King Street that has capacity issues associated with pipe size, there have been no reported issues associated with existing condition as the surface water can follow the street and discharge to Lake Pisiquid. Separation of this area is recommended but it is not a high priority. It is recommended that an investigation be conducted on King Street to confirm no private properties have been impacts as result of the capacity issue. Figure 2.10 shows the pipe of concern on King Street.

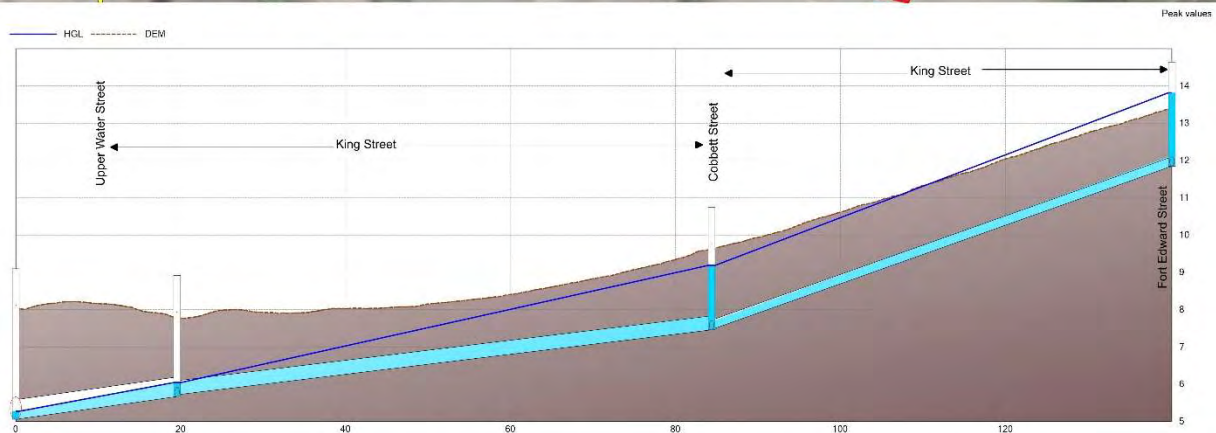


Figure 2.10: Plan and Profile View of the King Street Sewer during the Existing Conditions 1 in 5 Design Year Storm

2.3 Regional Interceptor

The regional interceptor consists of a gravity sewer that runs parallel to Lake Pisiquid and collects all the flows from the four sewer sheds and drains by gravity to Pump Station 7 (PS7). PS 7 was constructed in 2015 with a design capacity of 215 L/s (Stantec 90% Design Report February 2012) and a test capacity of 188 L/s (CBCL flow test October 2024) that discharges into the sewage treatment plant through 450mm diameter force main. Figure 2.11 provides an overview of the pump station. The regional interceptor and force main can be seen on Drawing 1 in Appendix A.

3 Conceptual Design

Each option below describes the core drainage pathway. It is intended that the sub catchments will be separated and connected to the new separated stormwater and sanitary sewers discussed below. Profiles of the major drainage pathways have been developed as part of this study to confirm slope and capacities and are presented in Appendix A. Prior to implementing the detail design within a sewershed, the main drainage pathway should be surveyed and designed to a level sufficient to confirm that all sub catchments can connect and there are no conflicts affecting the alignment that could impact the proposed slopes used in this report to calculate capacity and pipe size.

3.1 Summary of Previous Options

During the initial phase of the project several fully separated options were reviewed:

3.1.1 Remove Flow from Cunnabel Creek

To avoid having to structurally support houses during construction along Cunnabel Creek or acquire property to facilitate the installation of a large storm sewer, Option 1 proposes that storm water be diverted away from the existing Cunnabel Creek ROW, towards Albert Street in a large diameter box culvert along Stannus and Victoria Street. This will avoid installing large diameter sewers in close proximity to houses and businesses along the existing ROW but will increase the sewer depth as Albert Street is at a higher elevation than Cunnabel Creek.

3.1.2 Replacement of Existing System

This option mimics how the system currently operates with the current drainage pathways maintained which would require placing a large diameter stormwater pipe within the Cunnabel Creek easement, which as noted may result in significant private property impacts.

3.1.3 Spilt Flow Between Albert Street & Cunnabel Creek

This option balances the stormwater flow between Albert Street and Cunnabel Creek drainage areas to minimize pipes sizes. This was done by diverting flows from O'Brien Street, currently going to Cunnabel Creek, to Albert Street.

All these options rely upon gravity drainage to Lake Pisiquid, which cannot be guaranteed for Sewershed 3, Cunnabel Creek. As a result of this limitation the stormwater system servicing the Stannus Street and Gray Street areas would need to be sized to accommodate a 1 in 100-year storm with climate change. To address this issue additional work was conducted to determine how to mitigate the stormwater issue in this sewershed as discussed in the Stannus Street Options section.

3.2 Stannus Street Options

Due to the Stannus Street and Gray Street areas being at a low elevation with no natural gravity drainage pathway to Lake Pisiquid, strategies were developed to allow these areas to drain for a 1 in 100-year event. The strategies investigated included: diversion, storage, and pumping.

Each approach looked to improve the existing condition in a different way. Diversion focuses on directing peak flows away from Stannus Street area to limit infrastructure sizing. Storage looks to mitigate peak flows by allowing volumes of water to be stored and released at specified rates to limit impacts on downstream infrastructure.

Pumping was looked at as an option as gravity drainage to Lake Pisiquid is not possible under all conditions. In addition, an option of extending a gravity storm pipe to discharge at the Highway 101 culverts in Tregothic Marsh was investigated as an alternative to pumping to Lake Pisiquid. Further detail and explanation on each of these strategies is provided below in Figure 3.1.

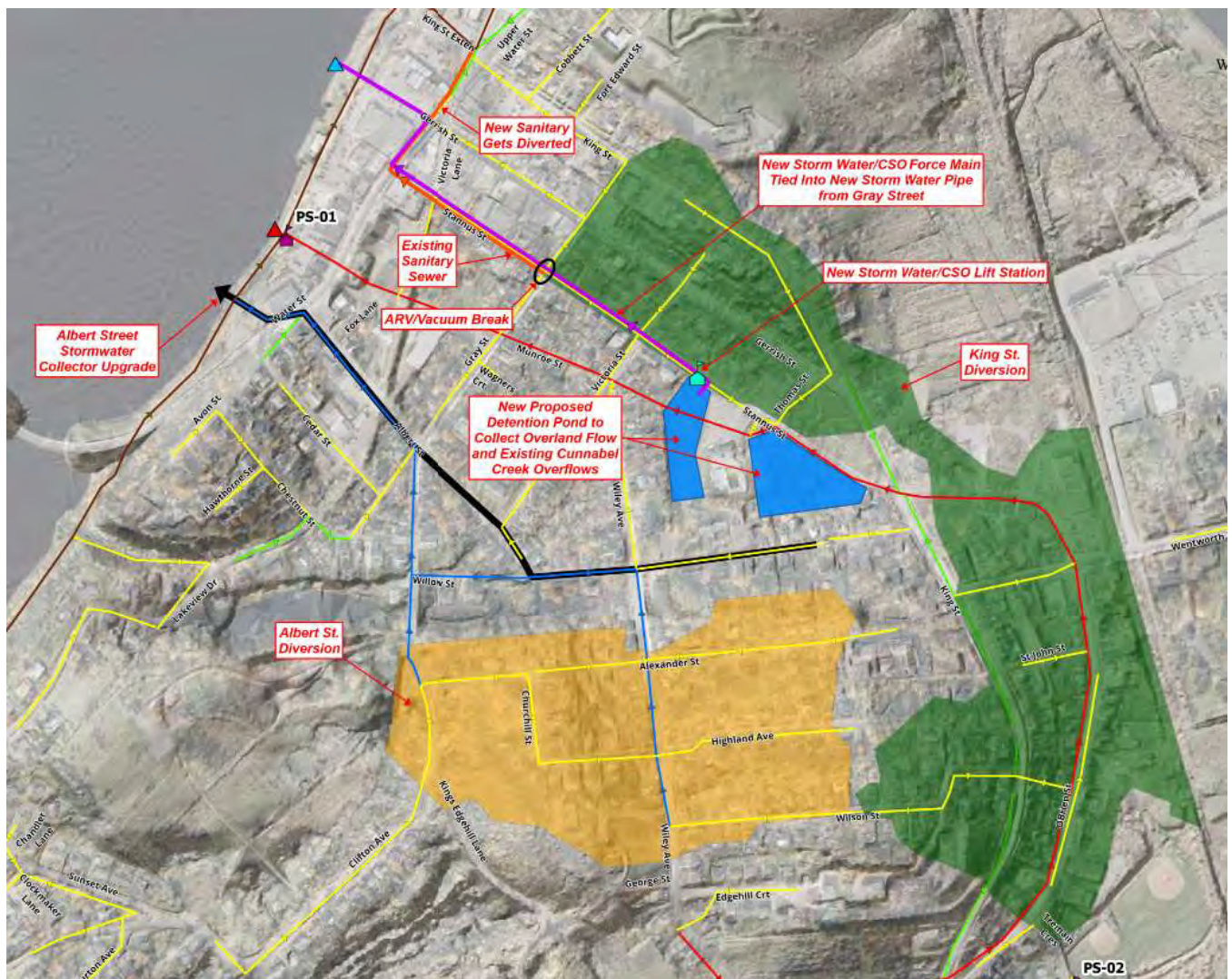


Figure 3.1: Overview of Conceptual Options

The options presented below will be compared to the existing combined sewer performance during 1 in 5-year, 1 in 10-year, and 1 in 100-year storm with climate change included. The hydraulic grade line through the Cunnabel Creek combined sewer will also be presented for comparison. Note that these options are being evaluated on their own with no other separation being completed in the community, other than what is provided in the description of each option.

Figure 3.2 to Figure 3.4 (on the following page) illustrate the flooding levels in the existing conditions for the 1 in 5-year, 1 in 10-year, and 1 in 100-year storm events. Figure 3.5 shows the hydraulic grade line through the Cunnabel Creek combined sewer.



Figure 3.2: Existing Conditions with 1:5-year and Climate Change

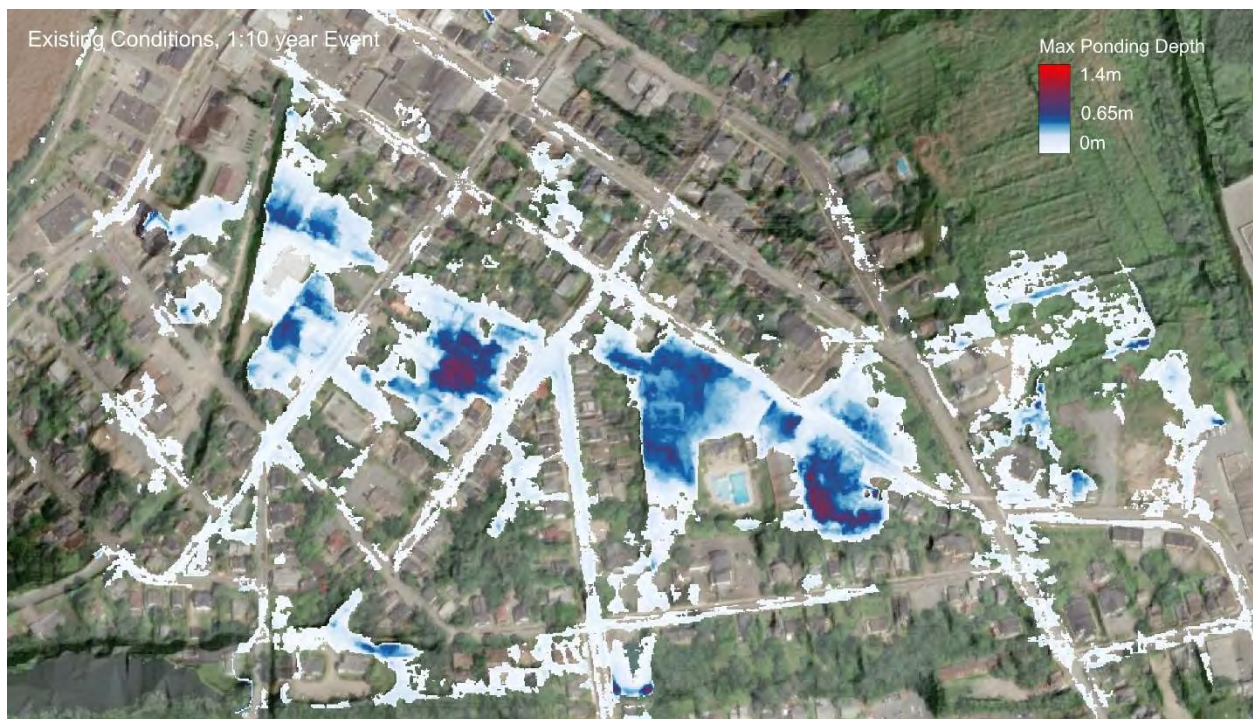


Figure 3.3: Existing Conditions with 1:10-year and Climate Change

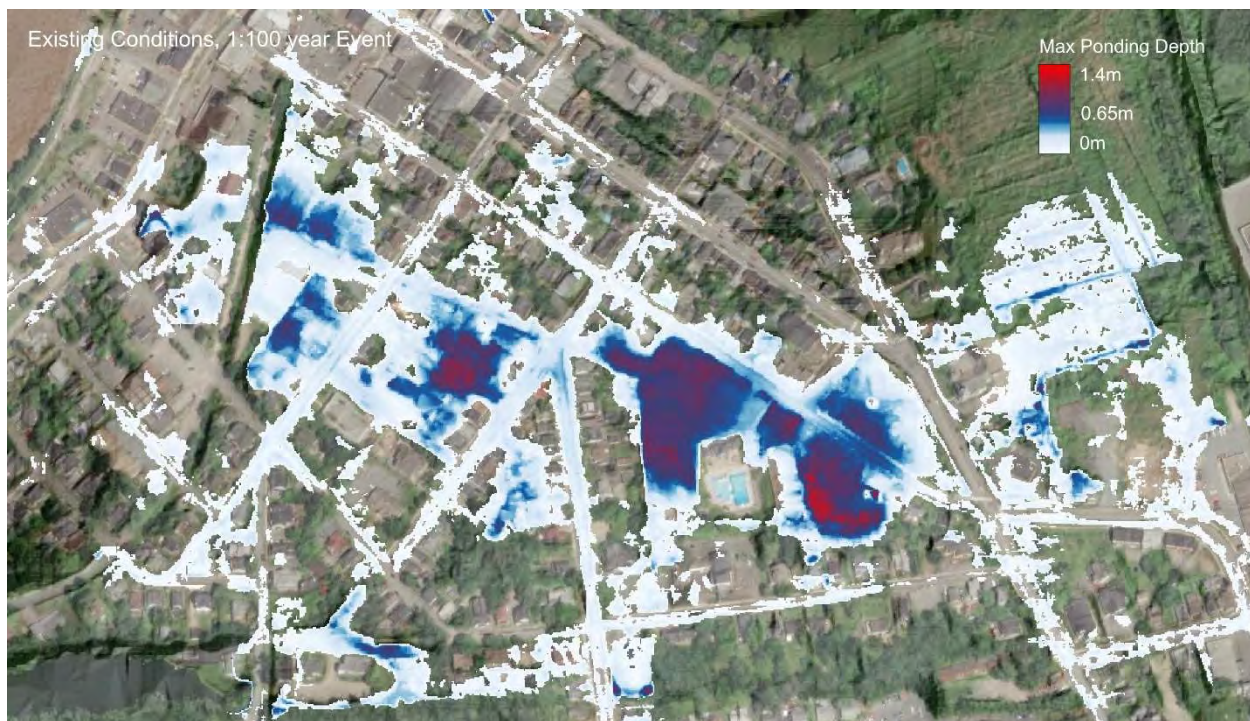


Figure 3.4: Existing Conditions with 1:100 year and Climate Change

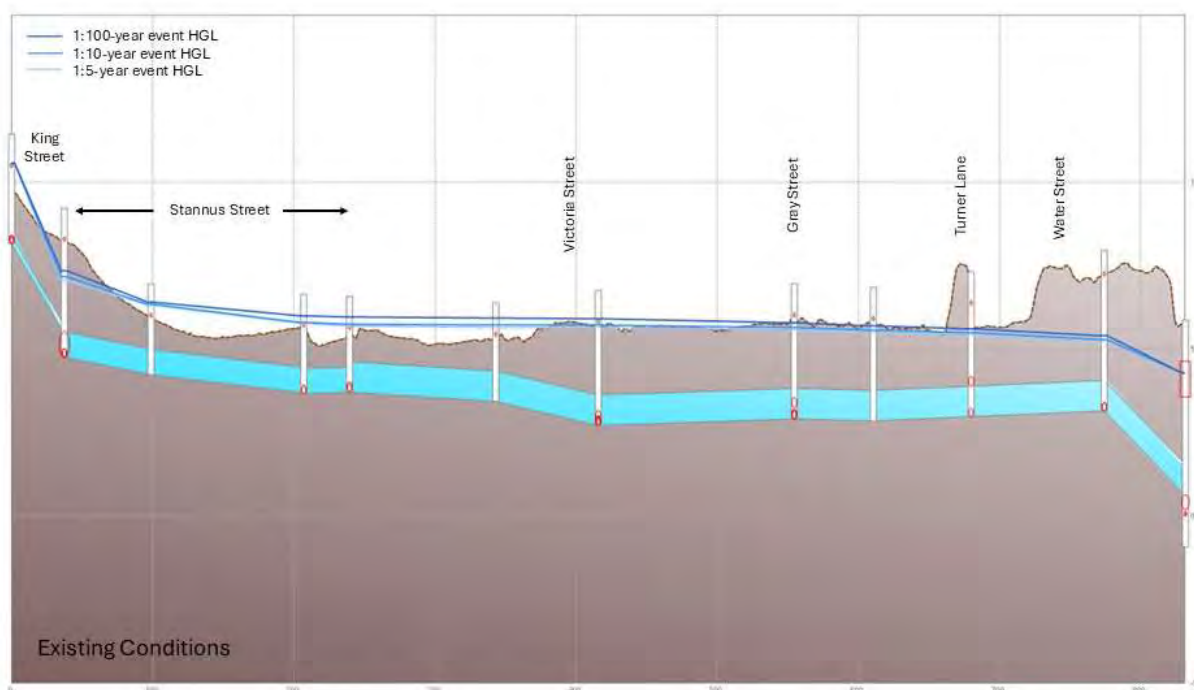


Figure 3.5: Hydraulic Grade Line through Cunnabel Creek Combined Sewer

3.2.1 Option 1 – Albert Street Diversion and Storage

The natural overland path is down Wiley Avenue, reaching Stannus Street via Victoria Street. This puts additional strain on the already overloaded Stannus Street/Cunnabel Creek system.

The objective of this option is to divert overland flow from Albert Street and Wiley Avenue away from Stannus Street, see Figure 3.6 for the layout of the proposed infrastructure.

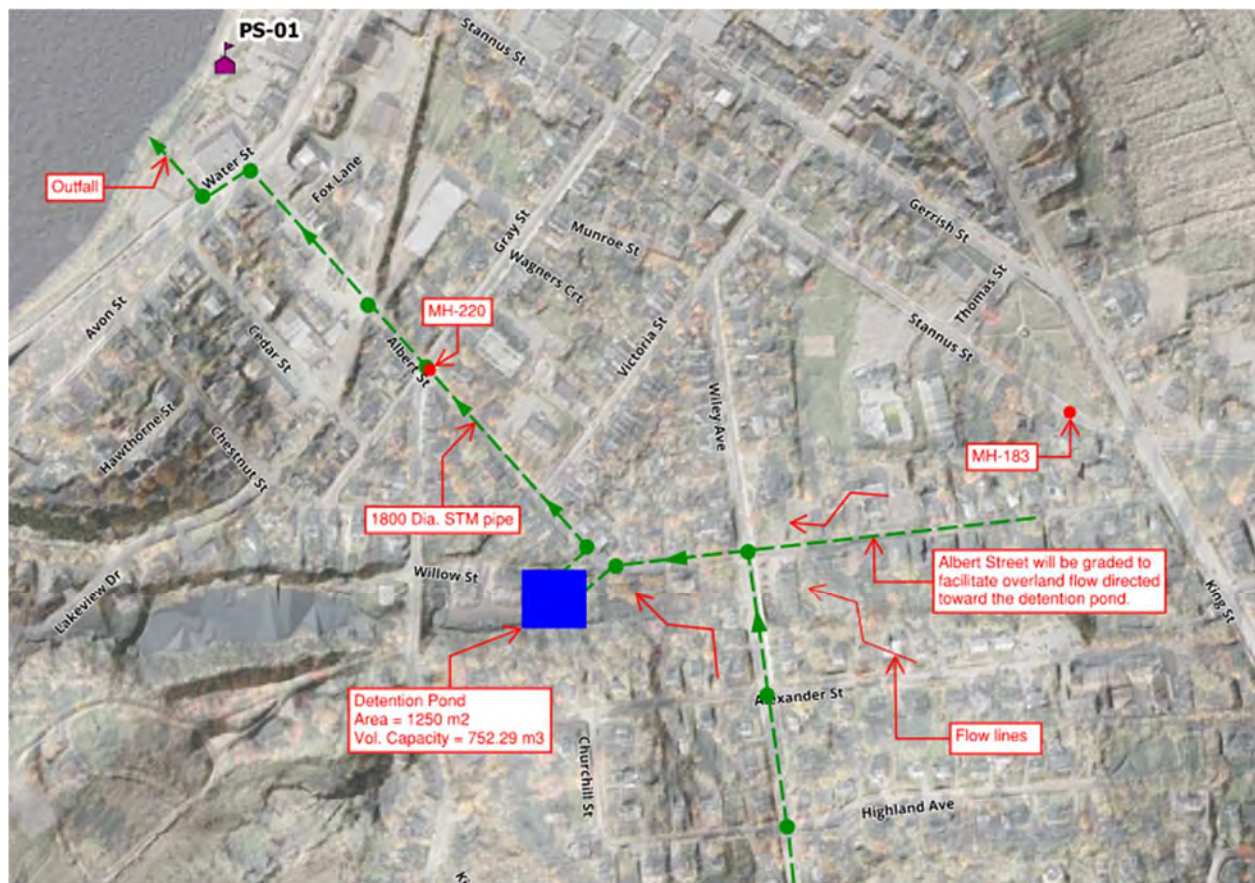


Figure 3.6: Albert Street Diversion and Storage

This conceptual option would include the following infrastructure upgrades:

- ▶ Fully separating all storm and sanitary pipes in this sub catchment.
- ▶ Significantly increasing the size of the Albert Street storm sewer main to create a trunk sewer that can accommodate as much of a 1 in 100-year storm as possible.
- ▶ Creating a new Albert Street stormwater outfall.
- ▶ Disconnecting the Albert Street storm sewer from the Wiley Avenue storm sewer, so that pipe flows are no longer directed toward Stannus Street.
- ▶ Regrading the Wiley Avenue and Albert Street intersection so that overland flows are no longer directed toward Stannus Street.

The modeled flood extents are presented below. The results indicated that there was improvement in the Gray Street area as expected as this flooding is partially caused by the Albert Street system surcharging and running overland until it collects in the low areas around the curling club.

To demonstrate the impact of implementing this option on the hydraulic grade line, two representative manholes, MH-220 on Gray Street and MH-183 on Stannus Street. The MHs

are identified in Figure 3.6 and have been selected to compare water levels for existing conditions and future conditions. It is important to note that MH-220 and MH-183 both experience flooding during existing storm events. Table 3.1 presents the water level modeled over the MHs during various storm events for existing and future conditions.

Table 3.1: Comparing the HGL Improvements for Option 1

	Storm Events (yr)	Surface Elevation (m)	Water Level ¹ Based on Existing Combined System (m)	Water Level ² Based on Option 1 (m)
MH-220	1:5	6.55	6.94/7.05	4.63
	1:10		7.01/7.10	4.70
	1:100		7.15/7.29	4.80
MH-183	1:5	5.95	6.25/6.30	6.29
	1:10		6.29/6.32	6.32
	1:100		6.34/6.40	6.39

Notes:

1 -Water level on the left is based on current design storms, water level on the right is based on future design storm with climate change

2 - Water level based on future design storm with climate change

The results show that the manholes both surcharge with the existing combined sewer system for the current and future design storms. With Option 1 implemented the water level is reduced to below surface level on Gray Street but no improvements are made on Stannus St. This results on Stannus St are expected as the capacity in the Cunnabel Creek combined sewer is being consumed by flows from King Street and O' Brien Street which are not being mitigated with this Option.

Figure 3.7 to Figure 3.9 (below) illustrate the flooding levels in the existing conditions for the 1 in 5-year, 1 in 10-year, and 1 in 100-year storm events. Figure 3.10 shows the hydraulic grade line through the Cunnabel Creek combined sewer.



Figure 3.7: Model Flood Extents 1 in 5-year and Climate Change



Figure 3.8: Model Flood Extents 1 in 10-year and Climate Change

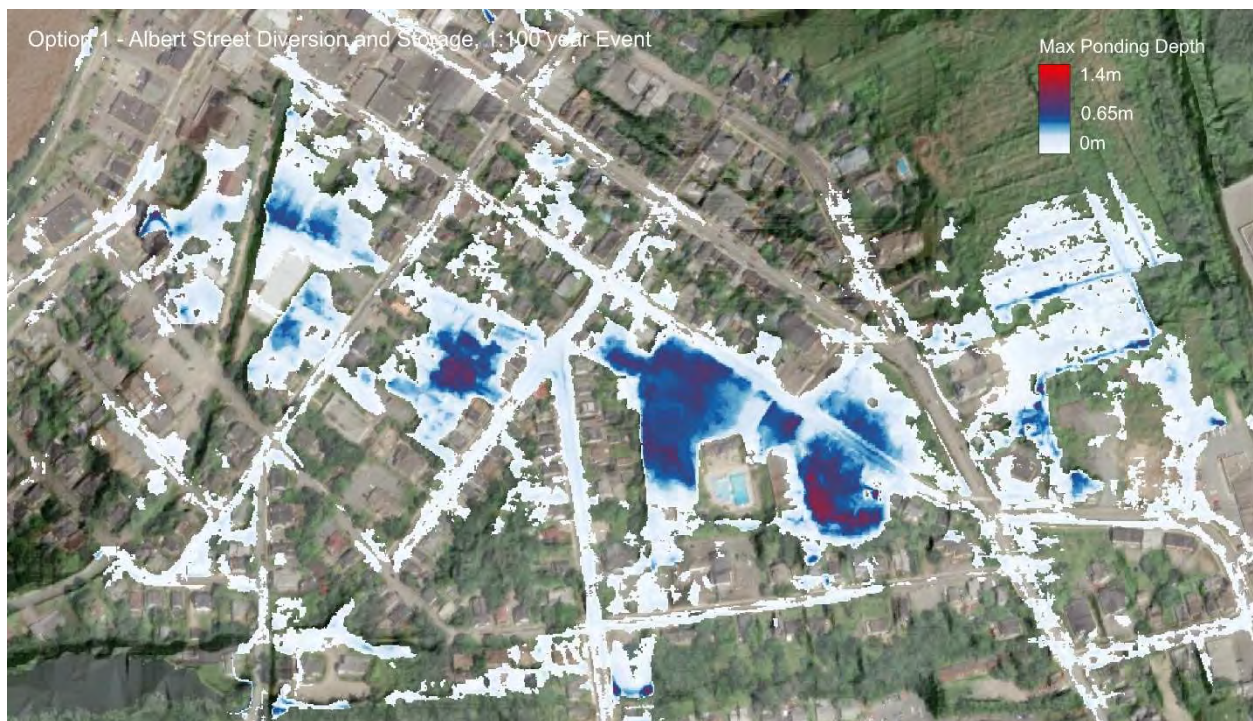


Figure 3.9: Model Flood Extents 1 in 100-year and Climate Change

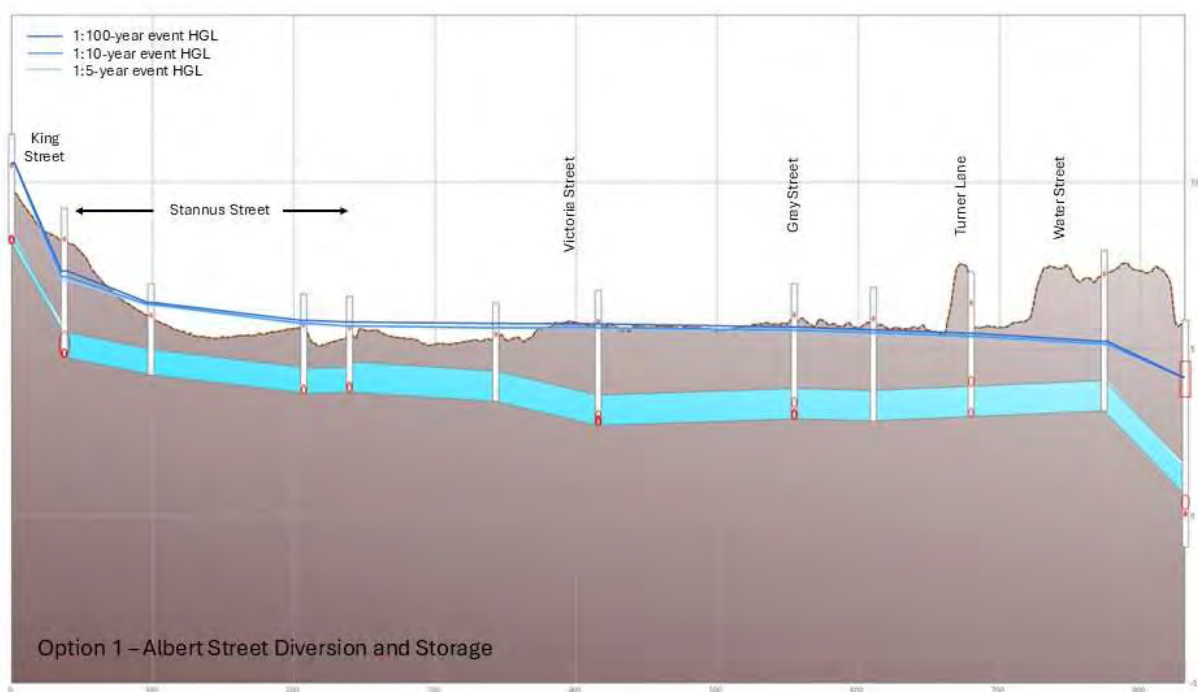


Figure 3.10: Hydraulic Grade Line through Cunneen Creek Combined Sewer

3.2.2 Option 2 – King Street Diversion

The objective of this option was to investigate how much of an impact overland flow from the green area of Figure 3.1 is impacting Stannus Street.

This conceptual option would include the following infrastructure upgrades:

- ▶ Fully separating all storm and sanitary pipes in this sub catchment.
- ▶ Increasing the size of the King Street storm sewer main based on modelling requirements.

The green area shown in Figure 3.1 is split into two distinct area. The first area encompasses King Street and O'Brien Street. The piped flow from these two streets is directed to Stannus Street; however, the overland flow is directed in the marsh area. This means that diverting flow has a minimal impact on the total flow going towards Stannus Street. The second area includes King Street and Gerrish Street; and while the overland and piped flow from this area is directed towards Stannus Street, it is a smaller total value. When considering these factors, this option did not provide significant improvement to flooding in Stannus Street.

3.2.3 Option 3 – Stannus Storage and Pumping

The Stannus Street area is the receiving environment for stormwater because it is a natural low area. This leads to significant surface flooding as well as combined sewer surcharging. The diversion of flows away from the area will help, however, as shown in the Albert Street diversion option this isn't enough to prevent surface flooding or surcharging of the Cunnabel Creek combined sewer.

The objective of this option is to evaluate a stormwater system in this area that can collect and store the surface water, reducing flooding risk until full separation is completed, and pump the water to the receiving environment, Lake Pisiquid.

This conceptual option would include the following infrastructure upgrades, shown in Figure 3.11.

- ▶ Fully separating all storm and sanitary pipes in this sub catchment.
- ▶ Adding a new stormwater pumping station.
- ▶ Adding a new stormwater storage facility.

Separate scenarios were evaluated for different pumping vs storage requirements and based on the assessment it was designed to go with minimal storage to not impact the parks as well as the constructability issues of high ground water and poor soil conditions.

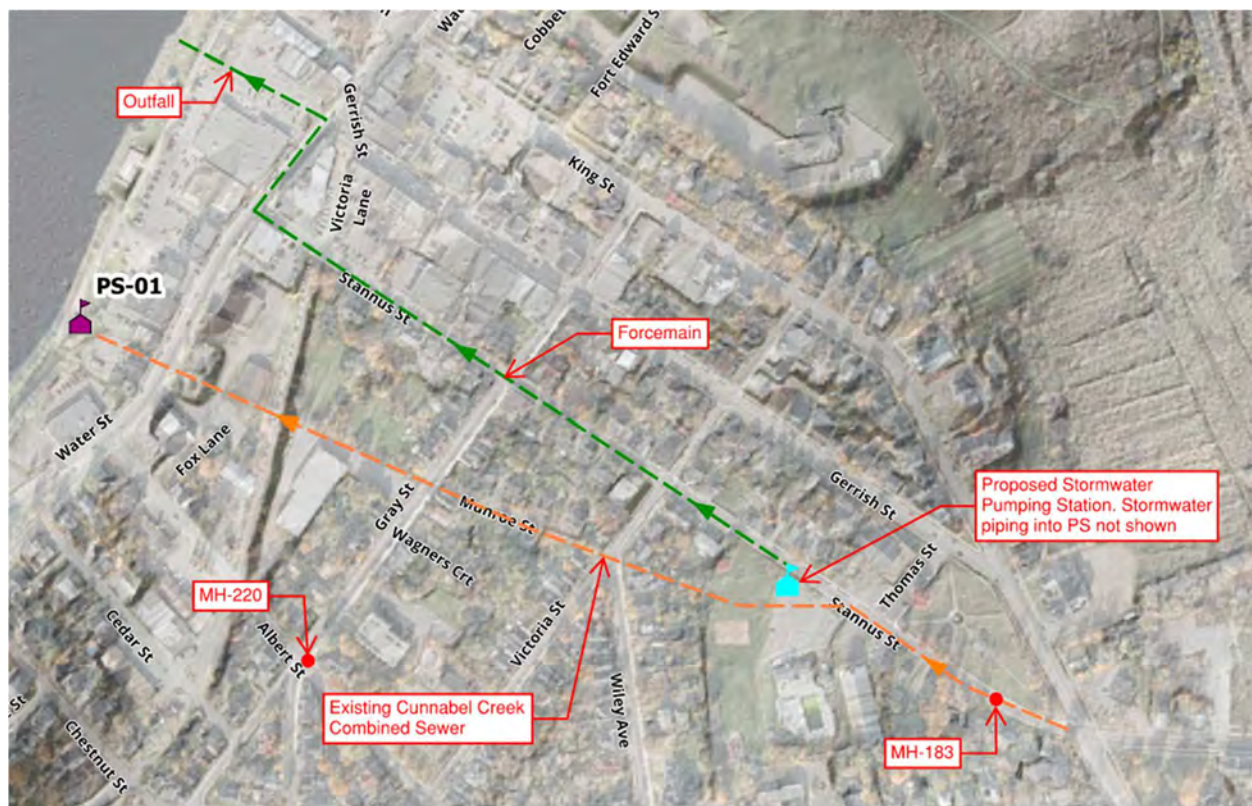


Figure 3.11: Proposed Layout for Stannus Storage and Pumping

The modeled flood extents are presented below. The results indicated that there was improvement in the Stannus Street area as expected as this flooding is caused by a combination of overland flow and combined sewer surcharging. This option provides a means of collecting the surface water and discharging it to Lake Pisiquid.

There was less improvement around Gray Street with this option as it does not address the surcharging from Albert Street which is a large contributor to the flooding at the curling club.

In this option, the hydraulic grade line along the Cunnabel Creek combined sewer still appears to be surcharged. This is a result of the capacity in the Cunnabel Creek combined sewer being consumed by piped flows from King Street and O' Brien Street which are not being mitigated with this approach. During the review of the results, it was thought that a combined sewer overflow connection from Cunnabel Creek combined sewer to the pump station may improve the hydraulic grade line of the Cunnabel Creek combined sewer; this option is discussed next.

To demonstrate the impact of implementing this option on the hydraulic grade line, two representative manholes, MH-220 on Gray Street and MH-183 on Stannus Street, have been selected to compare water levels for existing conditions and future conditions. It is important to note that MH-220 and MH-183 both experience flooding during existing storm events. Table 3.2 presents the water level modeled over the MHs during various storm events for existing and future conditions.

Table 3.2: Comparing the HGL Improvements for Option 3

	Storm Events (yr)	Rim Elevations (m)	Water Level ¹ Based on Existing Combined System (m)	Water Level ² Based on Option 3 (m)
MH-220	1:5	6.55	6.94/7.05	7.05
	1:10		7.01/7.10	7.10
	1:100		7.15/7.29	7.28
MH-183	1:5	5.95	6.25/6.30	6.14
	1:10		6.29/6.32	6.18
	1:100		6.34/6.40	6.23

Notes:

1 -Water level on the left is based on current design storms, water level on the right is based on future design storm with climate change

2 – Water level based on future design storm with climate change

The results show that the manholes both surcharge with the existing combined sewer system for the current and future design storms. With Option 3 implemented the water level is reduced but the system still surcharges on Stannus Street. On Gray Street there are no improvements. The results on Gray Street are expected as the capacity along Albert Street are not being mitigated with this Option.

Figure 3.12 to Figure 3.14 (below) illustrate the flooding levels in the existing conditions for the 1 in 5-year, 1 in 10-year, and 1 in 100-year storm events. Figure 3.15 shows the hydraulic grade line through the Cunnabel Creek combined sewer.

**Figure 3.12: Model Flood Extents 1 in 5-year and Climate Change**



Figure 3.13: Model Flood Extents 1 in 10-year and Climate Change



Figure 3.14: Model Flood Extents 1 in 100-year and Climate Change

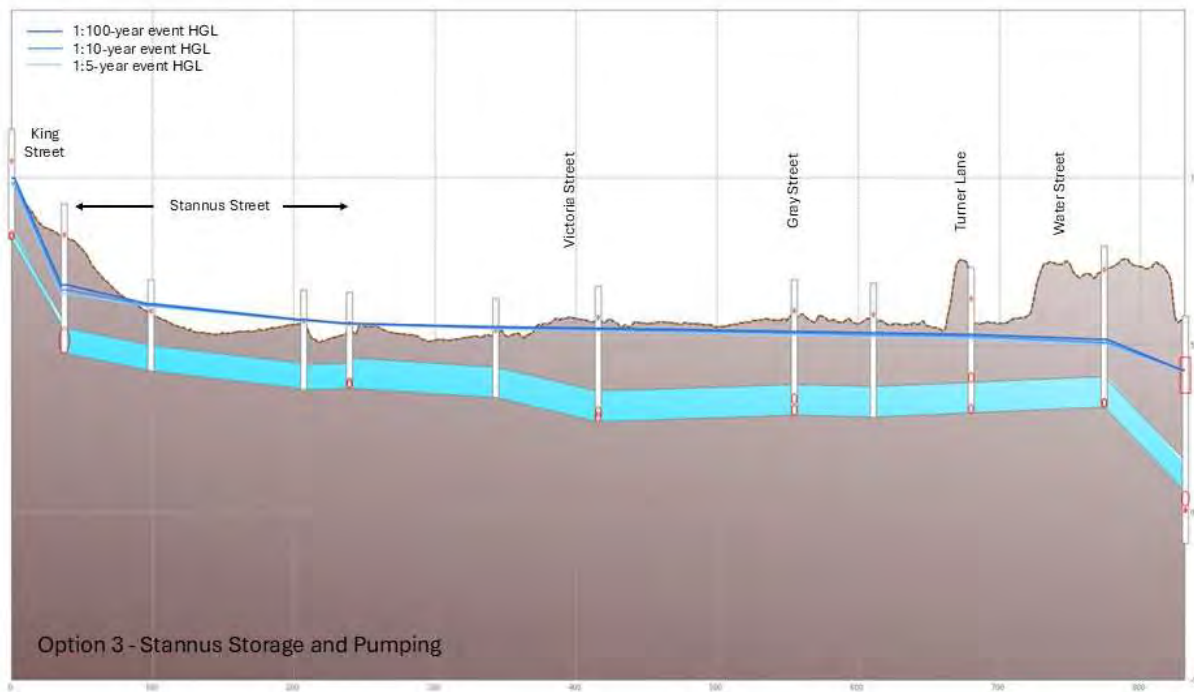


Figure 3.15: Hydraulic Grade Line through Cunnabel Creek Combined Sewer

3.2.4 Option 4 – Stannus Storage and Pumping with Connection to Cunnabel Creek Combined Sewer

This option was explored following the review of the previous option as a way to lower the hydraulic grade line in the Cunnabel Creek combined sewer. The objective of this connection would be to divert flow from the combined sewer system into the pump station preventing the release of combined sewer to surface. This option would include the following infrastructure upgrades, shown in Figure 3.16.

- ▶ Fully separating all storm and sanitary pipes in this sub catchment.
- ▶ Adding a new stormwater pumping station.
- ▶ Adding a new stormwater storage facility.
- ▶ Adding a combined sewer overflow connection to Cunnabel Creek combined sewer into the pump station.

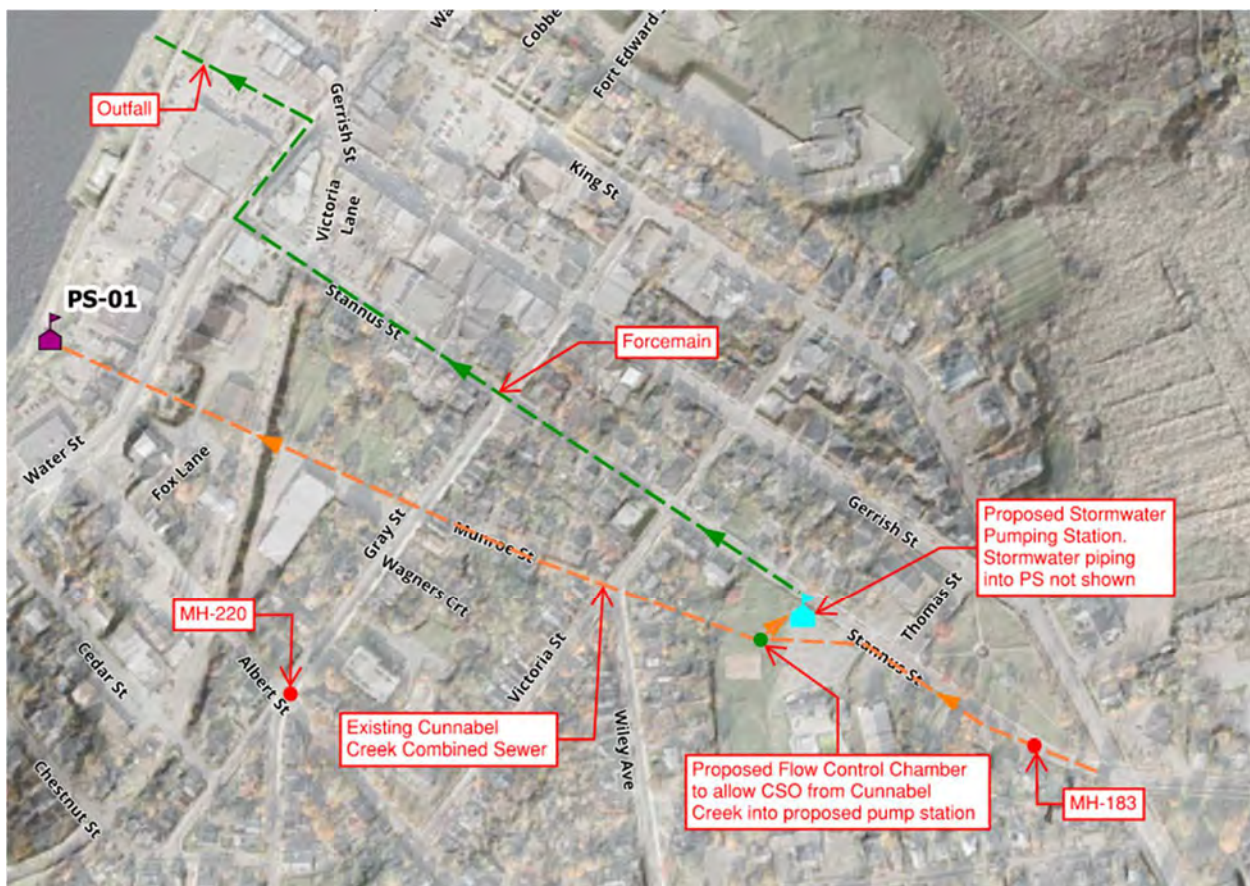


Figure 3.16: Proposed Layout Stannus Storage and Pumping with Connection to Cunnabel Creek Combined Sewer

The modeled flood extents are presented below. The results are very similar to the previous option as expected as there was no change in the ability of the system to collect additional surface water.

The hydraulic grade line along the Cunnabel Creek combined sewer dropped from the previous option as the overflow provided a release point. There may still be surcharging in low level manholes, however this is expected to be a low occurrence and an improvement to the system overall performance.

To demonstrate the impact of implementing this option on the hydraulic grade line, two representative manholes, MH-220 on Gray Street and MH-183 on Stannus Street, have been selected to compare water levels for existing conditions and future conditions. It is important to note that MH-220 and MH-183 both experience flooding during existing storm events. Table 3.3 presents the water level modeled over the MHs during various storm events for existing and future conditions.

Table 3.3: Comparing the HGL Improvements for Option 4

	Storm Events (yr)	Rim Elevations (m)	Water Level ¹ Based on Existing Combined System (m)	Water Level ² Based on Option 4 (m)
MH-220	1:5	6.55	6.94/7.05	7.05
	1:10		7.01/7.10	7.10
	1:100		7.15/7.29	7.29
MH-183	1:5	5.95	6.25/6.30	5.32
	1:10		6.29/6.32	5.35
	1:100		6.34/6.40	5.39

Notes:

1 -Water level on the left is based on current design storms, water level on the right is based on future design storm with climate change

2 – Water level based on future design storm with climate change

The results show that the manholes both surcharge with the existing combined sewer system for the current and future design storms. With Option 4 implemented the water level is reduced to below surface level on Stannus Street but no improvements are made on Gray Street. The results on Gray Street are expected as the capacity along Albert Street are not being mitigated with this Option.

Figure 3.17 to Figure 3.19 (on the following page) illustrate the flooding levels in the existing conditions for the 1 in 5-year, 1 in 10-year, and 1 in 100-year storm events. Figure 3.20 shows the hydraulic grade line through the Cunnabel Creek combined sewer.

**Figure 3.17: Model Flood Extents 1 in 5-year and Climate Change**



Figure 3.18: Model Flood Extents 1 in 10-year and Climate Change



Figure 3.19: Model Flood Extents 1 in 100-year and Climate Change

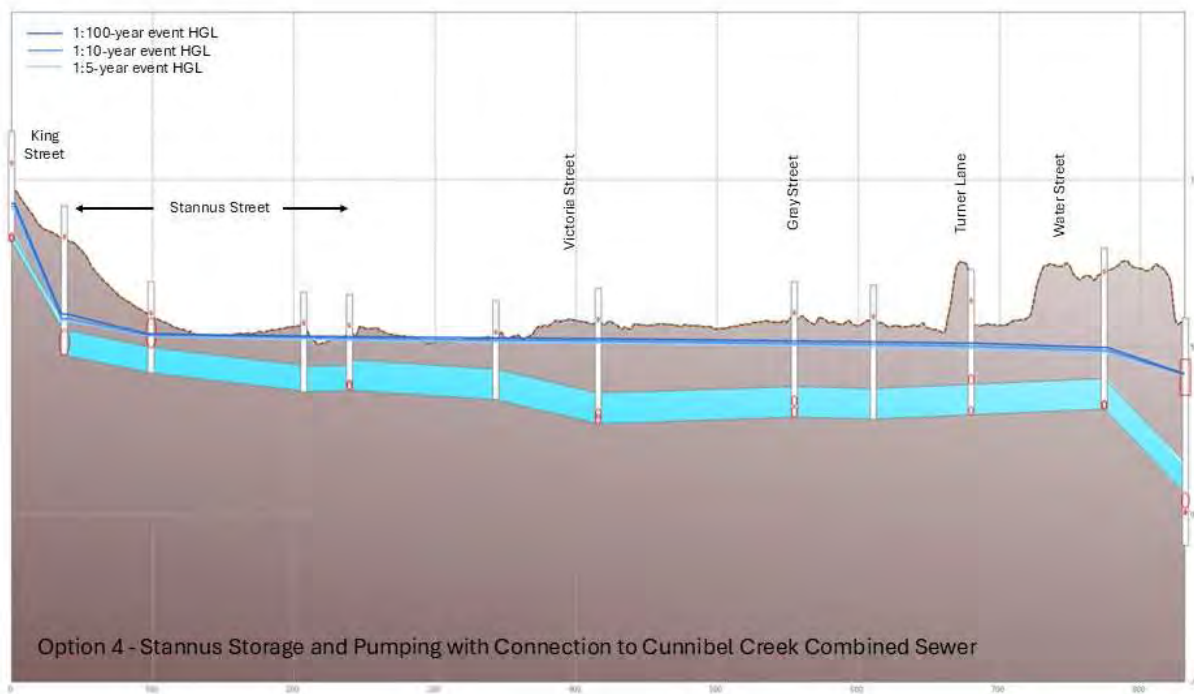


Figure 3.20: Hydraulic Grade Line through Cunnabel Creek Combined Sewer

3.2.5 Option 5 – Stannus Street Stormwater Connection to Tregothic Marsh

This option would change the receiving environment from Lake Pisiqid to Tregothic Marsh. This would be a wholistic change in how the system operates and is being considered as there are plans for a stormwater pump in the future to service Tregothic Marsh. Directing flow to this location would result in the Municipality only needing to construct and maintain one pump station instead of two which is a significant advantage for the Municipality. Figure 3.21 shows the proposed layout of this option.



Figure 3.21: Proposed Layout Stannus Street Stormwater Connection to Tregothic Marsh

A storm water pump station with a pumping capacity of $8.1 \text{ m}^3/\text{s}$ is required to maintain a maximum water level of 1.6m Elev. on the back side of the dike during high tides and a 1:100-year storm event. The pump station would consist of a 10m wide concrete inlet structure and sump containing individual pump bays for three (3) submersible axial flow propeller pumps. The inlet structure would have a raised concrete curb and static bar screen to prevent sedimentation and debris from accumulating in the sump. The pumps will discharge through 1.4m diameter riser columns above the normal high tide elevation into a spillway on the backside of the dike.

The pump station will normally operate on only two pumps with the third pump acting as a spare. The single pump duty point is 4.05m³/s at 8m TDH for a combined station capacity of 8.1m³/s. A 1500kW backup generator and automatic transfer switch (ATS) would be included to allow continued operation of two 600hp pumps in the event of a utility power failure. No building structures are required, and the generator, ATS, and control panels would all be housed in lockable weatherproof enclosures.

An approximate 150m long 4m wide gravel access road will be provided from Colonial Rd to the PS site which would include a minimum 6m wide laydown area at the site to permit the use of a boom truck to install and remove the pumps as necessary. 3-phase electricity will be extended approximately 600m along Colonial Rd from near the Headworks Wastewater Treatment Plant to the Pump Station site and will include a new pad mount transformer.

The existing aboiteau will remain operational for day-to-day discharges and the pump station would be activated based on a high level setpoint on the backside of the dike. One option for the pump configuration is provided in Figure 3.22, other options would be evaluated at the design stage.

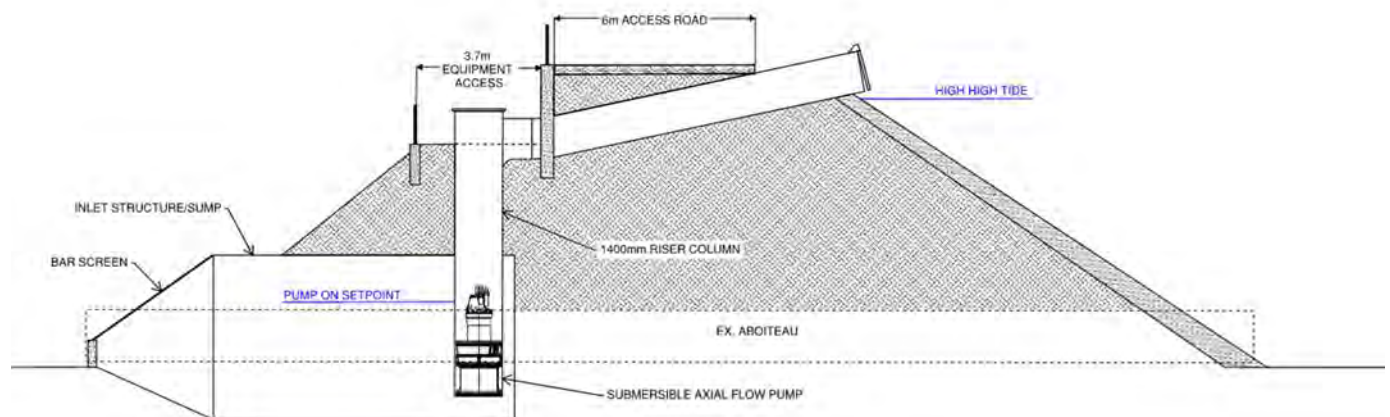


Figure 3.22: Pump Configuration Option

This conceptual option would include the following infrastructure upgrades:

- ▶ No separation of storm and sanitary pipes, except for Stannus Street from Gray St to the CSO chamber.
- ▶ Rerouting the storm pipes as needed to allow for gravity flow to Tregothic Marsh.
- ▶ Adding a new storm sewer main that directs flow to culvert crossing under highway 101
- ▶ In the future a stormwater pump station would be added at the existing aboiteau to allow stormwater to be discharged during high tide.

The modeled flood extents are similar to Options 3 and 4. This is expected as everything is the same except the means of removing the stormwater from the area and both methods are capable of removing the required stormwater. However, this option doesn't require a large pump station to be built in a public park with poor soil conditions and high ground water as an initial phase. This construction would be very difficult, time consuming and expensive.

The hydraulic grade line for Option 5 through Cunnabel Creek combined sewer is slightly higher than Option 4 but less than Option 3. To demonstrate the impact of implementing this option on the hydraulic grade line, two representative manholes, MH-220 on Gray Street and MH-183 on Stannus Street, have been selected to compare water levels for existing conditions and future conditions. It is important to note that MH-220 and MH-183 both experience flooding during existing storm events. Table 3.4 presents the water level modeled over the MHs during various storm events for existing and future conditions.

Table 3.4: Comparing the HGL Improvements for Option 5

	Storm Events (yr)	Rim Elevations (m)	Water Level ¹ Based on Existing Combined System (m)	Water Level ² Based on Option 5 (m)
MH-220	1:5	6.55	6.94/7.05	7.05
	1:10		7.01/7.10	7.10
	1:100		7.15/7.29	7.29
MH-183	1:5	5.95	6.25/6.30	5.30
	1:10		6.29/6.32	5.33
	1:100		6.34/6.40	5.37

Notes:

1 -Water level on the left is based on current design storms, water level on the right is based on future design storm with climate change

2 - Water level based on future design storm with climate change

This option would require a large storm sewer, or open ditch, to be designed to collect the stormwater from the sewershed and direct it to the culverts crossing at Highway 101. This will result in additional water being added to the Tregothic Marsh watershed which also has flood issues. The impacts of this were reviewed by using the modeled highwater elevation at the discharge point as the tailwater elevation in the model and modeling the new tailwater elevation as a boundary condition in the Tregothic Marsh model, to determine if this will result in additional flooding around the exhibition grounds. The results of the modeling are presented in Figure 3.23 to Figure 3.26, on the following page. The reason the flooding has not increased around the exhibition ground is that this flooding is caused by undersized culverts, ditches, downstream systems, and is not directly related to the water level at Highway 101. Figure 3.27 shows the hydraulic grade line through the Cunnabel Creek combined sewer.

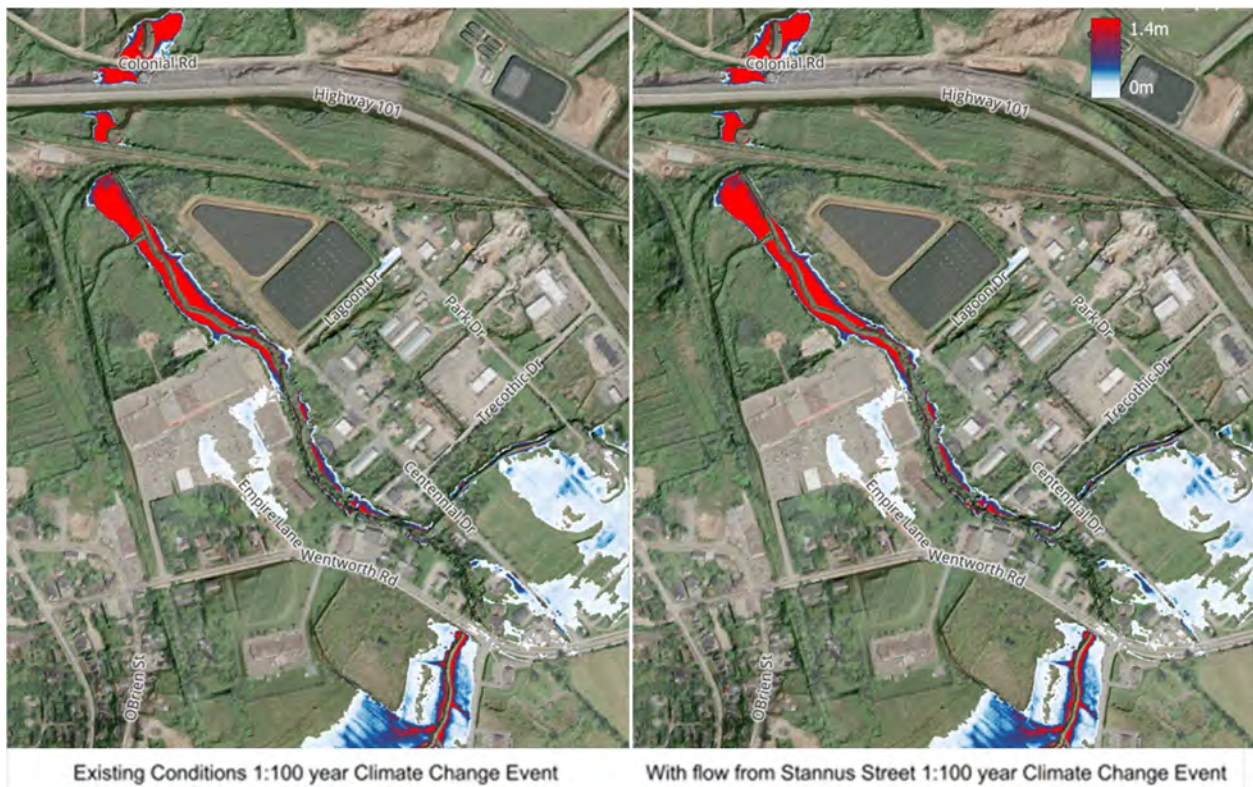


Figure 3.23: Flooding Comparison at Exhibition Grounds

This option will rely on provincially owned infrastructure such as the culverts under Highway 101 and the aboiteau structure to allow for water to reach the receiving environment. Discussion with the groups responsible for this infrastructure will need to be engaged to confirm they agree with this approach.



Figure 3.24: Model Flood Extents 1 in 5-year and Climate Change



Figure 3.25: Model Flood Extents 1 in 10-year and Climate Change

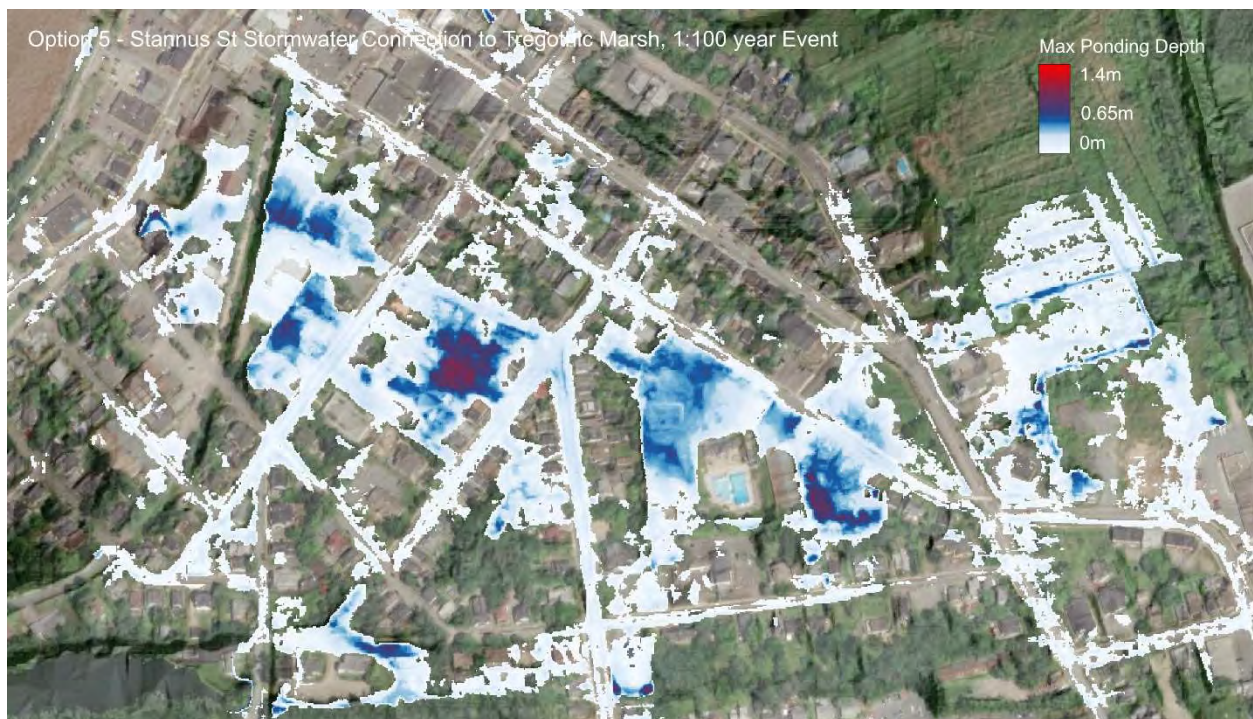


Figure 3.26: Model Flood Extents 1 in 100-year and Climate Change

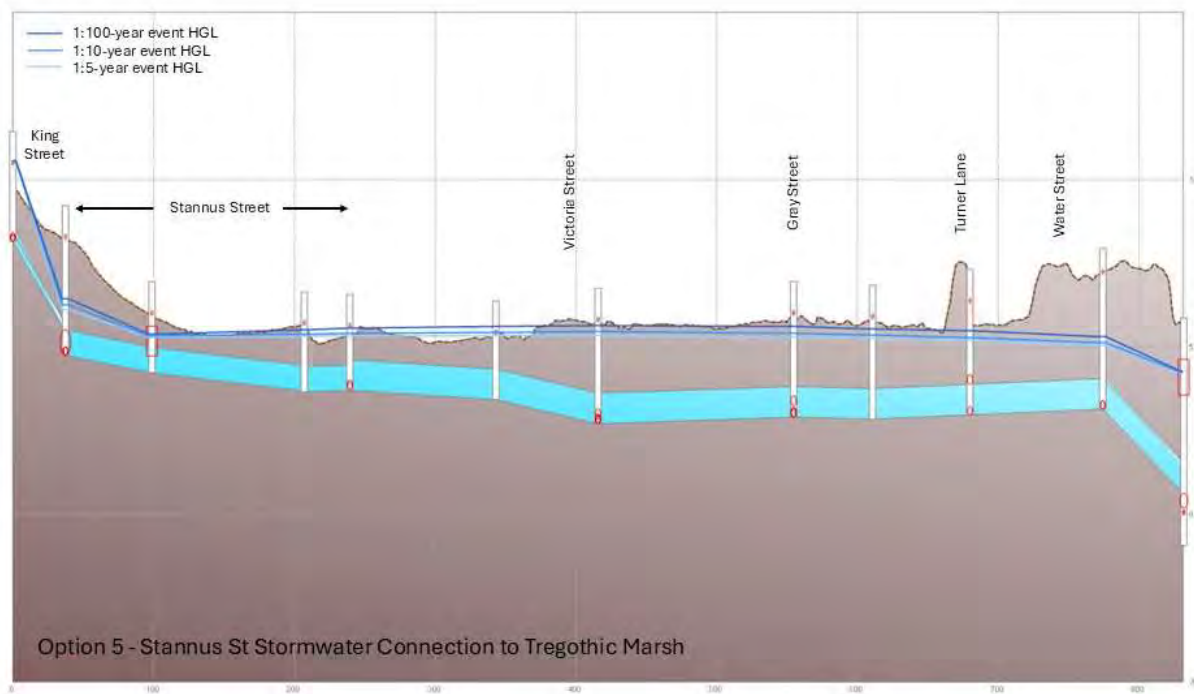


Figure 3.27: Hydraulic Grade Line through Cunnabel Creek Combined Sewer

3.3 Integrated Option Evaluation

Option 1, 3, 4 and 5 provided positive results in terms of options that could be implemented as first steps prior to the rest of the system being separated. Two combinations of options were explored to see how they worked together:

- ▶ Integration Option 1 – Albert Street Diversion with Option 3/4 – Stannus Street Storage and Pumping.
- ▶ Integration Option 2 – Albert Street Diversion with Option 5 – Stannus Street storm water Connection to Tregothic Marsh.

Option 3 and 4 have the same system layout and are considered equal in comparing results and therefore only one option was used to evaluate this combination. The evaluation below considered the integrated options, described above, connected into the existing system. This evaluation does not include the system being fully separated.

3.3.1 Integrated Option 1 – Albert Street Diversion with Option 3/4 – Stannus Street Storage and Pumping

This option combines the Albert Street diversion with a stormwater pump station near Stannus Street. This option addresses overland flow from the Albert Street sewershed into the Stannus area as well as provides a means of removing collected surface water from the area.

The modeled flood extents, presented below, show significant improvements in flood protection in both the Stannus Street and Gray Street areas. Figure 3.28 to Figure 3.30 (below) illustrate the flooding levels for this option, for the 1 in 5-year, 1 in 10-year, and 1 in 100-year storm events.

To demonstrate the impact of implementing this option on the hydraulic grade line, two representative manholes, MH-220 on Gray Street and MH-183 on Stannus Street, have been selected to compare water levels for existing conditions and future conditions. It is important to note that MH-220 and MH-183 both experience flooding during existing storm events. Table 3.5 presents the water level modeled over the MHs during various storm events for existing and future conditions.

Table 3.5: Comparing the HGL Improvements for Integrated Option 1/3 & 1/4

	Storm Events (yr)	Rim Elevations (m)	Water Level ¹ Based on Existing Combined System (m)	Water Level ² Based on Integrated Option 1/3 (m)	Water Level ² Based on Integrated Option 1/4 (m)
MH-220	1:5	6.55	6.94/7.05	4.56	4.51
	1:10		7.01/7.10	4.64	4.60
	1:100		7.15/7.29	4.75	4.71
MH-183	1:5	5.95	6.25/6.30	6.12	5.29
	1:10		6.29/6.32	6.17	5.33
	1:100		6.34/6.40	6.23	5.37

Notes:

1 -Water level on the left is based on current design storms, water level on the right is based on future design storm with climate change

2 – Water level based on future design storm with climate change

The water level for option 1/3 and 1/4 results in the water at Gray Street not surcharging from the manhole. The water level on Stannus Street for option 1/3 is reduced slightly but surcharging of combined sewer is still expected. The model results for Stannus Street for Option 1/4 indicates that combined sewer will not surcharge and exit the system onto the street.



Figure 3.28: Model Flood Extents 1 in 5-year and Climate Change



Figure 3.29: Model Flood Extents 1 in 10-year and Climate Change



Figure 3.30: Model Flood Extents 1 in 100-year and Climate Change

The modeled hydraulic grade line along Cunnabel Creek is different depending on if the CSO connection is implemented. As noted previously there is an improvement to the hydraulic grade line when the CSO is connected to the pump station. Figure 3.31 and Figure 3.32 show the hydraulic grade line through the Cunnabel Creek combined sewer.

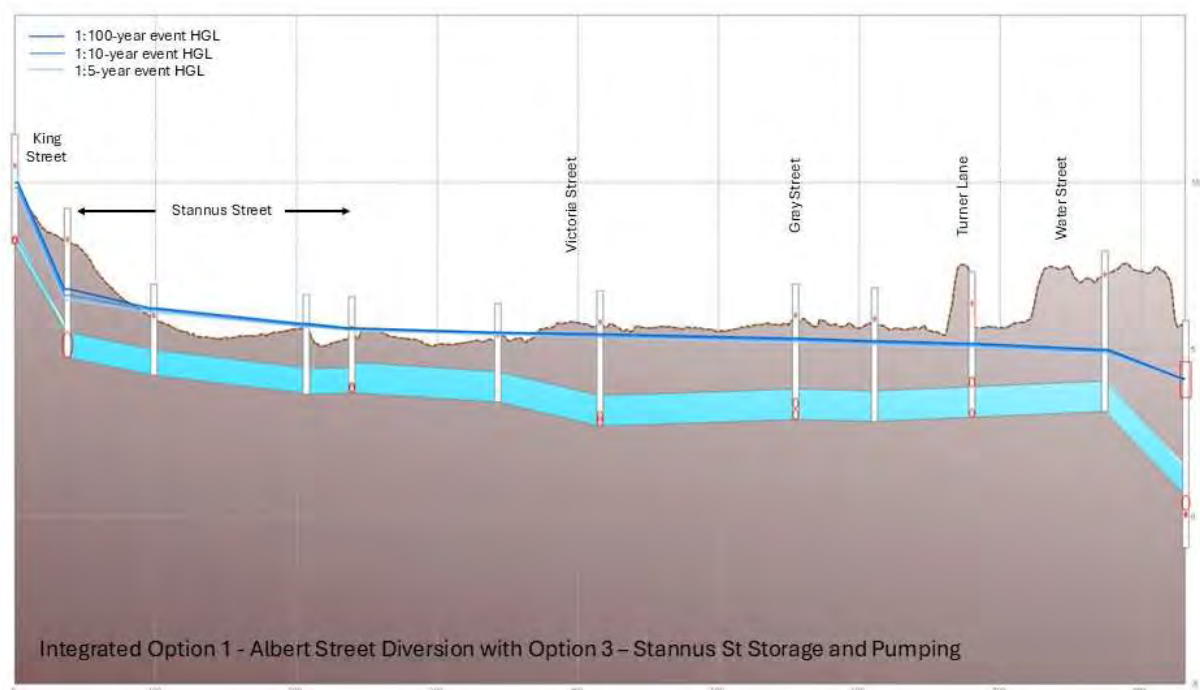


Figure 3.31: Hydraulic Grade Line through Cunnabel Creek Combined Sewer with No CSO Connection to the Pump Station (Option 1/3)

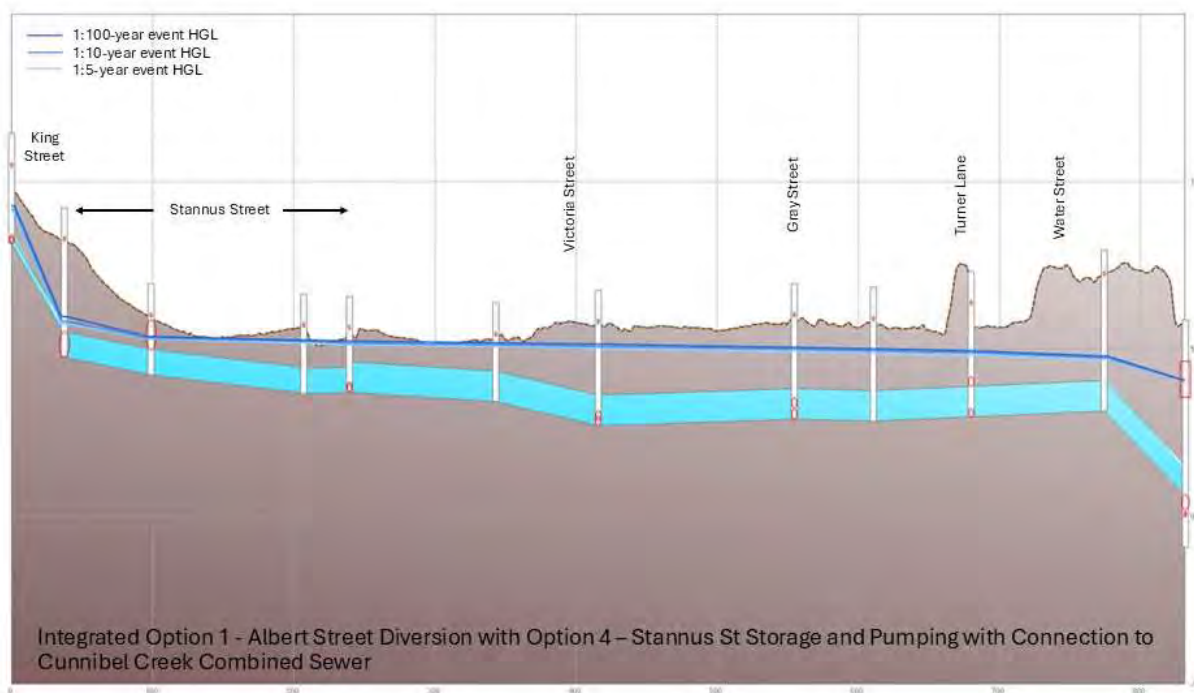


Figure 3.32: Hydraulic Grade Line through Cunnabel Creek Combined Sewer with CSO Connection to the Pump Station (Option 1/4)

3.3.2 Integrated Option 2 – Albert Street Diversion with Option 5 – Stannus Street Stormwater Connection to Tregothic Marsh

This option combined Albert St diversion with a stormwater pipe to divert stormwater to the Highway 101 culverts in Tregothic Marsh and a CSO connection to Cunnabel Creek. This option addresses overland flow from the Albert Street sewershed into the Stannus area as well as provides a means of removing collected surface water from the area.

The modeled flood extents, presented below, show significant improvements in the flood protection in both the Stannus Street and Gray Street areas. The hydraulic grade line along Cunnabel Creek line should limit surfacing of combined sewer onto Stannus Street. Figure 3.33 to Figure 3.35 (on the following page) illustrate the flooding levels in the existing conditions for the 1 in 5-year, 1 in 10-year, and 1 in 100-year storm events. Figure 3.36 shows the hydraulic grade line through the Cunnabel Creek combined sewer.

To demonstrate the impact of implementing this option on the hydraulic grade line, two representative manholes, MH-220 on Gray Street and MH-183 on Stannus Street, have been selected to compare water levels for existing conditions and future conditions. It is important to note that MH-220 and MH-183 both experience flooding during existing storm events. Table 3.6 presents the water level modeled over the MHs during various storm events for existing and future conditions.

Table 3.6: Comparing the HGL Improvements for Integrated Option 2

	Storm Events (yr)	Rim Elevations (m)	Water Level ¹ Based on Existing Combined System (m)	Water Level ² Based on Integrated Option 2 (m)
MH-220	1:5	6.55	6.94/7.05	4.57
	1:10		7.01/7.10	4.65
	1:100		7.15/7.29	4.76
MH-183	1:5	5.95	6.25/6.30	5.26
	1:10		6.29/6.32	5.29
	1:100		6.34/6.40	5.35

1 -Water level on the left is based on current design storms, water level on the right is based on future design storm with climate change

2 – Water level based on future design storm with climate change

This option has similar results to Option 1/4 and there would be no surcharging of combined sewer on Gray Street or Stannus Street.



Figure 3.33: Model Flood Extents 1 in 5-year and Climate Change



Figure 3.34: Model Flood Extents 1 in 10 year and Climate Change



Figure 3.35: Model Flood Extents 1 in 100-year and Climate Change

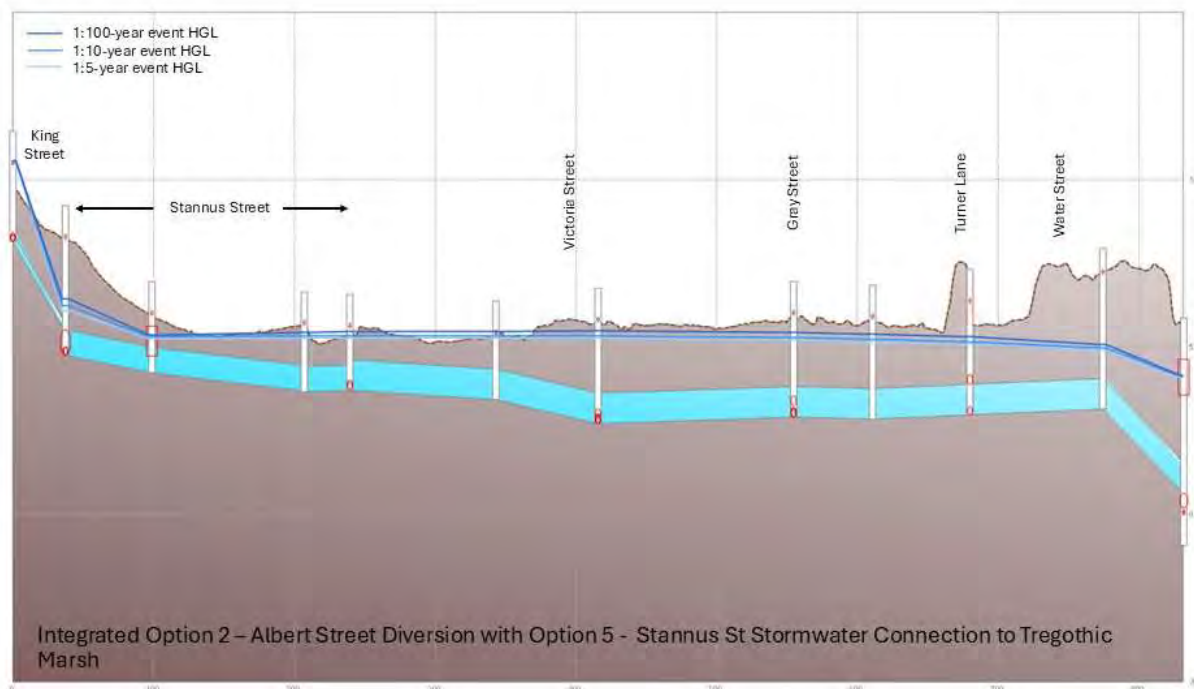


Figure 3.36: Hydraulic Grade Line through Cunnabel Creek Combined Sewer

3.3.3 Summary of HGL Performance

A summary table showing the elevation at MH220 and MH183 is provided below for various storms and options. This shows that integrating the options is needed to have the best performance and that best performance is only achieved once the system is fully separated. Drawing 2 in Appendix A presents the fully separated system.

Table 3.7: Comparing the HGL Improvements for Integrated Option 2

	MH-220			MH-183		
Storm Events (yr)	1:5	1:10	1:100	1:5	1:10	1:100
Rim Elevations	6.55			5.95		
Existing ¹	7.05	7.10	7.29	6.30	6.32	6.40
Option 1 ²	4.63	4.70	4.80	6.29	6.32	6.39
Option 3 ²	7.05	7.10	7.28	6.14	6.18	6.23
Option 4 ²	7.05	7.10	7.29	5.32	5.35	5.39
Option 5 ²	7.05	7.10	7.29	5.30	5.33	5.37
Integrated Option 1/3 ²	4.56	4.64	4.75	6.12	6.17	6.23
Integrated Option 1/4 ²	4.51	4.60	4.71	5.29	5.33	5.37
Integrated Option 2 ²	4.57	4.65	4.76	5.26	5.29	5.35
Full Separation ²	3.75	3.75	3.75	4.28	4.28	4.28

1 - Water level is based on future design storm with climate change

2 - Water level based on future design storm with climate change

3.3.4 Recommendation and Next Steps

3.3.4.1 Recommended Option

Both integrated options provide acceptable results and could be implemented. The difference between the two integrated options is how they remove the stormwater from Sewershed 3, Cunnabel Creek. Integrated Option 1 uses pumping to move the collected stormwater to Lake Pisiquid while Integrated Option 2 uses a gravity system to convey stormwater to Tregothic Marsh near Highway 101. Due to the complexity and time to construct a pump station and force main it is recommended to proceed to the next steps with Integrated Option 2.

3.3.4.2 Gray Steet – Deep Storm sewer

The stormwater system on Gray Street will consist of a large storm sewer that will start near the curling club and travel to the pump station. There is a significant, but short, change in grade near the intersection of Stannus Street and Gray Street which results in a very large and deep excavation to accommodate the pipe. This is required to collect the stormwater in this area and convey it to the proposed pump station or gravity storm system. This is a very small, localized sub catchment of Sewershed 3 and an alternative to this is to leave this area of the system as combined. The benefit of this would be the improved constructability of the storm sewer on Stannus Street, less impacts to property owners, and lower capital cost.

Based on the cost saving and simplified construction on Stannus Street, it is recommended to keep this area as combined. In this scenario, when the Cunnabel Creek combined sewer is eventually replaced, the proposed pipe will still need to be sized for the 1 in 100-year event, as stormwater will still be present in the system. This section of Cunnabel Creek is past the narrow right of way, and so replacing the existing pipe with one of similar size should be feasible.

3.3.4.3 Cunnabel Creek Combined Sewer Replacement

The existing Cunnabel Creek combined sewer is made of various material with varying slope and shape. Sections of the pipe are wood box culverts, circular CSP, or concrete pipes. It is our understanding the pipe is in poor condition and will need to be replaced or rehabilitated, if possible. The section of pipe in Victoria Park will likely be replaced with conventional open trench. The section from Victoria Street to PS1 is located in a difficult area to work and options such as slip lining, rehabilitation, or horizontal directional drill should be explored. For the purpose of this study, we assumed the existing pipe would be replaced with a variety of methods, open trench, horizontal directional drill, and slip lining. A conceptual profile is included in Appendix A.

The section just past Victoria Park under the homes will be slipped lined due to inability for conventional excavation. The section from Gray Street to Turner Lane will be open

trenched. The existing right of way should have room to allow for the removal of the existing combined sewer and replacement of the smaller sanitary sewer. This will need to be explored in more detail during design.

The section from Turner Lane to PS1 will be horizontal direction drilled. Slip lining was investigated, however, the existing combined sewer appears to be back graded and therefore it is not possible to install a pipe with an acceptable grade. Open excavation is not practical due to depth of excavation and proximity of existing buildings.

We have recommended that Area 1C not be separated and that it continues to drain into the Cunnabel Creek combined sewer in the Gray Street area. As a result, the piping from Gray Street to PS1 will need to be sized to accommodate 1 in 100-year storm with climate change.

3.3.4.4 Next Steps

The suggested phasing is presented in Chapter 4, which has the proposed gravity sewer and CSO chamber being construction in 2027. To meet this schedule, design would need to start immediately. This approach assumes that project funding is available; if this is not available, these steps would be delayed until funding is secured. To achieve construction in 2027, all things would need to go smoothly to allow this work to start immediately and approvals obtained without resistance.

Preliminary Design

This includes the development of the selected option to the point that discussion could be started with regulatory agencies and property owners that may be impacted by the construction. This would include confirming the alignment and elevation of the stormwater system, obtaining survey, and conducting geotechnical investigations.

Land purchase requirements are a project risk as it is not known how willing the current landowners would be to sell the land.

Regulatory permits would consist of wetland delineation and alteration permits. These permits require field work to be completed during the summer months to confirm boundaries and functions of wetlands. This would need to be initiated quickly to allow the work to be completed in the 2027 season.

The phasing of this project will result in CSO being discharged into an area that currently doesn't receive CSO. This will need to be discussed with NSE, and approval obtained for this. The CSO is also going to flow into the Bay and DFO will need to be consulted on this process. This process is a project risk as it can be difficult and timely. Discussion should be initiated as soon as possible with the appropriate regulatory agencies.

Detailed Design

Once the route is confirmed, land acquisitions are obtained, and regulatory requirements are understood, the project can move forward into detailed design. Detailed design would include the development of the design drawings and specifications used for construction and advancing the process of receiving regulatory approval.

Construction

After the preparation of Issued for Tender drawings, receiving regulatory approval, and securing all required funding along with Council approval, the construction phase of the project would begin. Depending on the availability of funding, the project could proceed with design of future phases while the construction of the current phase is underway.

4 Construction Phasing

The proposed construction phasing is based on building the separated storm sewer infrastructure, so it provides incremental improved performance of the stormwater and sanitary sewer systems. As the phases progress, the system's ability to prevent backups into basements from the existing combined sewer system will improve. In addition, the likelihood of surface flooding from overland flow in sewershed 3, and more specifically the Stannus Street and Gray Street areas, will be reduced. The overall phasing plan is provided in Appendix A as Dwg 03, and a screen shot of this is provided below for reference.

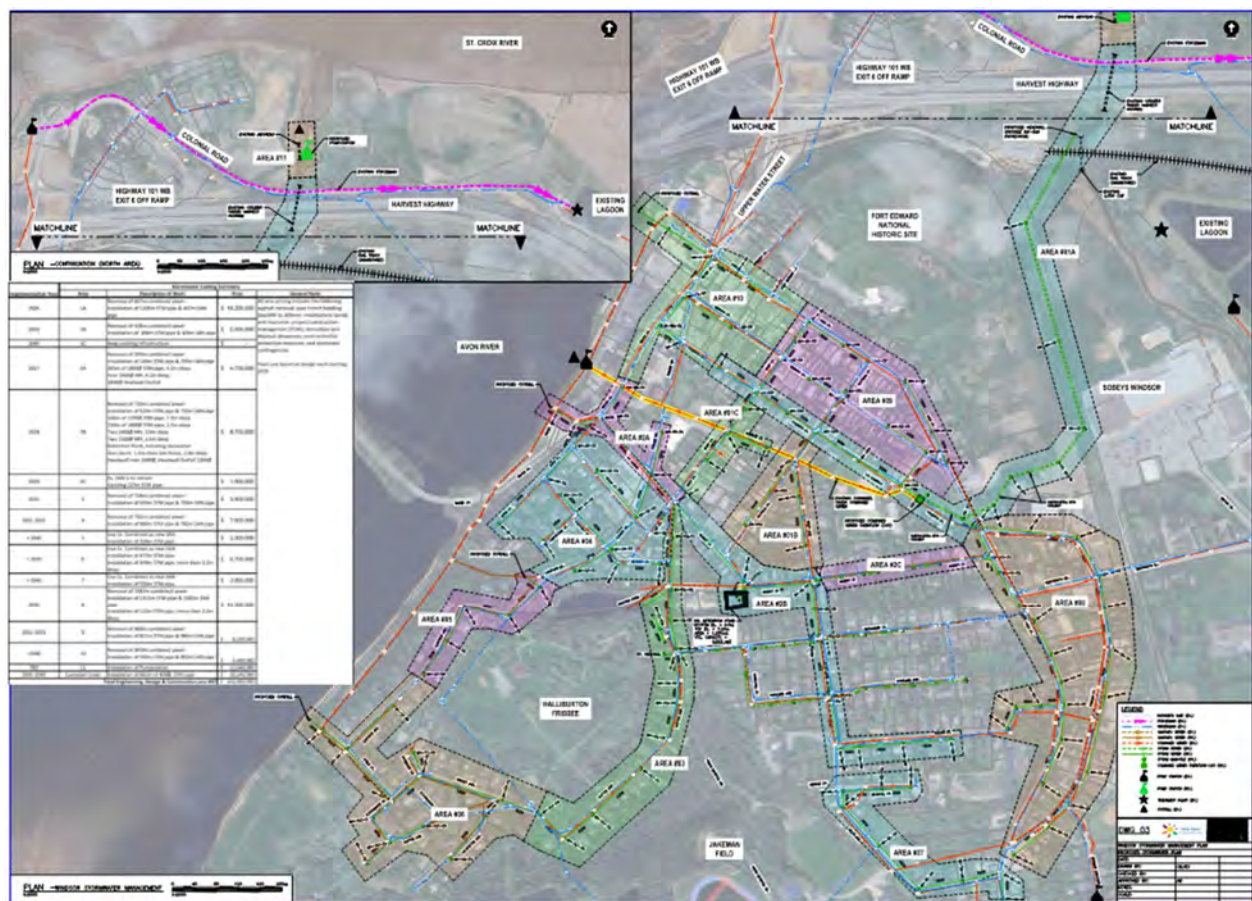


Figure 4.1: Master Plan

The stormwater management plan will generally require the removal of the existing combined sewer and replacing it with a sanitary sewer and a storm sewer. This report focused on the stormwater system and assumed that the new sanitary and stormwater systems would generally be installed in the same location of the existing combined sewer.

Profiles for the main sewer along Albert Street, Cunnabel Creek and the Wentworth storm sewer were developed to confirm grades and pipe sizes. The local sanitary and storm sewers will be sized as a part of the detailed design, which will also confirm routing, sizing and elevation of the main sewers.

In order to allow the construction to be phased, a flow control structure will need to be designed and constructed where the new separated sanitary and storm sewer connect to the existing combined sewers. This will need to be completed at the detailed design stage.

During the construction of the stormwater system there will be opportunities to upgrade and replace other infrastructure such as the road surface, sidewalks, curbs, and watermain that are outside the limits of work required to separate the existing combined sewer system. Assumptions were made in the preparation on the costs estimate for reinstatement and generally, unless noted otherwise, it was assumed that work would take place in one travel lane and new curbs would be installed on one side of the road. This method was used to limit the project budget to the work required to complete this separation scope. The scope could be increased at detailed design to include complete road resurfacing or other works that could be done efficiently at the same time.

The phasing approach was based on achieving the quickest improvements to the Stannus Street and Gray Street area. The improvements are noticeable with the completion of Area 1A but are greatly improved when Area 2 is completed. The rest of the system separation will continue to improve the performance of the system with full benefits occurring when the system is fully separated. The key implementation areas are Area 1 and 2, which should be implemented as quickly as possible, with 5 years being a reasonable time frame to complete this work. The remaining areas could be phased over the next 20-25 years.

4.1 Area 1

Area 1 is where majority of the flooding occurs. It has been broken down into three subareas Area 1A, 1B, and 1C, for phasing purposes.

4.1.1 Area 1A

This area should be the first phase of work to be completed as it includes the major trunk storm sewer to collect and convey stormwater to Tregothic Creek. The work in this area will include separating Stannus Street between Gray Street and the proposed combined sewer overflow (CSO) chamber. The purpose of the CSO chamber is to allow combined sewer to discharge from Cunnabel Creek to the stormwater system once the combined sewer is at capacity. This chamber will be looked at further during detailed design and could consist of a fixed weir, bending weir, or other flow control systems. The stormwater system on Stannus Street will be sized for 1 in 100-year storm with climate change and have additional surface access to allow for stormwater to enter the system. This work will

require obtaining a permit to discharge stormwater and combined sewer at the proposed location from Nova Scotia Environment. A summary of the linear infrastructure removals and additions are provided below.

Removals	Quantity (m)
Combined Sewer	667
Additions	
Storm Sewer	1209
Sanitary Sewer	667

4.1.2 Area 1B

This area consists of local collection and is not a high priority over the next 5 years. However, it should be completed as soon as possible after Area 2A and 2B are completed, as it will provide additional capacity for surface water to enter the stormwater system. A summary of the linear infrastructure removal and additions are provided below.

Removals	Quantity (m)
Combined Sewer	428
Additions	
Storm Sewer	308
Sanitary Sewer	428

4.1.3 Area 1C

This area is recommended to remain as combined sewer collection system, so no work is required in this area. This was done to eliminate the deep stormwater system along Gray Street and Stannus Street. Due to its small size, the cost to separate it was not considered feasible. A separate stormwater pipe could be installed along this street to provide additional access for stormwater to enter the system in low lying areas, if desired.

4.2 Area 2

Area 2 is the source of significant overland flow entering Stannus Street area. The work in this area will help divert the overland flow away from Stannus Street. Due to the large infrastructure and area required to complete the diversion in Area 2, the area has been broken down into three subareas Area 2A, 2B, and 2C for phasing purposes.

4.2.1 Area 2A

This area includes the separation of Albert Street from the outfall to Gray Street. The new storm sewer will be sized for a 1 in 100-year storm with climate change and will have additional inlet capacity added. This work will require obtaining a permit to construct a new

outfall from Nova Scotia Environment as well as DFO. This should be the first phase of Area 2 to be built, and if possible, this phase should be extended to include the additional pipe and storage pond area which are currently labelled under Area 2B. A summary of the linear infrastructure removals and additions are provided below.

Removals	Quantity (m)
Combined Sewer	293
Additions	
Storm Sewer	454
Sanitary Sewer	293

4.2.2 Area 2B

This area consists of stormwater piping and a storage pond to collect overland flow. The existing combined sewer will be separated, and the new storm sewer will be sized for a 1 in 100-year storm with climate change and have additional inlet capacity. The intent is to regrade Albert Street to collect the overland flow and convey it to the storage pond. Alexander Street, Highland Avenue, and Albert Street east of Wiley Avenue are already separated and will be connected to the new stormwater sewer on Wiley Avenue. The objective of the pond is to provide attenuation to limit downstream stormwater infrastructure size. A summary of the linear infrastructure removals and additions are provided below.

Removals	Quantity (m)
Combined Sewer	720
Additions	
Storm Sewer	1359
Sanitary Sewer	720

4.2.3 Area 2C

Area 2C was previously separated, however, the storm sewer does not have capacity to accommodate the required design storm and will need to be replaced. The sanitary sewer will remain. The new storm sewer will be sized for a 1 in 100-year storm with climate change and have additional inlet capacity. A summary of the linear infrastructure removals and additions are provided below.

Removals	Quantity (m)
Combined Sewer	0
Additions	
Storm Sewer	223
Sanitary Sewer	0

4.3 Area 3

This area contributes to the Albert Street storm sewer; however, can be considered low priority. The combined sewer would be separated when this phase is completed. A summary of the linear infrastructure removals and additions are provided below.

Removals	Quantity (m)
Combined Sewer	758
Additions	
Storm Sewer	593
Sanitary Sewer	758

4.4 Area 4

This area also contributes to the Albert Street storm sewer; however, can be considered low priority. The combined sewer would be separated when this phase is completed. A summary of the linear infrastructure removals and additions are provided below.

Removals	Quantity (m)
Combined Sewer	782
Additions	
Storm Sewer	980
Sanitary Sewer	782

4.5 Area 5

The stormwater in this area is collected by ditches and generally flows overland to Lake Pisiquid. There is no work required in this area; however, a piped stormwater system could be installed if desired. This would require a new outfall to be design and approved. A summary of the linear infrastructure removals and additions are provided below.

Removals	Quantity (m)
Combined Sewer	0
Additions	
Storm Sewer	339
Sanitary Sewer	0

4.6 Area 6

The stormwater in this area is collected by ditches and generally flows overland to Lake Pisiquid. There is no work required in this area; however, a piped stormwater system could be installed if desired. This would require a new outfall to be design and approved. A summary of the linear infrastructure removals and additions are provided below.

Removals	Quantity (m)
Combined Sewer	0
Additions	
Storm Sewer	349
Sanitary Sewer	0

4.7 Area 7

In this area the combined sewer would be separated. The stormwater system does not contribute to the Stannus Street area, making this area a low priority. A summary of the linear infrastructure removals and additions are provided below.

Removals	Quantity (m)
Combined Sewer	0
Additions	
Storm Sewer	558
Sanitary Sewer	0

4.8 Area 8

In this area the combined sewer would be separated. The piped flow from this area is directed to Stannus Street and this area would be considered high priority once Area 2 is completed. The overland flow from this area travels away from Stannus Street, however, some of this flow is captured by King Street and O'Brien Street and flows via the asphalt surfaces to Stannus Street. There are changes to the overland flow paths as part of this work. A summary of the linear infrastructure removals and additions are provided below.

Removals	Quantity (m)
Combined Sewer	2382
Additions	
Storm Sewer	1495
Sanitary Sewer	2382

4.9 Area 9

In this area the combined sewer would be separated. Most overland flows from this area flow to Stannus Street. There are changes to the overland flow paths as part of this work. A summary of the linear infrastructure removals and additions are provided below.

Removals	Quantity (m)
Combined Sewer	980
Additions	
Storm Sewer	821
Sanitary Sewer	980

4.10 Area 10

In this area the combined sewer would be separated. The stormwater system does not contribute to the Stannus Street area, so this area is low priority. There is a section of combined sewers on King Street that has limited capacity, and this section of pipe may need to be addressed prior to separating this area fully. A summary of the linear infrastructure removals and additions are provided below.

Removals	Quantity (m)
Combined Sewer	895
Additions	
Storm Sewer	593
Sanitary Sewer	895

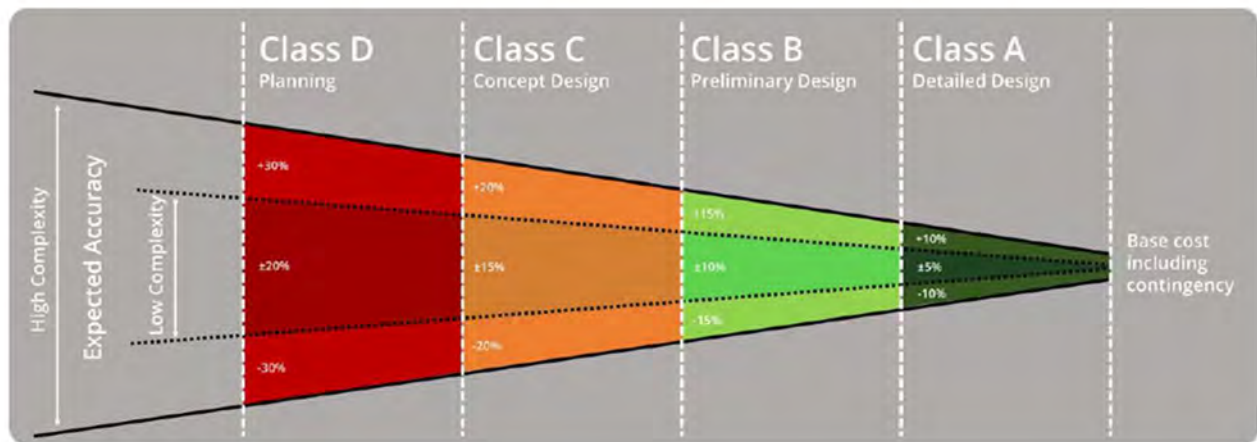
4.11 Area 11

In this area, a new stormwater pump station is required to manage drainage during high tide and 1-in-100-year storm events. It is likely that this station will not be needed until the Tregothic Marsh improves are completed. The existing aboiteau will remain in operation for day-to-day discharges, while the pump station will activate when water levels exceed a high setpoint behind the dike. The pump station is necessary to maintain a maximum water level of 1.6 m Elev. during critical conditions.

5 Opinion of Probable Cost

Costs were developed as part of the project to allow for comparison of options, not to set project budgets. In order to set actual project budgets further design will be required to confirm routing, exact sizing of new infrastructure, existing infrastructure conflicts (that may result in the need to relocate or replace existing works), construction methods, property impacts, environmental requirements, and numerous other issues.

The estimates prepared as part of this project are considered Class C Cost (Concept Design) Estimates for a complex project. The typical range of accuracy of an estimate at this stage in project development is +/-35%. As the projects become more defined and developed the costs will be better defined. We have included a figure below that helps to illustrate this general concept. As more information is obtained and more engineering work carried out , cost certainty increases.



The costs presented below were developed based on a combination of measured units (typically linear length) with estimated unit rates (\$/meter for example) and numerous allowances. Units were calculated from the model for existing combined sewer and new stormwater sewers.

The estimates contain contingencies for design development, construction, and engineering. A brief description of each follow.

Design development contingency is used to account for items that have not been investigated or known to be part of the project at this stage. A value of 40% was used for these estimates.

Construction contingency is to account for items that may come up during construction as unforeseen conditions during the project design phase. A value of 10% was used for these estimates.

Engineering contingency is used to estimate design services that may be required in the design and construction phase of the project. These could include items such as engineering services, geotechnical investigation, survey, and approvals. A value of 13% was used for these estimates.

Note that items such as land purchases, legal services, staff time, and complex environmental assessment, are not included in the estimate. A summary of our opinion of probable costs are provided below, a complete break down of the costing is provided in Appendix B for each Area.

OPINION of PROBABLE CONSTRUCTION COSTS
Stormwater Management Plan Town of Windsor



(Based on CBCL Stormwater Report Plan - dated 03-06-2023)

Date:	01/08/25
Project No.:	221101.00
Prepared & Revised by:	LI / AT / AB
Budget Class	Class C

SUMMARY

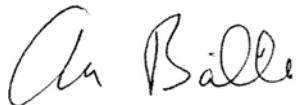
No.	AREA	AREA TOTALS
1	AREA 01A - Stannus Street	\$ 18,200,000
2	AREA 01B - Victoria Street	\$ 5,000,000
3	AREA 01C - Gray Street	\$ -
4	AREA 2A - Albert Street to Outfall	\$ 5,200,000
5	AREA 2B - Wiley Ave. to Albert Street	\$ 8,700,000
6	AREA 2C - Optional Albert Street	\$ 1,500,000
7	AREA 3 - Clifton Ave	\$ 5,900,000
8	AREA 4 - Cedar, Avon, and Chestnut Street	\$ 7,600,000
9	AREA 5 - Lakeview Drive	\$ 2,300,000
10	AREA 6 - Sunset Ave to River Street	\$ 6,700,000
11	AREA 7 - Wiley Avenue	\$ 3,900,000
12	AREA 8 - O'Brien and King Street	\$ 14,500,000
13	AREA 9 - Gerrish Street	\$ 8,200,000
14	AREA 10 - Water Street and King Street	\$ 6,400,000
15	AREA 11 - Aboiteau Pump Station	\$ 21,640,000
16	Cunnabel Creek - Upgrades	\$ 10,241,000
17	DESIGN DEVELOPMENT CONTINGENCY ALLOWANCE - Note 1	Included
18	CONSTRUCTION CONTINGENCY - Note 2	Included
19	LOCATION FACTOR - Note 3	Included
20	ESCALATION (Based on 2025 Dollars) - Note 4	Not Included
21	TOTAL - OPINION of PROBABLE CONSTRUCTION COSTS Less HST	\$ 126,000,000
22	Engineering & Design	\$ 16,400,000
	TOTAL - ENGINEERING & DESIGN and CONSTRUCTION COSTS Less HST	\$ 142,400,000

6 Conclusion

We hope that you find this stormwater management plan report sufficiently describes the required infrastructure upgrades for the Windsor area at a conceptual. Should you have any questions, require clarifications, or wish to discuss any aspects of this letter, please contact Alan Ehrenholz or Aaron Baillie. We appreciate the opportunity to be part of this project and look forward to its continued success.

Yours very truly,

CBCL Limited



Prepared by:
Aaron Baillie, P.Eng.
Manager Municipal Engineering
Direct: 902-492-6750
E-Mail: aaronb@cbcl.ca



Bobby Pettigrew P.Eng.
Sen. Water Resource Engineer
Direct: 343-655-1964
E-mail: bpettigrew@cbcl.ca

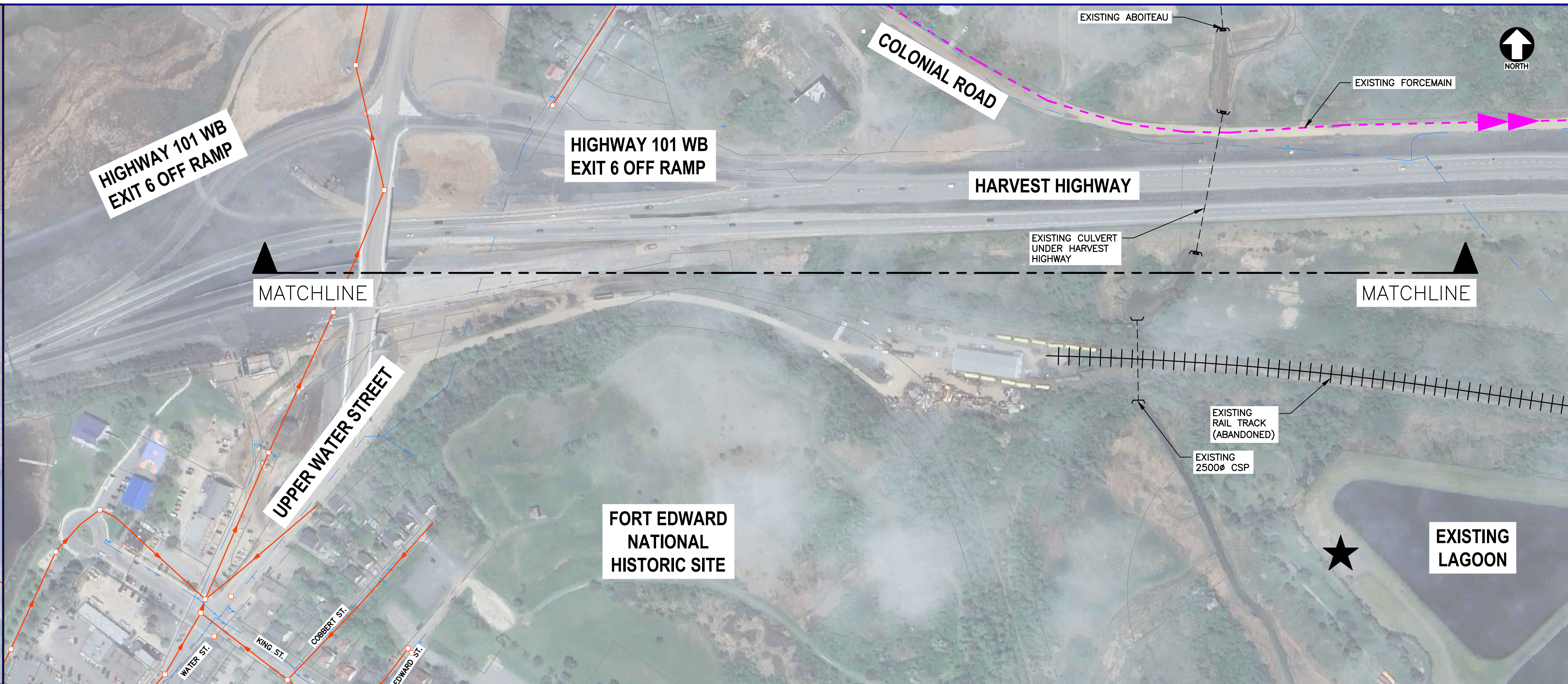
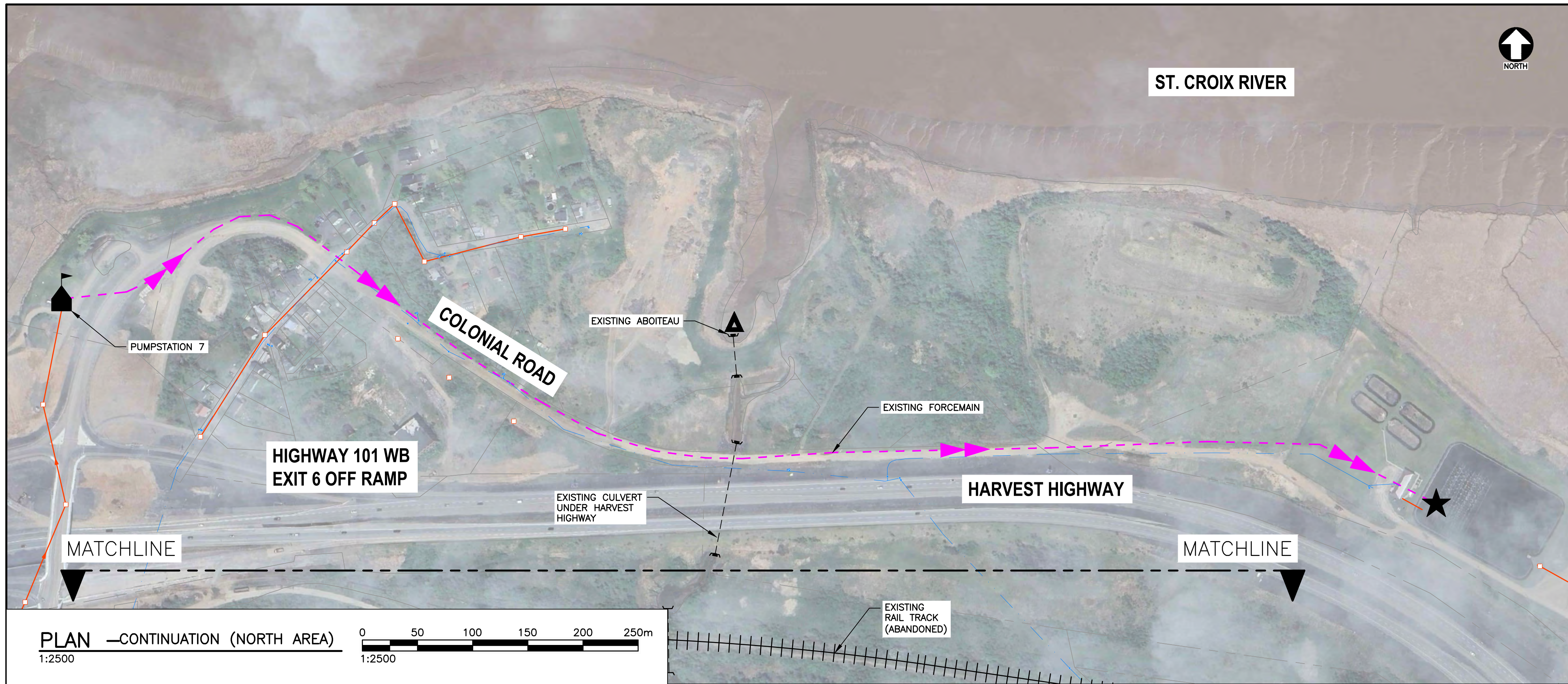


Reviewed by:
Alan Ehrenholz, P.Eng.
Group Lead Linear Infrastructure
Direct: 604-317-9720
E-Mail: aehrenholz@cbcl.ca

This document was prepared for the party indicated herein. The material and information in the document reflects CBCL Limited's opinion and best judgment based on the information available at the time of preparation. Any use of this document or reliance on its content by third parties is the responsibility of the third party. CBCL Limited accepts no responsibility for any damages suffered as a result of third-party use of this document.

APPENDIX A

Drawings and Figures



LEGEND

- PROPERTY LINE (EX.)
- FORCEMAIN (EX.)
- WATERMAIN (EX.)
- SANITARY SEWER (EX.)
- SANITARY SEWER (PR.)
- COMBINED SEWER (EX.)
- COMBINED SEWER (PR.)
- STORM SEWER (EX.)
- STORM SEWER (PR.)
- STORM MANHOLE (PR.)
- COMBINED SEWER OVERFLOW-CSO (PR.)
- PUMP STATION (EX.)
- PUMP STATION (PR.)
- TREATMENT PLANT (EX.)
- OUTFALL (EX.)

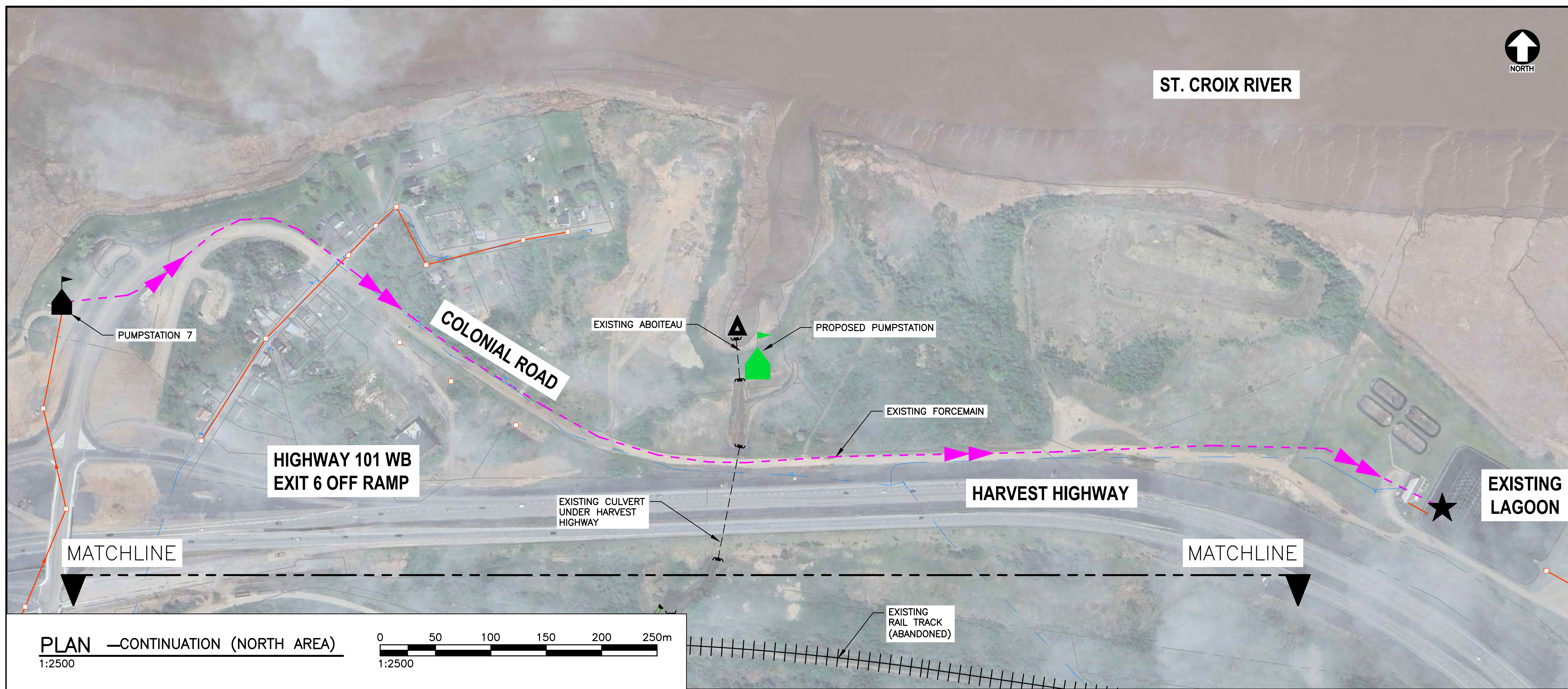
DWG 01

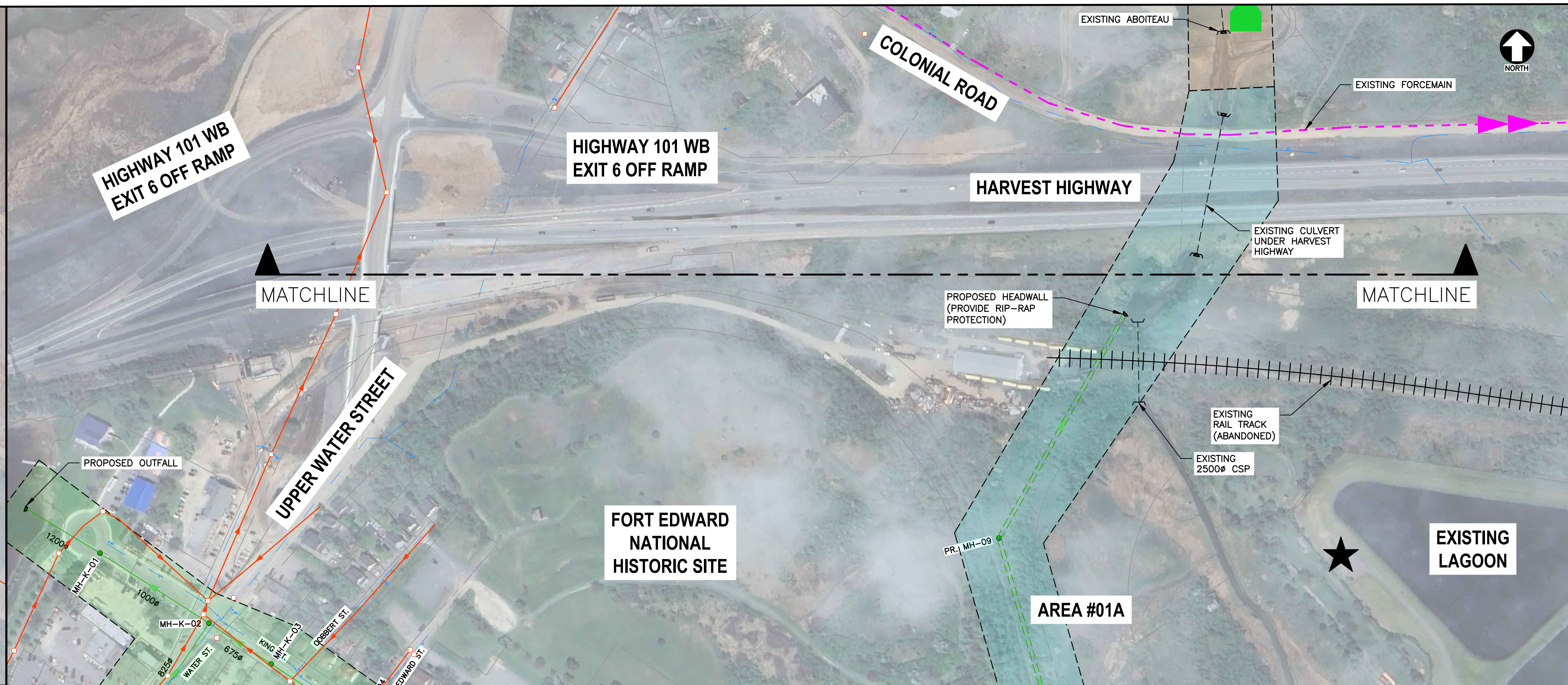
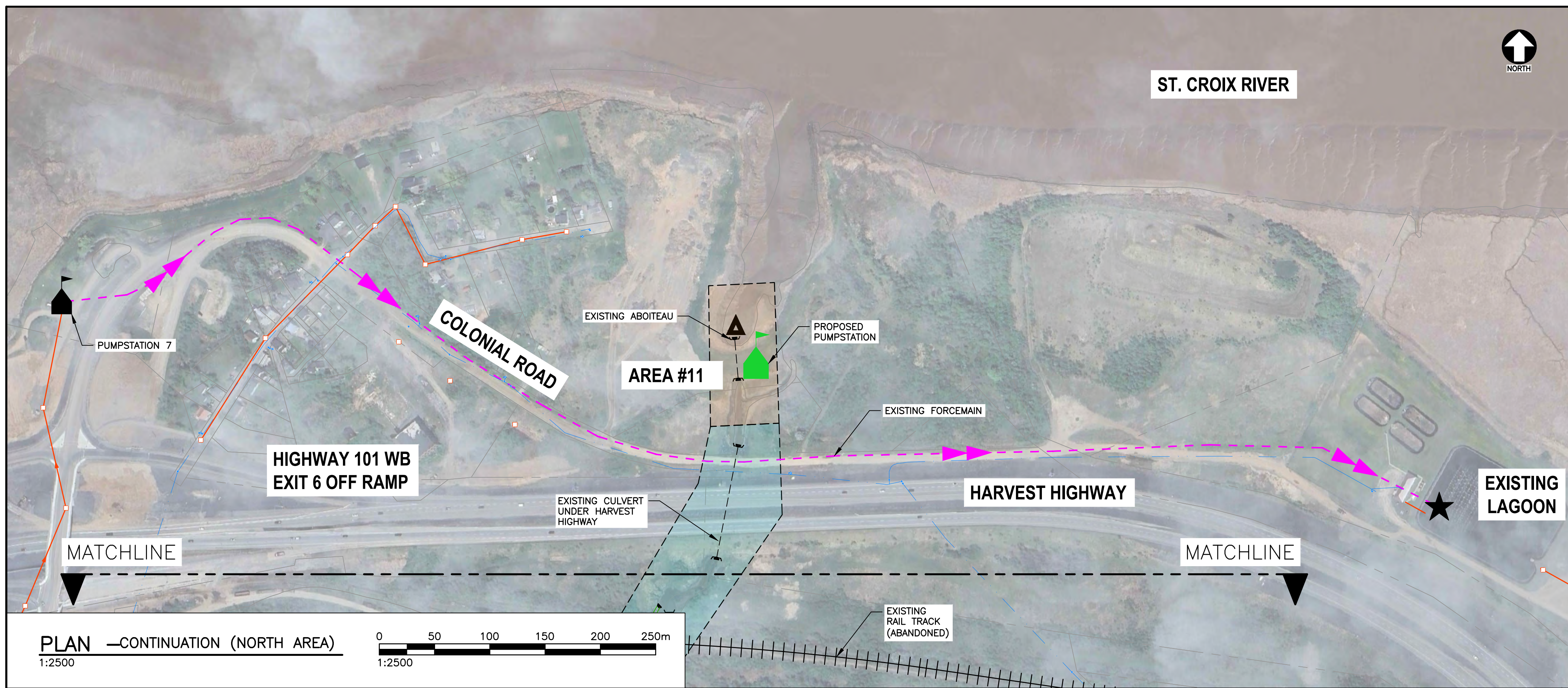
WINDSOR STORMWATER MANAGEMENT PLAN

EXISTING CONDITION

DATE:	1/8/2025	
DRAWN BY:	EJ	
CHECKED BY:	AE	
APPROVED BY:	AB	
NOTES:		
SCALE:	AS NOTED	

West Harts
CBCL





LEGEND

- PROPERTY LINE (EX.)
- FORCE MAIN (EX.)
- WATER MAIN (EX.)
- SANITARY SEWER (EX.)
- COMBINED SEWER (EX.)
- STORM SEWER (EX.)
- STORM MANHOLE (PR.)
- COMBINED SEWER OVERFLOW-CSO (PR.)
- PUMP STATION (EX.)
- PUMP STATION (PR.)
- TREATMENT PLANT (EX.)
- OUTFALL (EX.)

DWG 03 West Harts CBCL

WINDSOR STORMWATER MANAGEMENT PLAN

PROPOSED STORMWATER PLAN

DATE:	1/8/2025
DRAWN BY:	EJ
CHECKED BY:	AE
APPROVED BY:	AB
NOTES:	
SCALE:	AS NOTED



PROJECT LOCATION

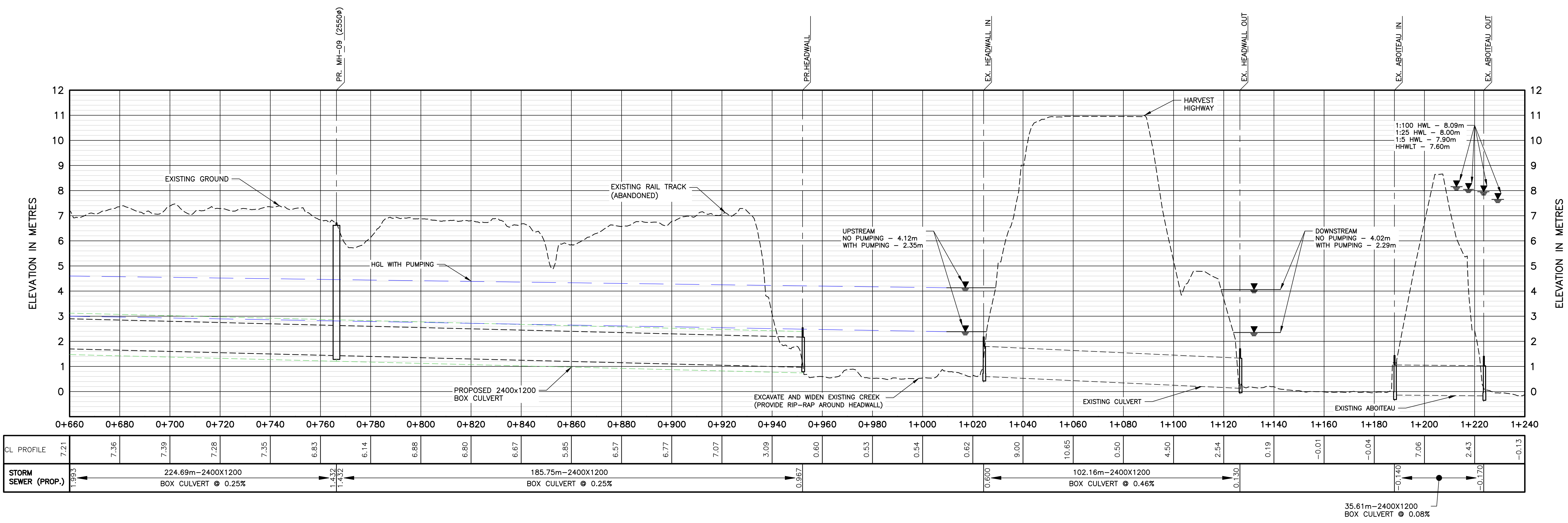
KEY PLAN NTS

LEGEND

- PROPERTY LINE (EX.)
- FORCEMAIN (EX.)
- WATERMAIN (EX.)
- SANITARY SEWER (EX.)
- SANITARY SEWER (PR.)
- COMBINED SEWER (EX.)
- STORM SEWER (PR.)
- BOX CULVERT STORM SEWER (PR.)
- COMBINED MH (EX.)
- STORM MANHOLE (PR.)
- COMBINED SEWER OVERFLOW-CSO (PR.)
- PUMP STATION (EX.)
- PUMP STATION (PR.)
- CUNNINGHAM CREEK PIPE (EX.)
- STORM HEADWALL (PR.)
- STORM HEADWALL (EX.)
- TOP OF SLOPE (EX.)
- RAIL TRACKS (EX.)

NOTES

1. THIS DRAWING IS CONCEPTUAL ONLY. DO NOT USE FOR CONSTRUCTION.



PROFILE
1:1000[H] 1:100 [V]

NOT FOR CONSTRUCTION

No.	Description	Date	By
A	ISSUED FOR SMALL REPORT	07/23/2025	AB

Revision or Issue

File No.

WINDSOR STORMWATER MANAGEMENT PLAN

STUDY CIVIL

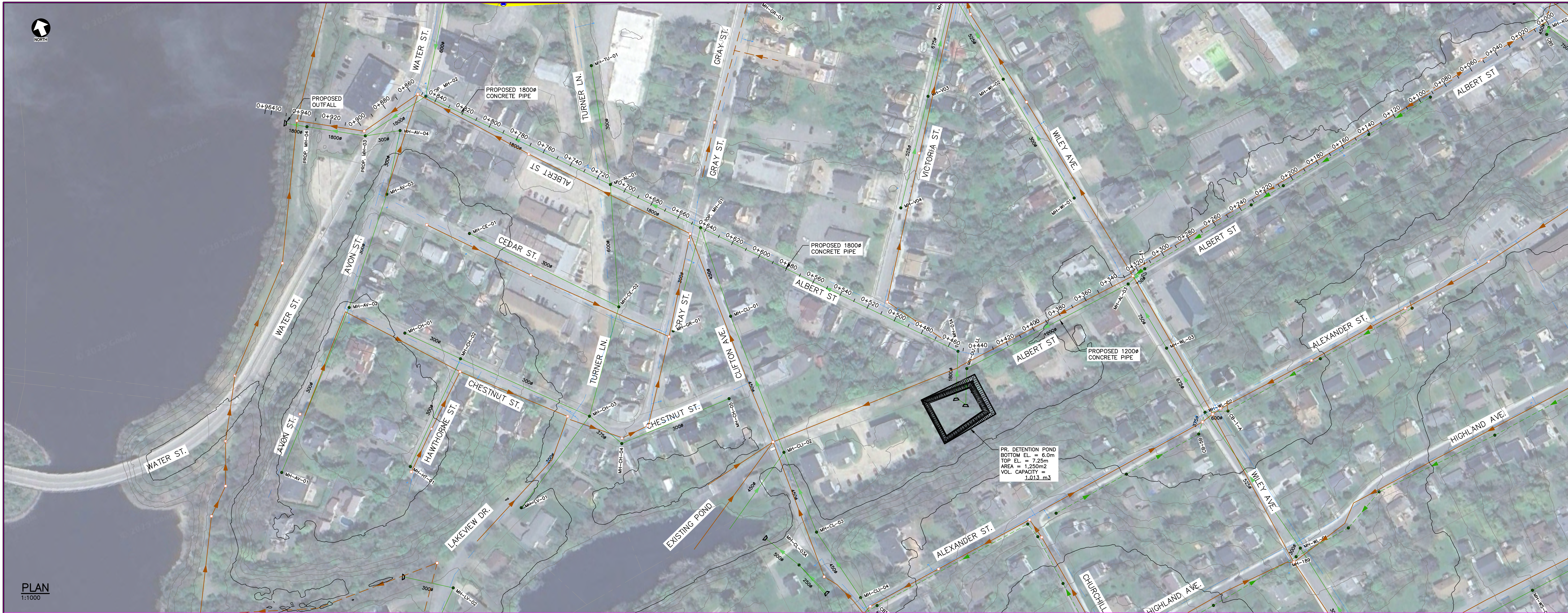
TREGOTHIC MARSH STORMWATER PLAN AND PROFILE

CBCL

Drawn	Checked	Scale	Contract No.
AE	AB	AS NOTED	221101

Sheet No. 2 of 2

DWG 4B



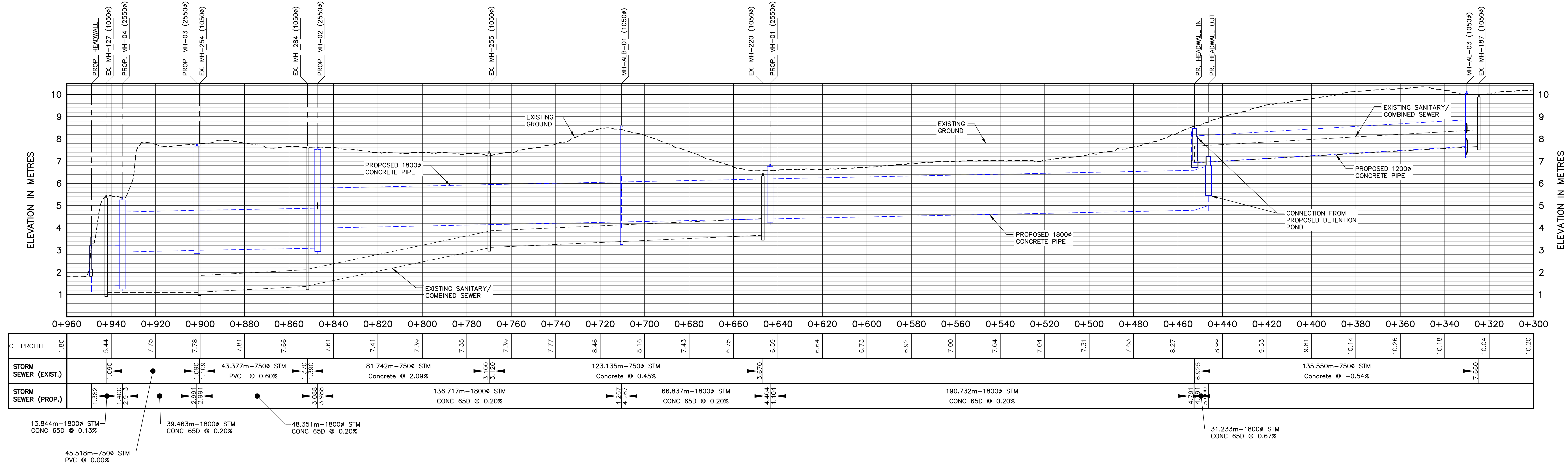
KEY PLAN
NTS

LEGEND

- PROPERTY LINE (EX.)
- FORCEMAIN (EX.)
- WATERMAIN (EX.)
- SANITARY SEWER (EX.)
- SANITARY SEWER (PR.)
- COMBINED SEWER (EX.)
- STORM SEWER (PR.)
- BOX CULVERT STM SEWER (PR.)
- COMBINED MH (EX.)
- STORM MANHOLE (PR.)
- COMBINED SEWER OVERFLOW-SSO (PR.)
- PUMP STATION (EX.)
- PUMP STATION (PR.)
- CUNIBEL CREEK PIPE (EX.)
- STORM HEADWALL (PR.)
- TOP OF SLOPE (EX.)
- RAIL TRACKS (EX.)

NOTES
1. THIS DRAWING IS CONCEPTUAL ONLY. DO NOT USE FOR CONSTRUCTION.

PLAN
1:1000



PROFILE —PROPOSED 1800 DIA CONCRETE PIPE ALONG ALBERT STREET
1:1000[H] 1:100[V]

NOT FOR CONSTRUCTION

No.	Description	Date	By
A	ISSUED FOR SMALL REPORT	07/23/2025	AB

Revision or Issue

File No. #####

MWH WINDSOR
STORMWATER PLAN

STUDY
CIVIL

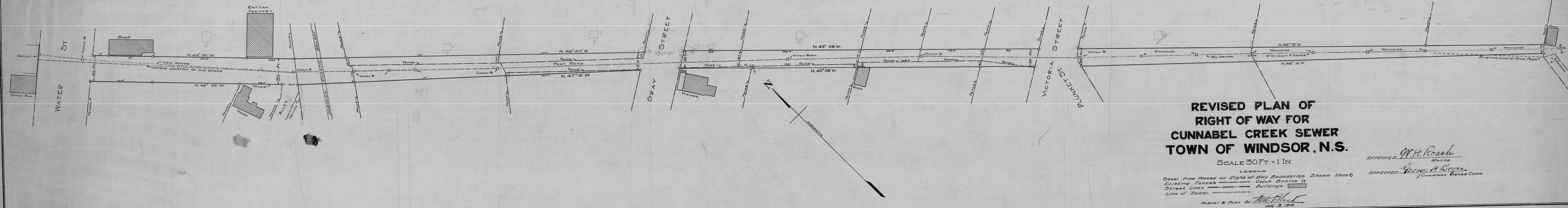
ALBERT STREET PROFILE
FROM THE OUTFALL TO
WILEY AVE.

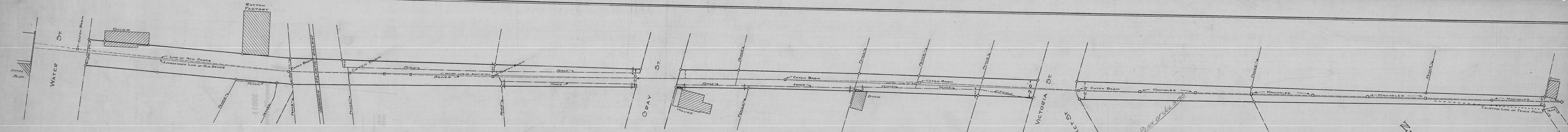
CBCL

Drawn	Checked	Scale	Contract No.
AE	AB	AS NOTED	221101

Sheet No. 1 of 1

DWG 6





APPROVED MAYOR
 APPROVED CHAIRMAN SEWER COMM.

SUPERCEDED BY PLAN OF JUL 3, 1916

PLAN SHOWING RIGHT OF WAY FOR CUNABEL CREEK SEWER

AS STAKED OUT FROM AN OLD TRACING NOW IN
 THE POSSESSION OF THE TOWN

Scale 30 Ft. = 1 In.

- LEGEND
- Steel Pins Placed on Right of Way Boundaries Shown thus ○
 - Existing Fences ————
 - Street Lines ————
 - Line of Sewer ————
 - Catch Basins □
 - Buildings ▨
 - Note: Width of Rof.W. at East End has been Reduced from 12 ft. to 10 ft.

Survey & Plan By *[Signature]*
 June 19, 1916

APPENDIX B

Class C Opinion of Probable Cost

OPINION of PROBABLE CONSTRUCTION COSTS
Stormwater Management Plan Town of Windsor



Date:	01/08/25
Project No.	221101.00
Prepared & Reviewed by:	EJ / AT / AB
Budget Class	Class C

(Based on CBCL Stormwater Report Plan - dated 05-06-2025)

SUMMARY

No.	AREA	AREA TOTALS
1	AREA 01A - Stannus Street	\$ 18,200,000
2	AREA 01B - Victoria Street	\$ 5,000,000
3	AREA 01C - Gray Street	\$ -
4	AREA 2A - Albert Street to Outfall	\$ 5,200,000
5	AREA 2B - Wiley Ave. to Albert Street	\$ 8,700,000
6	AREA 2C - Optional Albert Street	\$ 1,500,000
7	AREA 3 - Clifton Ave	\$ 5,900,000
8	AREA 4 - Cedar, Avon, and Chestnut Street	\$ 7,600,000
9	AREA 5 - Lakeview Drive	\$ 2,300,000
10	AREA 6 - Sunset Ave to River Street	\$ 6,700,000
11	AREA 7 - Wiley Avenue	\$ 3,900,000
12	AREA 8 - O'Brien and King Street	\$ 14,500,000
13	AREA 9 - Gerrish Street	\$ 8,200,000
14	AREA 10 - Water Street and King Street	\$ 6,400,000
15	AREA 11 - Aboiteau Pump Station	\$ 21,640,000
16	Cunnabel Creek - Upgrades	\$ 10,241,000
17	DESIGN DEVELOPMENT CONTINGENCY ALLOWANCE - <i>Note 1</i>	<i>Included</i>
18	CONSTRUCTION CONTINGENCY - <i>Note 2</i>	<i>Included</i>
19	LOCATION FACTOR - <i>Note 3</i>	<i>Included</i>
20	ESCALATION (Based on 2025 Dollars) - <i>Note 4</i>	<i>Not Included</i>
21	TOTAL - OPINION of PROBABLE CONSTRUCTION COSTS Less HST	\$ 126,000,000
22	Engineering & Design	\$ 16,400,000
	TOTAL - ENGINEERING & DESIGN and CONSTRUCTION COSTS Less HST	\$ 142,400,000

THIS OPINION OF PROBABLE COSTS IS PRESENTED ON THE BASIS OF EXPERIENCE, QUALIFICATIONS, AND BEST JUDGEMENT. IT HAS BEEN PREPARED IN ACCORDANCE WITH ACCEPTABLE PRINCIPLES AND PRACTICES. MARKET TRENDS, NON-COMPETITIVE BIDDING SITUATIONS, UNFORSEEN LABOUR AND MATERIAL ADJUSTMENTS AND THE LIKE ARE BEYOND THE CONTROL OF CBCL LIMITED. AS SUCH WE CANNOT WARRANT OR GUARANTEE THAT ACTUAL COSTS WILL NOT VARY FROM THE OPINION PROVIDED.

- Note 1** This Design Developmnt Allowance is to account for uncertainty in construction cost due to undefined design scope.
- Note 2** The Construction Contingency is to factor in potential post tender Change Orders.
- Note 3** This Location Factor is for variances between construction costs at the location of the project & historical costs data.
- Note 4** This Escalation / Inflation Allowance is for increases in construction costs from the time of budget development to Tender Call.

Budget Definitions

A **Class "C" Budget** is based on a full description of the preferred option, construction/design experience and market conditions. This estimate should be sufficient for making correct investment decisions and obtaining preliminary project approval. Design development is typically in the order of 25% complete.



Opinion of Probable Construction Costs
STM & SAN Management Plan Town of Windsor

(Based on CBCL Stormwater Report Plan - dated 05-06-2025)

AREA 01A - Stannus Street

Date:	01/08/25
Project No.	221101.00
Prepared & Revieed by:	EJ / AT / AB
Budget Class	Class C

SCHEDULE OF QUANTITIES AND UNIT PRICES

Item	Description	Depth	Unit Price	Qty	TOTALS	AREA TOTALS
1	MOBILIZATION, BONDS, INSURANCE, PCM	LS	10%	10%	\$ 1,000,000	\$ 1,000,000
2	DEMOLITIONS & DISPOSAL ALLOWANCE	LS	\$ 100,000	1	\$ 100,000	\$ 100,000
Stormwater Management						
A.	Pipe					\$ 10,700,000
1	250 PVC DR35	m	\$ 2,650	0	\$ -	
2	300 PVC DR35	m	\$ 2,650	0	\$ -	
3	350 PVC DR35	m	\$ 2,700	0	\$ -	
4	375 PVC DR35	m	\$ 2,750	84	\$ 231,000	
5	400 PVC DR35	m	\$ 2,800	0	\$ -	
6	450 Concrete 65D	m	\$ 2,775	66	\$ 183,150	
8	500 Concrete 65D	m	\$ 2,800	66	\$ 184,800	
13	750 Concrete 65D	m	\$ 2,950	225	\$ 663,750	
20	2.4x1.2m Box Culvert	m	\$ 8,000.00	954	\$ 7,632,000	
B.	Structure					
1	Manholes (1.05m Dia.) Precast	no.	\$ 6,000.00	3	\$ 18,000	
2	Manholes (1.80m Dia.) Precast	no.	\$ 12,000.00	8	\$ 96,000	
3	Manholes (2.40m Dia.) Precast	no.	\$ 20,000.00	5	\$ 100,000	
4	<u>CSO</u> Cast-in Place	no.	\$ 80,000.00	1	\$ 80,000	
5	Headwall Outfall Cast-in Place	no.	\$ 10,000.00	1	\$ 10,000	
Sanitary Management						
A.	Pipe					
1	200 PVC DR35	m	\$ 1,200.00		\$ -	
2	250 PVC DR35	m	\$ 1,200.00	667	\$ 800,400.00	
B.	Structure					
1	Manholes Precast	no.	\$ 6,000.00	9.00	\$ 54,000.00	
2	U.G. Tank Cast-in Place	no.		0	\$ -	
3	Headwall Outfall Cast-in Place	no.		0	\$ -	
Watermain Management						
1	200 DR18 Water		\$ 1,500.00	0	\$ -	
Services						
1	House	ea	\$ 10,000	44	\$ 440,000	
10	ENVIRONMENTAL PROTECTION	LS	\$ 180,000	1	\$ 180,000	
.1	Silt Fencing	m	\$ -	0	Included	
.2	Ditch Dykes	Ea	\$ -	0	Included	
.3	Settling Ponds	Ea	\$ -	0	Included	
.4	Ground Cover	m ²	\$ -	0	Included	
.5	Debris Boom	m	\$ -	0	Included	
.6	Silt Curtain	m	\$ -	0	Included	
12	DESIGN DEVELOPMENT CONTINGENCY ALLOWANCE - Note 1			40%	\$ 4,720,000	
13	OPINION of PROBABLE COSTS w/o CONSTRUCTION CONTINGENCY				\$ 16,520,000	
14	CONSTRUCTION CONTINGENCY - Note 1			10%	\$ 1,652,000	
15	LOCATION FACTOR - Note 2			0%	Included	
16	ESCALATION (Based on 2025 Dollars) - Note 3			0%	Not Included	
17	OPINION of PROBABLE CONSTRUCTION COSTS c/w CONTINGENCY Less HST				\$ 18,200,000	

THIS OPINION OF PROBABLE COSTS IS PRESENTED ON THE BASIS OF EXPERIENCE, QUALIFICATIONS, AND BEST JUDGEMENT. IT HAS BEEN PREPARED IN ACCORDANCE WITH ACCEPTABLE PRINCIPLES AND PRACTICES. MARKET TRENDS, NON-COMPETITIVE BIDDING SITUATIONS, UNFORSEEN LABOUR AND MATERIAL ADJUSTMENTS AND THE LIKE ARE BEYOND THE CONTROL OF CBCL LIMITED. AS SUCH WE CANNOT WARRANT OR GUARANTEE THAT ACTUAL COSTS WILL NOT VARY FROM THE OPINION PROVIDED.

Note 1 This Design Developmnt Allowance is to account for uncertainty in construction cost due to undefined design scope.
Note 2 The Construction Contingency is to factor in potential post tender Change Orders.
Note 3 This Location Factor is for variances between construction costs at the location of the project & historical costs data.
Note 4 This Escalation / Inflation Allowance is for increases in construction costs from the time of budget development to Tender Call.

**Opinion of Probable Construction Costs
STM & SAN Management Plan Town of Windsor**



(Based on CBCL Stormwater Report Plan - dated 05-06-2025)

AREA 01B - Victoria Street

Date:	01/08/25
Project No.	221101.00
Prepared & Reviewed by:	EJ / AT / AB
Budget Class	Class C

SCHEDULE OF QUANTITIES AND UNIT PRICES

Item	Description	Depth	Unit Price	Qty	TOTALS	AREA TOTALS
1	MOBILIZATION, BONDS, INSURANCE, PCM	LS	10%	10%	\$ 1,000,000	\$ 1,000,000
2	DEMOLITIONS & DISPOSAL ALLOWANCE	LS	\$ 100,000	1	\$ 100,000	\$ 100,000
Stormwater Management						
A.	Pipe					\$ 2,100,000
1	250 PVC DR35	m	\$ 2,650	0	\$ -	
2	300 PVC DR35	m	\$ 2,650	93	\$ 245,136	
9	525 Concrete 65D	m	\$ 2,800	144	\$ 403,190	
10	550 Concrete 65D	m	\$ 2,875	0	\$ -	
11	600 Concrete 65D	m	\$ 2,875	0	\$ -	
12	675 Concrete 65D	m	\$ 2,950	71	\$ 210,198	
B.	Structure					
1	Manholes Precast	no.	\$ 6,000	5	\$ 30,000	
2	U.G. Tank Cast-in Place	no.		0	\$ -	
3	Headwall Outfall Cast-in Place	no.	\$ 10,000	0	\$ -	
Sanitary Management						
A.	Pipe					
1	200 PVC DR35	m	\$ 1,200		\$ -	
2	250 PVC DR35	m	\$ 1,200	428	\$ 513,600	
B.	Structure					
1	Manholes Precast	no.	\$ 6,000	4	\$ 24,000	
2	U.G. Tank Cast-in Place	no.		0	\$ -	
3	Headwall Outfall Cast-in Place	no.		0	\$ -	
Services						
1	House	ea	\$ 10,000	46	\$ 460,000	
10	ENVIRONMENTAL PROTECTION	LS	\$ 180,000	1	\$ 180,000	
.1	Silt Fencing	m	\$ -	0	<i>Included</i>	
.2	Ditch Dykes	Ea	\$ -	0	<i>Included</i>	
.3	Settling Ponds	Ea	\$ -	0	<i>Included</i>	
.4	Ground Cover	m ²	\$ -	0	<i>Included</i>	
.5	Debris Boom	m	\$ -	0	<i>Included</i>	
.6	Silt Curtain	m	\$ -	0	<i>Included</i>	
12	DESIGN DEVELOPMENT CONTINGENCY ALLOWANCE - Note 1			40%	\$ 1,280,000	
13	OPINION of PROBABLE COSTS w/o CONSTRUCTION CONTINGENCY				\$ 4,480,000	
14	CONSTRUCTION CONTINGENCY - Note 1			10%	\$ 448,000	
15	LOCATION FACTOR - Note 2			0%	<i>Included</i>	
16	ESCALATION (Based on 2025 Dollars) - Note 3			0%	<i>Not Included</i>	
17	OPINION of PROBABLE CONSTRUCTION COSTS c/w CONTINGENCY Less HST				\$ 5,000,000	

THIS OPINION OF PROBABLE COSTS IS PRESENTED ON THE BASIS OF EXPERIENCE, QUALIFICATIONS, AND BEST JUDGEMENT. IT HAS BEEN PREPARED IN ACCORDANCE WITH ACCEPTABLE PRINCIPLES AND PRACTICES. MARKET TRENDS, NON-COMPETITIVE BIDDING SITUATIONS, UNFORSEEN LABOUR AND MATERIAL ADJUSTMENTS AND THE LIKE ARE BEYOND THE CONTROL OF CBCL LIMITED. AS SUCH WE CANNOT WARRANT OR GUARANTEE THAT ACTUAL COSTS WILL NOT VARY FROM THE OPINION PROVIDED.

- Note 1** This Design Developmnt Allowance is to account for uncertainty in construction cost due to undefined design scope.
- Note 2** The Construction Contingency is to factor in potential post tender Change Orders.
- Note 3** This Location Factor is for variances between construction costs at the location of the project & historical costs data.
- Note 4** This Escalation / Inflation Allowance is for increases in construction costs from the time of budget development to Tender Call.

Opinion of Probable Construction Costs
STM & SAN Management Plan Town of Windsor



(Based on CBCL Stormwater Report Plan - dated 05-06-2025)

AREA 01C - Gray Street

Date:	01/08/25
Project No.	221101.00
Prepared & Reviewed by:	EJ / AT / AB
Budget Class	Class C

SCHEDULE OF QUANTITIES AND UNIT PRICES

Item	Description	Depth	Unit Price	Qty	TOTALS	AREA TOTALS
1	MOBILIZATION, BONDS, INSURANCE, PCM	LS	10%	10%	\$ 1,000,000	\$ 1,000,000
2	DEMOLITIONS & DISPOSAL ALLOWANCE	LS	\$ 100,000	1	\$ 100,000	\$ 100,000
Stormwater Management						\$ 400,000
A.	Pipe					
1	250 PVC DR35		\$ 2,650	0	\$ -	
2	300 PVC DR35		\$ 2,650	0	\$ -	
3	350 PVC DR35		\$ 2,700	0	\$ -	
4	375 PVC DR35		\$ 2,750	0	\$ -	
5	400 PVC DR35		\$ 2,800	0	\$ -	
6	450 Concrete 65D		\$ 2,775	0	\$ -	
7	475 Concrete 65D		\$ 2,775	0	\$ -	
8	500 Concrete 65D		\$ 2,800	0	\$ -	
9	525 Concrete 65D		\$ 2,800	0	\$ -	
10	550 Concrete 65D		\$ 2,875	0	\$ -	
11	600 Concrete 65D		\$ 2,875	0	\$ -	
12	675 Concrete 65D		\$ 2,950	0	\$ -	
13	750 Concrete 65D		\$ 2,950	0	\$ -	
14	825 Concrete 65D		\$ 3,000	0	\$ -	
15	900 Concrete 65D		\$ 3,100	0	\$ -	
16	1000 Concrete 65D		\$ 3,100	0	\$ -	
17	1050 Concrete 65D		\$ 3,100	0	\$ -	
B.	Structure					
1	Manholes Precast	no.	\$ 6,000.00	0	\$ -	
2	U.G. Tank Cast-in Place	no.		0	\$ -	
3	Headwall Outfall Cast-in Place	no.	\$ 10,000.00	0	\$ -	
Sanitary Management						
A.	Pipe					
1	200 PVC DR35	m	\$ 1,200.00		\$ -	
2	250 PVC DR35	m	\$ 1,200.00		\$ -	
B.	Structure					
1	Manholes Precast	0	\$ 6,000.00		\$ -	
2	U.G. Tank Cast-in Place	0			\$ -	
3	Headwall Outfall Cast-in Place	0	\$ 10,000.00		\$ -	
Services						
1	House	ea	\$ 10,000	22	\$ 220,000.00	
10	ENVIRONMENTAL PROTECTION	LS	\$ 180,000	1	\$ 180,000	
.1	Silt Fencing	m	\$ -	0	<i>Included</i>	
.2	Ditch Dykes	Ea	\$ -	0	<i>Included</i>	
.3	Settling Ponds	Ea	\$ -	0	<i>Included</i>	
.4	Ground Cover	m ²	\$ -	0	<i>Included</i>	
.5	Debris Boom	m	\$ -	0	<i>Included</i>	
.6	Silt Curtain	m	\$ -	0	<i>Included</i>	
12	DESIGN DEVELOPMENT CONTINGENCY ALLOWANCE - Note 1			40%	\$ 600,000	
13	OPINION of PROBABLE COSTS w/o CONSTRUCTION CONTINGENCY				\$ 2,100,000	
14	CONSTRUCTION CONTINGENCY - Note 1			10%	\$ 210,000	
15	LOCATION FACTOR - Note 2			0%	<i>Included</i>	
16	ESCALATION (Based on 2025 Dollars) - Note 3			0%	<i>Not Included</i>	
17	OPINION of PROBABLE CONSTRUCTION COSTS c/w CONTINGENCY Less HST				\$ 2,400,000	



Opinion of Probable Construction Costs
STM & SAN Management Plan Town of Windsor

Date:	01/08/25
Project No.	221101.00
Prepared & Reviewed by:	EJ / AT / AB
Budget Class	Class C

(Based on CBCL Stormwater Report Plan - dated 05-06-2025)

AREA 2A - Albert Street to Outfall

SCHEDULE OF QUANTITIES AND UNIT PRICES

Item	Description	Depth	Unit Price	Qty	TOTALS	AREA TOTALS
1	MOBILIZATION, BONDS, INSURANCE, PCM		LS 10%	1	\$ 400,000	\$ 400,000
2	DEMOLITIONS & DISPOSAL ALLOWANCE		LS \$ 50,000	1	\$ 50,000	\$ 50,000
Stormwater Management						
AREA 2A ALBERT STREET to OUTFALL						
2A.1 1800 DIA AND OUTFALL						
A. Pipe	Shallow (1m to 2.0m)					\$ 2,900,000
1	250 PVC DR35	m	\$ 2,650	0	\$ -	
2	300 PVC DR35	m	\$ 2,650	80	\$ 213,291	
11	600 Concrete 65D	m	\$ 2,875	69	\$ 197,142	
12	675 Concrete 65D	m	\$ 2,950	0	\$ -	
13	750 Concrete 65D	m	\$ 2,950	0	\$ -	
14	825 Concrete 65D	m	\$ 3,000	0	\$ -	
15	900 Concrete 65D	m	\$ 3,100	0	\$ -	
16	1000 Concrete 65D	m	\$ 3,100	0	\$ -	
17	1050 Concrete 65D	m	\$ 3,100	0	\$ -	
3	1800 concrete 65D	m	\$ 5,000	305	\$ 1,526,060	
B. Structure						
1	1.05mØ Manholes	no.	\$ 6,000.00	1	\$ 6,000	
2	2.40mØ Manholes	no.	\$ 20,000.00	4	\$ 80,000	
3	Headwall Outfall	1.80 dia. Pipe C no.	\$ 5,000.00	1	\$ 5,000	
Sanitary Management						
A. Pipe						
1	200 PVC DR35	m	\$ 1,200.00		\$ -	
2	250 PVC DR35	m	\$ 1,200.00	293	\$ 351,600.00	
B. Structure						
1	Manholes Precast	no.	\$ 6,000.00	6	\$ 36,000.00	
2	U.G. Tank Cast-in Place	no.		0	\$ -	
3	Headwall Outfall Cast-in Place	no.		0	\$ -	
Services						
1	House	ea	\$ 10,000	7	\$ 70,000.00	
Land Purchase					\$ 300,000.00	
10	ENVIRONMENTAL PROTECTION	LS	\$ 60,000	1	\$ 60,000	
.1	Silt Fencing	m	\$ -	0	Included	
.2	Ditch Dykes	Ea	\$ -	0	Included	
.3	Settling Ponds	Ea	\$ -	0	Included	
.4	Ground Cover	m ²	\$ -	0	Included	
.5	Debris Boom	m	\$ -	0	Included	
.6	Silt Curtain	m	\$ -	0	Included	
12	DESIGN DEVELOPMENT CONTINGENCY ALLOWANCE - Note 1			40%	\$ 1,340,000	
13	OPINION of PROBABLE COSTS w/o CONSTRUCTION CONTINGENCY				\$ 4,690,000	
14	CONSTRUCTION CONTINGENCY - Note 2			10%	\$ 469,000	
15	LOCATION FACTOR - Note 3			0%	Included	
16	ESCALATION (Based on 2025 Dollars) - Note 4			0%	Not Included	
17	OPINION of PROBABLE CONSTRUCTION COSTS c/w CONTINGENCY Less HST				\$ 5,200,000	

THIS OPINION OF PROBABLE COSTS IS PRESENTED ON THE BASIS OF EXPERIENCE, QUALIFICATIONS, AND BEST JUDGEMENT. IT HAS BEEN PREPARED IN ACCORDANCE WITH ACCEPTABLE PRINCIPLES AND PRACTICES. MARKET TRENDS, NON-COMPETITIVE BIDDING SITUATIONS, UNFORSEEN LABOUR AND MATERIAL ADJUSTMENTS AND THE LIKE ARE BEYOND THE CONTROL OF CBCL LIMITED. AS SUCH WE CANNOT WARRANT OR GUARANTEE THAT ACTUAL COSTS WILL NOT VARY FROM THE OPINION PROVIDED.

- Note 1This Design Developmnt Allowance is to account for uncertainty in construction cost due to undefined design scope.
- Note 2The Construction Contingency is to factor in potential post tender Change Orders.
- Note 3This Location Factor is for variances between construction costs at the location of the project & historical costs data.

Opinion of Probable Construction Costs
STM & SAN Management Plan Town of Windsor



(Based on CBCL Stormwater Report Plan - dated 05-06-2025)

AREA 2B - Wiley Ave. to Albert Street

Date:	01/08/25
Project No.	221101.00
Prepared & Reviewed by:	EJ / AT / AB
Budget Class	Class C

SCHEDULE OF QUANTITIES AND UNIT PRICES

Item	Description	Depth	Unit Price	Qty	TOTALS	AREA TOTALS
1	MOBILIZATION, BONDS, INSURANCE, PCM	LS	10%	10%	\$ 500,000	\$ 500,000
2	DEMOLITIONS & DISPOSAL ALLOWANCE	LS	\$ 100,000	1	\$ 100,000	\$ 100,000
Stormwater Management						
AREA 2B WILEY AVE. TO ALBERT STREET						
2B.1						\$ 5,000,000
A. Pipe						
1	250 PVC DR35	Shallow (1m to 2.0m)	m \$ 2,650	0	\$ -	
2	300 PVC DR35		m \$ 2,650	303	\$ 803,361	
9	525 Concrete 65D		m \$ 2,800	111	\$ 310,554	
10	550 Concrete 65D		m \$ 2,875	0	\$ -	
11	600 Concrete 65D	2.50m Deep	m \$ 2,875	0	\$ -	
12	675 Concrete 65D		m \$ 2,950	50	\$ 147,432	
13	750 Concrete 65D		m \$ 2,950	50	\$ 147,432	
B. Structure						
1	Manholes		no. \$ 6,000.00	7	\$ 42,000	
2	U.G. Tank		no. \$ 20,000.00	0	\$ -	
3	Headwall Outfall		no. \$ 10,000.00	0	\$ -	
2B.2						
A. Pipe	Between (2.0m to 3.2m)					
13	750 Concrete 65D		m \$ 2,950	15	\$ 44,398	
2B.4	LARGER PIPE (1800 & 1200 Dia.) & DETENTION POND					
A. Pipe						
1	1200 2.5m Deep		m \$ 3,500	146	\$ 509,905	
2	1800 2.5m Deep		m \$ 5,000	230	\$ 1,148,970	
B. Structure						
1	2.40mØ Manholes	3.0m Deep	no. \$ 20,000	2	\$ 40,000	
2	1.50mØ Manholes	2.5m Deep	no. \$ 11,000	2	\$ 22,000	
3	Detention Pond	1.25m deep	no. \$ 229,279	1	\$ 229,279	
4	Headwall Outfall	1.20 dia. Pipe Ou	m \$ 10,000	1	\$ 10,000	
5	Headwall In	1.80 dia. Pipe In	m \$ 10,000	1	\$ 10,000	
Sanitary Management						
A. Pipe						
1	200 PVC DR35		m \$ 1,200.00		\$ -	
2	250 PVC DR35		m \$ 1,200.00	720	\$ 864,000	
B. Structure						
1	Manholes Precast		no. \$ 6,000.00	8	\$ 48,000	
Services						
1	House		ea \$ 10,000	49	\$ 490,000.00	
10	ENVIRONMENTAL PROTECTION	LS	\$ 50,000	1	\$ 50,000	
.1	Silt Fencing	m	\$ -	0	Included	
.2	Ditch Dykes	Ea	\$ -	0	Included	
.3	Settling Ponds	Ea	\$ -	0	Included	
.4	Ground Cover	m ²	\$ -	0	Included	
.5	Debris Boom	m	\$ -	0	Included	
.6	Silt Curtain	m	\$ -	0	Included	
.7	USE AS NEEDED	Ea	\$ -	0	\$ -	
12	DESIGN DEVELOPMENT CONTINGENCY ALLOWANCE - Note 1				40%	\$ 2,240,000
13	OPINION of PROBABLE COSTS w/o CONSTRUCTION CONTINGENCY					\$ 7,840,000
14	CONSTRUCTION CONTINGENCY - Note 1				10%	\$ 784,000
15	LOCATION FACTOR - Note 2				0%	Included
16	ESCALATION (Based on 2025 Dollars) - Note 3				0%	Not Included
17	OPINION of PROBABLE CONSTRUCTION COSTS c/w CONTINGENCY Less HST					\$ 8,700,000

THIS OPINION OF PROBABLE COSTS IS PRESENTED ON THE BASIS OF EXPERIENCE, QUALIFICATIONS, AND BEST JUDGEMENT. IT HAS BEEN PREPARED IN ACCORDANCE WITH ACCEPTABLE PRINCIPLES AND PRACTICES. MARKET TRENDS, NON-COMPETITIVE BIDDING SITUATIONS, UNFORSEEN LABOUR AND MATERIAL ADJUSTMENTS AND THE LIKE ARE BEYOND THE CONTROL OF CBCL LIMITED. AS SUCH WE CANNOT WARRANT OR GUARANTEE THAT ACTUAL COSTS WILL NOT VARY FROM THE OPINION PROVIDED.

Note 1	This Design Developmnt Allowance is to account for uncertainty in construction cost due to undefined design scope.
Note 2	The Construction Contingency is to factor in potential post tender Change Orders.
Note 3	This Location Factor is for variances between construction costs at the location of the project & historical costs data.
Note 4	This Escalation / Inflation Allowance is for increases in construction costs from the time of budget development to Tender Call.

Budget Definitions



Opinion of Probable Construction Costs
STM & SAN Management Plan Town of Windsor

Date:	01/08/25
Project No.	221101.00
Prepared & Reviewed by:	EJ / AT / AB
Budget Class	Class C

(Based on CBCL Stormwater Report Plan - dated 05-06-2025)

AREA 2C - Optional Albert Street

SCHEDULE OF QUANTITIES AND UNIT PRICES

Item	Description	Depth	Unit Price	Qty	TOTALS	AREA TOTALS
1	MOBILIZATION, BONDS, INSURANCE, PCM	LS	10%	10%	\$ 100,000	\$ 100,000
2	DEMOLITIONS & DISPOSAL ALLOWANCE	LS	\$ 30,000	1	\$ 30,000	\$ 30,000
Stormwater Management						
2C	ALBERT STREET (OPTIONAL)				Optional	
2C.1	Shallow (1m to 2.0m)					
A.	Pipe					
1	250 PVC DR35	m	\$ 2,650	0	\$ -	
2	300 PVC DR35	m	\$ 2,650	0	\$ -	
3	350 PVC DR35	m	\$ 2,700	0	\$ -	
4	375 PVC DR35	m	\$ 2,750	48	\$ 132,327	
5	400 PVC DR35	m	\$ 2,800	0	\$ -	
6	450 Concrete 65D	m	\$ 2,775	0	\$ -	
7	475 Concrete 65D	m	\$ 2,775	0	\$ -	
8	500 Concrete 65D	m	\$ 2,800	0	\$ -	
9	525 Concrete 65D	m	\$ 2,800	0	\$ -	
10	550 Concrete 65D	m	\$ 2,875	0	\$ -	
11	600 Concrete 65D	m	\$ 2,875	92	\$ 263,310	
12	675 Concrete 65D	m	\$ 2,950	83	\$ 244,635	
13	750 Concrete 65D	m	\$ 2,950	0	\$ -	
14	825 Concrete 65D	m	\$ 3,000	0	\$ -	
15	900 Concrete 65D	m	\$ 3,100	0	\$ -	
16	1000 Concrete 65D	m	\$ 3,100	0	\$ -	
17	1050 Concrete 65D	m	\$ 3,100	0	\$ -	
B.	Structure					
1	Manholes	Precast	no. \$ 6,000.00	1	\$ 6,000	
2	U.G. Tank	Cast-in Place	no. \$ 20,000.00	0	\$ -	
3	Headwall Outfall	Cast-in Place	no. \$ 10,000.00	0	\$ -	
Services						
1	House	ea	\$ 10,000	12	\$ 120,000.00	
10	ENVIRONMENTAL PROTECTION	LS	\$ 10,000	1	\$ 10,000	
.1	Silt Fencing	m	\$ -	0	Included	
.2	Ditch Dykes	Ea	\$ -	0	Included	
.3	Settling Ponds	Ea	\$ -	0	Included	
.4	Ground Cover	m ²	\$ -	0	Included	
.5	Debris Boom	m	\$ -	0	Included	
.6	Silt Curtain	m	\$ -	0	Included	
.7	USE AS NEEDED	Ea	\$ -	0	\$ -	
12	DESIGN DEVELOPMENT CONTINGENCY ALLOWANCE - Note 1			40%	\$ 364,000	
13	OPINION of PROBABLE COSTS w/o CONSTRUCTION CONTINGENCY				\$ 1,274,000	
14	CONSTRUCTION CONTINGENCY - Note 1			10%	\$ 127,400	
15	LOCATION FACTOR - Note 2			0%	Included	
16	ESCALATION (Based on 2025 Dollars) - Note 3			0%	Not Included	
17	OPINION of PROBABLE CONSTRUCTION COSTS c/w CONTINGENCY Less HST				\$ 1,500,000	

THIS OPINION OF PROBABLE COSTS IS PRESENTED ON THE BASIS OF EXPERIENCE, QUALIFICATIONS, AND BEST JUDGEMENT. IT HAS BEEN PREPARED IN ACCORDANCE WITH ACCEPTABLE PRINCIPLES AND PRACTICES. MARKET TRENDS, NON-COMPETITIVE BIDDING SITUATIONS, UNFORSEEN LABOUR AND MATERIAL ADJUSTMENTS AND THE LIKE ARE BEYOND THE CONTROL OF CBCL LIMITED. AS SUCH WE CANNOT WARRANT OR GUARANTEE THAT ACTUAL COSTS WILL NOT VARY FROM THE OPINION PROVIDED.

- Note 1This Design Developmnt Allowance is to account for uncertainty in construction cost due to undefined design scope.
- Note 2The Construction Contingency is to factor in potential post tender Change Orders.
- Note 3This Location Factor is for variances between construction costs at the location of the project & historical costs data.
- Note 4This Escalation / Inflation Allowance is for increases in construction costs from the time of budget development to Tender Call.



Opinion of Probable Construction Costs
STM & SAN Management Plan Town of Windsor

Date:	01/08/25
Project No.	221101.00
Prepared & Reviewed by:	EJ / AT / AB
Budget Class	Class C

(Based on CBCL Stormwater Report Plan - dated 05-06-2025)

AREA 3 - Clifton Ave

SCHEDULE OF QUANTITIES AND UNIT PRICES

Item	Description	Depth	Unit Price	Qty	TOTALS	AREA TOTALS
1	MOBILIZATION, BONDS, INSURANCE, PCM	LS	10%	10%	\$ 250,000	\$ 250,000
2	DEMOLITIONS & DISPOSAL ALLOWANCE	LS	\$ 70,000	1	\$ 70,000	\$ 70,000
Stormwater Management						
3	AREA 03 CLIFTON AVE.					
3.1	Shallow (1m to 2.0m)					
A.	Pipe					\$ 3,500,000
1	250 PVC DR35	m	\$ 2,650	251	\$ 665,150	
2	300 PVC DR35	m	\$ 2,650	169	\$ 447,850	
6	450 Concrete 65D	m	\$ 2,775	174	\$ 482,850	
B.	Structure					
1	Manholes	no.	\$ 6,000.00	10	\$ 60,000	
2	U.G. Tank	no.	\$ 20,000.00	0	\$ -	
3	Headwall Outfall	no.	\$ 10,000.00	0	\$ -	
3.2	Between (2.0m to 3.2m)					
A.	Pipe					
6	450 Concrete 65D	m	\$ 2,775	160	\$ 444,505	
B.	Structure					
1	Manholes	no.	\$ 6,000	1	\$ 6,000	
2	U.G. Tank	no.	\$ 23,000	0	\$ -	
3.3					\$ -	
Sanitary Management						
A.	Pipe					
1	200 PVC DR35	m	\$ 1,200		\$ -	
2	250 PVC DR35	m	\$ 1,200	758	\$ 909,600	
B.	Structure					
1	Manholes Precast	no.	\$ 6,000	11	\$ 66,000	
2	U.G. Tank Cast-in Place	no.			\$ -	
3	Headwall Outfall Cast-in Place	no.	\$ 10,000		\$ -	
Services						
1	House	ea	\$ 10,000	35	\$ 350,000.00	
10	ENVIRONMENTAL PROTECTION	LS	\$ 30,000	1	\$ 30,000	
.1	Silt Fencing	m	\$ -	0	Included	
.2	Ditch Dykes	Ea	\$ -	0	Included	
.3	Settling Ponds	Ea	\$ -	0	Included	
.4	Ground Cover	m ²	\$ -	0	Included	
.5	Debris Boom	m	\$ -	0	Included	
.6	Silt Curtain	m	\$ -	0	Included	
.7	USE AS NEEDED	Ea	\$ -	0	\$ -	
12	DESIGN DEVELOPMENT CONTINGENCY ALLOWANCE - Note 1			40%	\$ 1,528,000	
13	OPINION of PROBABLE COSTS w/o CONSTRUCTION CONTINGENCY				\$ 5,348,000	
14	CONSTRUCTION CONTINGENCY - Note 1			10%	\$ 534,800	
15	LOCATION FACTOR - Note 2			0%	Included	
16	ESCALATION (Based on 2025 Dollars) - Note 3			0%	Not Included	
17	OPINION of PROBABLE CONSTRUCTION COSTS c/w CONTINGENCY Less HST				\$ 5,900,000	

THIS OPINION OF PROBABLE COSTS IS PRESENTED ON THE BASIS OF EXPERIENCE, QUALIFICATIONS, AND BEST JUDGEMENT. IT HAS BEEN PREPARED IN ACCORDANCE WITH ACCEPTABLE PRINCIPLES AND PRACTICES. MARKET TRENDS, NON-COMPETITIVE BIDDING SITUATIONS, UNFORSEEN LABOUR AND MATERIAL ADJUSTMENTS AND THE LIKE ARE BEYOND THE CONTROL OF CBCL LIMITED. AS SUCH WE CANNOT WARRANT OR GUARANTEE THAT ACTUAL COSTS WILL NOT VARY FROM THE OPINION PROVIDED.

- Note 1**

This Design Developmnt Allowance is to account for uncertainty in construction cost due to undefined design scope.
- Note 2**

The Construction Contingency is to factor in potential post tender Change Orders.
- Note 3**

This Location Factor is for variances between construction costs at the location of the project & historical costs data.
- Note 4**

This Escalation / Inflation Allowance is for increases in construction costs from the time of budget development to Tender Call.



Opinion of Probable Construction Costs
STM & SAN Management Plan Town of Windsor

Date:	01/08/25
Project No.	221101.00
Prepared & Reviewed by:	EJ / AT / AB
Budget Class	Class C

(Based on CBCL Stormwater Report Plan - dated 05-06-2025)

AREA 4 - Cedar, Avon, and Chestnut Street

SCHEDULE OF QUANTITIES AND UNIT PRICES

Item	Description	Depth	Unit Price	Qty	TOTALS	AREA TOTALS
1	MOBILIZATION, BONDS, INSURANCE, PCM		LS 10%	10%	\$ 450,000	\$ 450,000
2	DEMOLITIONS & DISPOSAL ALLOWANCE		LS \$ 80,000	1	\$ 80,000	\$ 80,000
Stormwater Management						
3	AREA 04 CEDAR, AVON AND CHESNUT STREET					
4.1	Shallow (1m to 2.0m)					
A.	Pipe					\$ 4,400,000
1	250 PVC DR35	m	\$ 2,650	0	\$ -	
2	300 PVC DR35	m	\$ 2,650	634	\$ 1,678,974	
B.	Structure					
1	Manholes	no.	\$ 6,000.00	10	\$ 60,000	
2	U.G. Tank	no.		0	\$ -	
3	Headwall Outfall	no.	\$ 10,000.00	0	\$ -	
4.2	Between (2.0m to 3.2m)					
A.	Pipe					
1	250 PVC DR35	m	\$ 2,650	0	\$ -	
2	300 PVC DR35	m	\$ 2,650	188	\$ 499,241	
9	525 Concrete 65D	m	\$ 2,800	158	\$ 441,319	
10	550 Concrete 65D	m	\$ 2,875	0	\$ -	
11	600 Concrete 65D	m	\$ 2,875	0	\$ -	
12	675 Concrete 65D	m	\$ 2,950	0	\$ -	
13	750 Concrete 65D	m	\$ 2,950	0	\$ -	
B.	Structure					
1	Manholes	no.	\$ 6,000	3	\$ 18,000	
2	U.G. Tank	no.		0	\$ -	
Sanitary Management						
A.	Pipe					
1	200 PVC DR35	m	\$ 1,200		\$ -	
2	250 PVC DR35	m	\$ 1,200	782	\$ 938,400	
B.	Structure					
1	Manholes Precast	no.	\$ 6,000	11	\$ 66,000	
2	U.G. Tank Cast-in Place	no.		0	\$ -	
3	Headwall Outfall Cast-in Place	no.	\$ 10,000	0	\$ -	
Services						
1	House	ea	\$ 10,000	59	\$ 590,000.00	
10	ENVIRONMENTAL PROTECTION	LS	\$ 75,000	1	\$ 75,000	
.1	Silt Fencing	m	\$ -	0	Included	
.2	Ditch Dykes	Ea	\$ -	0	Included	
.3	Settling Ponds	Ea	\$ -	0	Included	
.4	Ground Cover	m ²	\$ -	0	Included	
.5	Debris Boom	m	\$ -	0	Included	
.6	Silt Curtain	m	\$ -	0	Included	
12	DESIGN DEVELOPMENT CONTINGENCY ALLOWANCE - Note 1			40%		\$ 1,972,000
13	OPINION of PROBABLE COSTS w/o CONSTRUCTION CONTINGENCY					\$ 6,902,000
14	CONSTRUCTION CONTINGENCY - Note 1			10%		\$ 690,200
15	LOCATION FACTOR - Note 2			0%		Included
16	ESCALATION (Based on 2025 Dollars) - Note 3			0%		Not Included
17	OPINION of PROBABLE CONSTRUCTION COSTS c/w CONTINGENCY Less HST					\$ 7,600,000

THIS OPINION OF PROBABLE COSTS IS PRESENTED ON THE BASIS OF EXPERIENCE, QUALIFICATIONS, AND BEST JUDGEMENT. IT HAS BEEN PREPARED IN ACCORDANCE WITH ACCEPTABLE PRINCIPLES AND PRACTICES. MARKET TRENDS, NON-COMPETITIVE BIDDING SITUATIONS, UNFORSEEN LABOUR AND MATERIAL ADJUSTMENTS AND THE LIKE ARE BEYOND THE CONTROL OF CBCL LIMITED. AS SUCH WE CANNOT WARRANT OR GUARANTEE THAT ACTUAL COSTS WILL NOT VARY FROM THE OPINION PROVIDED.

- Note 1

This Design Developmnt Allowance is to account for uncertainty in construction cost due to undefined design scope.
- Note 2

The Construction Contingency is to factor in potential post tender Change Orders.
- Note 3

This Location Factor is for variances between construction costs at the location of the project & historical costs data.
- Note 4

This Escalation / Inflation Allowance is for increases in construction costs from the time of budget development to Tender Call.



Opinion of Probable Construction Costs
STM & SAN Management Plan Town of Windsor

Date:	01/08/25
Project No.	221101.00
Prepared & Reviewed by:	EJ / AT / AB
Budget Class	Class C

(Based on CBCL Stormwater Report Plan - dated 05-06-2025)

AREA 5 - Lakeview Drive

SCHEDULE OF QUANTITIES AND UNIT PRICES

Item	Description	Depth	Unit Price	Qty	TOTALS	AREA TOTALS
1	MOBILIZATION, BONDS, INSURANCE, PCM	LS	10%	10%	\$ 200,000	\$ 200,000
2	DEMOLITIONS & DISPOSAL ALLOWANCE	LS	\$ 50,000	1	\$ 50,000	\$ 50,000
Stormwater Management						
3	AREA 05 LAKEVIEW AVE.					
5.1	Shallow (1m to 2.0m)					
A.	Pipe					\$ 1,200,000
1	250 PVC DR35	m	\$ 2,650	0	\$ -	
2	300 PVC DR35	m	\$ 2,650	339	\$ 898,716	
B.	Structure					
1	Manholes	Precast	no. \$ 6,000.00	5	\$ 30,000	
2	U.G. Tank	Cast-in Place	no.	0	\$ -	
3	Headwall Outfall	Cast-in Place	no. \$ 10,000.00	1	\$ 10,000	
Services						
1	House	ea	\$ 10,000	15	\$ 150,000.00	
10	ENVIRONMENTAL PROTECTION	LS	\$ 30,000	1	\$ 30,000	
.1	Silt Fencing	m	\$ -	0	Included	
.2	Ditch Dykes	Ea	\$ -	0	Included	
.3	Settling Ponds	Ea	\$ -	0	Included	
.4	Ground Cover	m ²	\$ -	0	Included	
.5	Debris Boom	m	\$ -	0	Included	
.6	Silt Curtain	m	\$ -	0	Included	
.7	USE AS NEEDED	Ea	\$ -	0	\$ -	
12	DESIGN DEVELOPMENT CONTINGENCY ALLOWANCE - Note 1			40%	\$ 580,000	
13	OPINION of PROBABLE COSTS w/o CONSTRUCTION CONTINGENCY				\$ 2,030,000	
14	CONSTRUCTION CONTINGENCY - Note 1			10%	\$ 203,000	
15	LOCATION FACTOR - Note 2			0%	Included	
16	ESCALATION (Based on 2025 Dollars) - Note 3			0%	Not Included	
17	OPINION of PROBABLE CONSTRUCTION COSTS c/w CONTINGENCY Less HST				\$ 2,300,000	

THIS OPINION OF PROBABLE COSTS IS PRESENTED ON THE BASIS OF EXPERIENCE, QUALIFICATIONS, AND BEST JUDGEMENT. IT HAS BEEN PREPARED IN ACCORDANCE WITH ACCEPTABLE PRINCIPLES AND PRACTICES. MARKET TRENDS, NON-COMPETITIVE BIDDING SITUATIONS, UNFORSEEN LABOUR AND MATERIAL ADJUSTMENTS AND THE LIKE ARE BEYOND THE CONTROL OF CBCL LIMITED. AS SUCH WE CANNOT WARRANT OR GUARANTEE THAT ACTUAL COSTS WILL NOT VARY FROM THE OPINION PROVIDED.

Note 1	This Design Developmnt Allowance is to account for uncertainty in construction cost due to undefined design scope.
Note 2	The Construction Contingency is to factor in potential post tender Change Orders.
Note 3	This Location Factor is for variances between construction costs at the location of the project & historical costs data.
Note 4	This Escalation / Inflation Allowance is for increases in construction costs from the time of budget development to Tender Call.

Opinion of Probable Construction Costs
STM & SAN Management Plan Town of Windsor



Date:	01/08/25
Project No.	221101.00
Prepared & Reviewed by:	EJ / AT / AB
Budget Class	Class C

(Based on CBCL Stormwater Report Plan - dated 05-06-2025)

AREA 6 - Sunset Ave to River Street

SCHEDULE OF QUANTITIES AND UNIT PRICES

Item	Description	Depth	Unit Price	Qty	TOTALS	AREA TOTALS
1	MOBILIZATION, BONDS, INSURANCE, PCM	LS	10%	10%	\$ 600,000	\$ 600,000
2	DEMOLITIONS & DISPOSAL ALLOWANCE	LS	\$ 100,000	1	\$ 100,000	\$ 100,000
Stormwater Management						
3	AREA 06 SUNDET AVE. TO RIVER STREET					
6.1	Shallow (1m to 2.0m)					
A.	Pipe					\$ 3,600,000
1	250 PVC DR35	m	\$ 2,650	0	\$ -	
2	300 PVC DR35	m	\$ 2,650	213	\$ 564,151	
3	350 PVC DR35	m	\$ 2,700	0	\$ -	
4	375 PVC DR35	m	\$ 2,750	117	\$ 321,750	
9	525 Concrete 65D	m	\$ 2,800	117	\$ 327,496	
10	550 Concrete 65D	m	\$ 2,875	0	\$ -	
11	600 Concrete 65D	m	\$ 2,875	31	\$ 89,125	
B.	Structure					
1	Manholes	Precast	no. \$ 6,000.00	8	\$ 48,000	
2	U.G. Tank	Cast-in Place	no.	0	\$ -	
3	Headwall Outfall	Cast-in Place	no. \$ 10,000.00	1	\$ 10,000	
6.2	Between (2.0m to 3.2m)					
A.	Pipe					
1	250 PVC DR35	m	\$ 2,650	0	\$ -	
2	300 PVC DR35	m	\$ 2,650	56	\$ 149,269	
6	450 Concrete 65D	m	\$ 2,775	104	\$ 287,729	
7	475 Concrete 65D	m	\$ 2,775	0	\$ -	
8	500 Concrete 65D	m	\$ 2,800	0	\$ -	
9	525 Concrete 65D	m	\$ 2,800	55	\$ 154,591	
B.	Structure					
1	Manholes	no.	\$ 6,000	2	\$ 12,000	
6.3	Deep (More than 3.20m)				\$ -	
A.	Pipe					
11	600 Concrete 65D	m	\$ 2,875	70	\$ 202,495	
12	750 Concrete 65D	m	\$ 2,950	279	\$ 822,289	
B.	Structure					
1	Manholes	no.	\$ 6,000.00	3	\$ 18,000	
2	U.G. Tank	no.		0	\$ -	
Services						
1	House	ea	\$ 10,000	43	\$ 430,000.00	
10	ENVIRONMENTAL PROTECTION	LS	\$ 150,000	1	\$ 150,000	
.1	Silt Fencing	m	\$ -	0	Included	
.2	Ditch Dykes	Ea	\$ -	0	Included	
.3	Settling Ponds	Ea	\$ -	0	Included	
.4	Ground Cover	m ²	\$ -	0	Included	
.5	Debris Boom	m	\$ -	0	Included	
.6	Silt Curtain	m	\$ -	0	Included	
.7	USE AS NEEDED	Ea	\$ -	0	\$ -	
12	DESIGN DEVELOPMENT CONTINGENCY ALLOWANCE - Note 1			40%		\$ 1,720,000
13	OPINION of PROBABLE COSTS w/o CONSTRUCTION CONTINGENCY					\$ 6,020,000
14	CONSTRUCTION CONTINGENCY - Note 1			10%		\$ 602,000
15	LOCATION FACTOR - Note 2			0%		Included
16	ESCALATION (Based on 2025 Dollars) - Note 3			0%		Not Included
17	OPINION of PROBABLE CONSTRUCTION COSTS c/w CONTINGENCY Less HST					\$ 6,700,000

THIS OPINION OF PROBABLE COSTS IS PRESENTED ON THE BASIS OF EXPERIENCE, QUALIFICATIONS, AND BEST JUDGEMENT. IT HAS BEEN PREPARED IN ACCORDANCE WITH ACCEPTABLE PRINCIPLES AND PRACTICES. MARKET TRENDS, NON-COMPETITIVE BIDDING SITUATIONS, UNFORSEEN LABOUR AND MATERIAL ADJUSTMENTS AND THE LIKE ARE BEYOND THE CONTROL OF CBCL LIMITED. AS SUCH WE CANNOT WARRANT OR GUARANTEE THAT ACTUAL COSTS WILL NOT VARY FROM THE OPINION PROVIDED.

- Note 1This Design Developmnt Allowance is to account for uncertainty in construction cost due to undefined design scope.
- Note 2The Construction Contingency is to factor in potential post tender Change Orders.
- Note 3This Location Factor is for variances between construction costs at the location of the project & historical costs data.
- Note 4This Escalation / Inflation Allowance is for increases in construction costs from the time of budget development to Tender Call.



Opinion of Probable Construction Costs
STM & SAN Management Plan Town of Windsor

Date:	01/08/25
Project No.	221101.00
Prepared & Reviewed by:	EJ / AT / AB
Budget Class	Class C

(Based on CBCL Stormwater Report Plan - dated 05-06-2025)

AREA 7 - Wiley Avenue

SCHEDULE OF QUANTITIES AND UNIT PRICES

Item	Description	Depth	Unit Price	Qty	TOTALS	AREA TOTALS
1	MOBILIZATION, BONDS, INSURANCE, PCM	LS	10%	10%	\$ 300,000	\$ 300,000
2	DEMOLITIONS & DISPOSAL ALLOWANCE	LS	\$ 75,000	1	\$ 75,000	\$ 75,000
Stormwater Management						
3	AREA 07 WILEY STREET (END)					
7.1	Shallow (1m to 2.0m)					
A.	Pipe					\$ 2,100,000
1	250 PVC DR35	m	\$ 2,650	0	\$ -	
2	300 PVC DR35	m	\$ 2,650	125	\$ 331,764	
3	350 PVC DR35	m	\$ 2,700	0	\$ -	
4	375 PVC DR35	m	\$ 2,750	125	\$ 344,674	
9	525 Concrete 65D	m	\$ 2,800	188	\$ 526,943	
14	825 Concrete 65D	m	\$ 3,000	120	\$ 361,293	
B.	Structure					
1	Manholes	Precast	no. \$ 6,000.00	7	\$ 42,000	
2	U.G. Tank	Cast-in Place	no.	0	\$ -	
7.2	Between (2.0m to 3.2m)					
B.	Structure					
1	Manholes	no.	\$ 6,000	2	\$ 12,000	
2	U.G. Tank	no.		0	\$ -	
Services						
1	House	ea	\$ 10,000	37	\$ 370,000.00	
10	ENVIRONMENTAL PROTECTION	LS	\$ 45,000	1	\$ 45,000	
.1	Silt Fencing	m	\$ -	0	Included	
.2	Ditch Dykes	Ea	\$ -	0	Included	
.3	Settling Ponds	Ea	\$ -	0	Included	
.4	Ground Cover	m ²	\$ -	0	Included	
.5	Debris Boom	m	\$ -	0	Included	
.6	Silt Curtain	m	\$ -	0	Included	
.7	USE AS NEEDED	Ea	\$ -	0	\$ -	
12	DESIGN DEVELOPMENT CONTINGENCY ALLOWANCE - Note 1			40%		\$ 990,000
13	OPINION of PROBABLE COSTS w/o CONSTRUCTION CONTINGENCY					\$ 3,465,000
14	CONSTRUCTION CONTINGENCY - Note 1			10%		\$ 346,500
15	LOCATION FACTOR - Note 2			0%		Included
16	ESCALATION (Based on 2025 Dollars) - Note 3			0%		Not Included
17	OPINION of PROBABLE CONSTRUCTION COSTS c/w CONTINGENCY Less HST					\$ 3,900,000

THIS OPINION OF PROBABLE COSTS IS PRESENTED ON THE BASIS OF EXPERIENCE, QUALIFICATIONS, AND BEST JUDGEMENT. IT HAS BEEN PREPARED IN ACCORDANCE WITH ACCEPTABLE PRINCIPLES AND PRACTICES. MARKET TRENDS, NON-COMPETITIVE BIDDING SITUATIONS, UNFORSEEN LABOUR AND MATERIAL ADJUSTMENTS AND THE LIKE ARE BEYOND THE CONTROL OF CBCL LIMITED. AS SUCH WE CANNOT WARRANT OR GUARANTEE THAT ACTUAL COSTS WILL NOT VARY FROM THE OPINION PROVIDED.

- Note 1

This Design Developmnt Allowance is to account for uncertainty in construction cost due to undefined design scope.
- Note 2

The Construction Contingency is to factor in potential post tender Change Orders.
- Note 3

This Location Factor is for variances between construction costs at the location of the project & historical costs data.
- Note 4

This Escalation / Inflation Allowance is for increases in construction costs from the time of budget development to Tender Call.

Opinion of Probable Construction Costs
STM & SAN Management Plan Town of Windsor



Date:	01/08/25
Project No.	221101.00
Prepared & Reviewed by:	EJ / AT / AB
Budget Class	Class C

(Based on CBCL Stormwater Report Plan - dated 05-06-2025)

AREA 8 - O'Brien and King Street

SCHEDULE OF QUANTITIES AND UNIT PRICES

Item	Description	Depth		Unit Price	Qty	TOTALS	AREA TOTALS
1	MOBILIZATION, BONDS, INSURANCE, PCM		LS	10%	10%	\$ 700,000	\$ 700,000
2	DEMOLITIONS & DISPOSAL ALLOWANCE		LS	\$ 100,000	1	\$ 100,000	\$ 100,000
Stormwater Management							
3	AREA 08	O'BRIEN AND KING STREET					
8.1	Shallow (1m to 2.0m)						
A.	Pipe						\$ 8,600,000
2	300 PVC DR35		m	\$ 2,650	130	\$ 343,305	
6	450 Concrete 65D		m	\$ 2,775	5	\$ 13,614	
9	525 Concrete 65D		m	\$ 2,800	81	\$ 227,346	
11	600 Concrete 65D		m	\$ 2,875	88	\$ 252,782	
12	675 Concrete 65D		m	\$ 2,950	64	\$ 188,071	
13	750 Concrete 65D		m	\$ 2,950	282	\$ 831,251	
14	825 Concrete 65D		m	\$ 3,000	140	\$ 420,891	
16	1000 Concrete 65D		m	\$ 3,100	88	\$ 272,800	
17	1050 Concrete 65D		m	\$ 3,100	98	\$ 303,800	
B.	Structure						
1	Manholes	Precast	no.	\$ 6,000.00	14	\$ 84,000	
8.2	Between (2.0m to 3.2m)						
A.	Pipe						
9	525 Concrete 65D		m	\$ 2,800	125	\$ 350,050	
12	675 Concrete 65D		m	\$ 2,950	138	\$ 406,017	
13	750 Concrete 65D		m	\$ 2,950	133	\$ 391,604	
B.	Structure						
1	Manholes		no.	\$ 6,000	7	\$ 42,000	
8.3	Deep (More than 3.20m)					\$ -	
A.	Pipe						
12	750 Concrete 65D		m	\$ 2,950	123	\$ 361,779	
B.	Structure			\$ 2,950.00			
1	Manholes		no.	\$ 6,000.00	1	\$ 6,000	
Sanitary Management							
A.	Pipe						
1	200 PVC DR35		m	\$ 1,200		\$ -	
2	250 PVC DR35		m	\$ 1,200	2,382	\$ 2,858,400	
B.	Structure						
1	Manholes	Precast	no.	\$ 6,000	28	\$ 168,000	
Services							
1	House		ea	\$ 10,000	95	\$ 950,000.00	
10	ENVIRONMENTAL PROTECTION		LS	\$ 120,000	1	\$ 120,000	
	.1 Silt Fencing		m	\$ -	0	Included	
	.2 Ditch Dykes		Ea	\$ -	0	Included	
	.3 Settling Ponds		Ea	\$ -	0	Included	
	.4 Ground Cover		m ²	\$ -	0	Included	
	.5 Debris Boom		m	\$ -	0	Included	
	.6 Silt Curtain		m	\$ -	0	Included	
	.7 USE AS NEEDED		Ea	\$ -	0	\$ -	
12	DESIGN DEVELOPMENT CONTINGENCY ALLOWANCE - Note 1				40%	\$ 3,760,000	
13	OPINION of PROBABLE COSTS w/o CONSTRUCTION CONTINGENCY					\$ 13,160,000	
14	CONSTRUCTION CONTINGENCY - Note 1				10%	\$ 1,316,000	
15	LOCATION FACTOR - Note 2				0%	Included	
16	ESCALATION (Based on 2025 Dollars) - Note 3				0%	Not Included	
17	OPINION of PROBABLE CONSTRUCTION COSTS c/w CONTINGENCY Less HST					\$ 14,500,000	

THIS OPINION OF PROBABLE COSTS IS PRESENTED ON THE BASIS OF EXPERIENCE, QUALIFICATIONS, AND BEST JUDGEMENT. IT HAS BEEN PREPARED IN ACCORDANCE WITH ACCEPTABLE PRINCIPLES AND PRACTICES. MARKET TRENDS, NON-COMPETITIVE BIDDING SITUATIONS, UNFORSEEN LABOUR AND MATERIAL ADJUSTMENTS AND THE LIKE ARE BEYOND THE CONTROL OF CBCL LIMITED. AS SUCH WE CANNOT WARRANT OR GUARANTEE THAT ACTUAL COSTS WILL NOT VARY FROM THE OPINION PROVIDED.

Note 1	This Design Developmnt Allowance is to account for uncertainty in construction cost due to undefined design scope.
Note 2	The Construction Contingency is to factor in potential post tender Change Orders.
Note 3	This Location Factor is for variances between construction costs at the location of the project & historical costs data.
Note 4	This Escalation / Inflation Allowance is for increases in construction costs from the time of budget development to Tender Call.

Opinion of Probable Construction Costs
STM & SAN Management Plan Town of Windsor



(Based on CBCL Stormwater Report Plan - dated 05-06-2025)

Date:	01/08/25
Project No.	221101.00
Prepared & Reviewed by:	EJ / AT / AB
Budget Class	Class C

AREA 9 - Gerrish Street

SCHEDULE OF QUANTITIES AND UNIT PRICES

Item	Description	Depth	Unit Price	Qty	TOTALS	AREA TOTALS
1	MOBILIZATION, BONDS, INSURANCE, PCM		LS 10%	10%	\$ 700,000	\$ 700,000
2	DEMOLITIONS & DISPOSAL ALLOWANCE		LS \$ 100,000	1	\$ 100,000	\$ 100,000
Stormwater Management						
3	AREA 09 GERRISH STREET					
9.1	Shallow (1.0m to 2.0m)					
A.	Pipe					\$ 4,500,000
2	300 PVC DR35		m \$ 2,650	520	\$ 1,377,141	
6	450 Concrete 65D		m \$ 2,775	153	\$ 423,224	
9	525 Concrete 65D		m \$ 2,800	74	\$ 207,813	
10	550 Concrete 65D		m \$ 2,875	0	\$ -	
11	600 Concrete 65D		m \$ 2,875	74	\$ 213,325	
B.	Structure					
1	Manholes	Precast	no. \$ 6,000.00	13	\$ 78,000	
Sanitary Management						
A.	Pipe					
1	200 PVC DR35		m \$ 1,200		\$ -	
2	250 PVC DR35		m \$ 1,200	980	\$ 1,176,000	
B.	Structure					
1	Manholes	Precast	no. \$ 6,000	6	\$ 36,000	
Services						
1	House		ea \$ 10,000	81	\$ 810,000.00	
10	ENVIRONMENTAL PROTECTION		LS \$ 120,000	1	\$ 120,000	
	.1 Silt Fencing		m \$ -	0	Included	
	.2 Ditch Dykes		Ea \$ -	0	Included	
	.3 Settling Ponds		Ea \$ -	0	Included	
	.4 Ground Cover		m ² \$ -	0	Included	
	.5 Debris Boom		m \$ -	0	Included	
	.6 Silt Curtain		m \$ -	0	Included	
	.7 USE AS NEEDED		Ea \$ -	0	\$ -	
12	DESIGN DEVELOPMENT CONTINGENCY ALLOWANCE - Note 1			40%		\$ 2,120,000
13	OPINION of PROBABLE COSTS w/o CONSTRUCTION CONTINGENCY					\$ 7,420,000
14	CONSTRUCTION CONTINGENCY - Note 1			10%		\$ 742,000
15	LOCATION FACTOR - Note 2			0%		Included
16	ESCALATION (Based on 2025 Dollars) - Note 3			0%		Not Included
17	OPINION of PROBABLE CONSTRUCTION COSTS c/w CONTINGENCY Less HST					\$ 8,200,000

THIS OPINION OF PROBABLE COSTS IS PRESENTED ON THE BASIS OF EXPERIENCE, QUALIFICATIONS, AND BEST JUDGEMENT. IT HAS BEEN PREPARED IN ACCORDANCE WITH ACCEPTABLE PRINCIPLES AND PRACTICES. MARKET TRENDS, NON-COMPETITIVE BIDDING SITUATIONS, UNFORSEEN LABOUR AND MATERIAL ADJUSTMENTS AND THE LIKE ARE BEYOND THE CONTROL OF CBCL LIMITED. AS SUCH WE CANNOT WARRANT OR GUARANTEE THAT ACTUAL COSTS WILL NOT VARY FROM THE OPINION PROVIDED.

Note 1	This Design Developmnt Allowance is to account for uncertainty in construction cost due to undefined design scope.
Note 2	The Construction Contingency is to factor in potential post tender Change Orders.
Note 3	This Location Factor is for variances between construction costs at the location of the project & historical costs data.
Note 4	This Escalation / Inflation Allowance is for increases in construction costs from the time of budget development to Tender Call.

Opinion of Probable Construction Costs
STM & SAN Management Plan Town of Windsor



(Based on CBCL Stormwater Report Plan - dated 05-06-2025)

AREA 10 - Water Street and King Street

Date:	01/08/25
Project No.	221101.00
Prepared & Reviewed by:	EJ / AT / AB
Budget Class	Class C

SCHEDULE OF QUANTITIES AND UNIT PRICES

Item	Description	Depth	Unit Price	Qty	TOTALS	AREA TOTALS
1	MOBILIZATION, BONDS, INSURANCE, PCM	LS	10%	10%	\$ 700,000	\$ 700,000
2	DEMOLITIONS & DISPOSAL ALLOWANCE	LS	\$ 100,000	1	\$ 100,000	\$ 100,000
Stormwater Management						
3	AREA 10 WATER STREET AND KING STREET					
10.1	Shallow (1.0m to 2.0m)					
A.	Pipe					\$ 3,300,000
1	250 PVC DR35	m	\$ 2,650	0	\$ -	
2	300 PVC DR35	m	\$ 2,650	280	\$ 743,071	
9	525 Concrete 65D	m	\$ 2,800	69	\$ 193,575	
14	825 Concrete 65D	m	\$ 3,000	88	\$ 264,417	
15	1000 Concrete 65D	m	\$ 3,100	94	\$ 291,784	
16	1050 Concrete 65D	m	\$ 3,100	0	\$ -	
17	1200 Concrete 65D	m	\$ 3,500	62	\$ 216,629	
B.	Structure					
1	Manholes Precast		\$ 6,000.00	8	\$ 48,000	
2	U.G. Tank Cast-in Place			0	\$ -	
3	Headwall Outfall 1.20 dia. Pipe Outfall		\$ 10,000.00	1	\$ 10,000	
Sanitary Management						
A.	Pipe					
1	200 PVC DR35	m	\$ 1,200		\$ -	
2	250 PVC DR35	m	\$ 1,200	895	\$ 1,074,000	
B.	Structure					
1	Manholes Precast	no.	\$ 6,000	12	\$ 72,000	
Services						
1	House	ea	\$ 10,000	17	\$ 170,000.00	
10	ENVIRONMENTAL PROTECTION	LS	\$ 120,000	1	\$ 120,000	
	.1 Silt Fencing	m	\$ -	0	Included	
	.2 Ditch Dykes	Ea	\$ -	0	Included	
	.3 Settling Ponds	Ea	\$ -	0	Included	
	.4 Ground Cover	m ²	\$ -	0	Included	
	.5 Debris Boom	m	\$ -	0	Included	
	.6 Silt Curtain	m	\$ -	0	Included	
	.7 USE AS NEEDED	Ea	\$ -	0	\$ -	
12	DESIGN DEVELOPMENT CONTINGENCY ALLOWANCE - Note 1			40%		\$ 1,640,000
13	OPINION of PROBABLE COSTS w/o CONSTRUCTION CONTINGENCY					\$ 5,740,000
14	CONSTRUCTION CONTINGENCY - Note 1			10%		\$ 574,000
15	LOCATION FACTOR - Note 2			0%		Included
16	ESCALATION (Based on 2025 Dollars) - Note 3			0%		Not Included
17	OPINION of PROBABLE CONSTRUCTION COSTS c/w CONTINGENCY Less HST					\$ 6,400,000

THIS OPINION OF PROBABLE COSTS IS PRESENTED ON THE BASIS OF EXPERIENCE, QUALIFICATIONS, AND BEST JUDGEMENT. IT HAS BEEN PREPARED IN ACCORDANCE WITH ACCEPTABLE PRINCIPLES AND PRACTICES. MARKET TRENDS, NON-COMPETITIVE BIDDING SITUATIONS, UNFORSEEN LABOUR AND MATERIAL ADJUSTMENTS AND THE LIKE ARE BEYOND THE CONTROL OF CBCL LIMITED. AS SUCH WE CANNOT WARRANT OR GUARANTEE THAT ACTUAL COSTS WILL NOT VARY FROM THE OPINION PROVIDED.

Note 1	This Design Developmnt Allowance is to account for uncertainty in construction cost due to undefined design scope.
Note 2	The Construction Contingency is to factor in potential post tender Change Orders.
Note 3	This Location Factor is for variances between construction costs at the location of the project & historical costs data.
Note 4	This Escalation / Inflation Allowance is for increases in construction costs from the time of budget development to Tender Call.



OPINION of PROBABLE CONSTRUCTION COSTS

Town of Windsor

AREA 11 - Aboiteau Pump Station

(Based on CBCL Submission dated July 15, 2025)

DATE:	01/08/25
CBCL FILE No.:	221101.00
PREPARED BY:	PG/AT
EST. DESCRIPTION:	Class C

No.	DESCRIPTION	UNIT	EST. QTY.	UNIT COST	TOTAL
CIVIL					
1	Civil Site Work	LS	1	\$ 3,100,000	\$ 3,100,000
MECHANICAL					
8	Process Equipment and Mechanical	LS	1	\$ 3,800,000	\$ 3,800,000
ELECTRICAL					
10	Electrical & Instrumentation	LS	1	\$ 2,000,000	\$ 2,000,000
11	Generator System	LS	1	\$ 1,700,000	\$ 1,700,000
CONTINGENCIES & ALLOWANCE					
12	Design Development & Construction Contingency			40%	\$ 4,200,000
13	Inflation Adjustment to 2029 ALLOWANCE			15%	\$ 2,300,000
TOTAL OPINION OF PROBABLE CONSTRUCTION COSTS (Including contingencies allowance)					\$ 17,100,000
ENGINEERING					
14	Engineering Allowance			10%	\$ 1,710,000
TOTAL OPINION of PROBABLE CONSTRUCTION & ENGINEERING COSTS					\$18,810,000
				Taxes (Net HST)	15%
					\$ 2,830,000
TOTAL OPINION of PROBABLE PROJECT COSTS c/w HST					\$ 21,640,000

THIS OPINION OF PROBABLE COSTS IS PRESENTED ON THE BASIS OF EXPERIENCE, QUALIFICATIONS, AND BEST JUDGEMENT. IT HAS BEEN PREPARED IN ACCORDANCE WITH ACCEPTABLE PRINCIPLES AND PRACTICES. MARKET TRENDS, NON-COMPETITIVE BIDDING SITUATIONS, UNFORESEEN LABOUR AND MATERIAL ADJUSTMENTS AND THE LIKE ARE BEYOND THE CONTROL OF CBCL LIMITED. AS SUCH WE CANNOT WARRANT OR GUARANTEE THAT ACTUAL COSTS WILL NOT VARY FROM THE OPINION PROVIDED.

Budget Definitions

A Class "C" Budget is based on a full description of the preferred option, construction/design experience and market conditions. This estimate should be sufficient for making correct investment decisions and obtaining preliminary project approval. Design development is typically in the order of 25% complete.

**Opinion of Probable Construction Costs
STM & SAN Management Plan Town of Windsor**



(Based on CBCL Stormwater Report Plan - dated 05-06-2025)

Date:	01/08/25
Project No.	221101.00
Prepared & Reviewed by:	EJ / AT / AB
Budget Class	Class C

Cunnabel Creek - Upgrades

SCHEDULE OF QUANTITIES AND UNIT PRICES

<u>Item</u>	<u>Description</u>	<u>Depth</u>	<u>Unit Price</u>	<u>Qty</u>	<u>TOTALS</u>	<u>AREA TOTALS</u>
Stormwater Management						\$ 6,650,000
A	Pipe					
	1 450mm storm sewer	m	\$ 10,000	665	\$ 6,650,000	
DESIGN DEVELOPMENT CONTINGENCY ALLOWANCE - Note 1						40% \$ 2,660,000
OPINION of PROBABLE COSTS w/o CONSTRUCTION CONTINGENCY						\$ 9,310,000
CONSTRUCTION CONTINGENCY - Note 1						10% \$ 931,000
LOCATION FACTOR - Note 2						0% <i>Included</i>
ESCALATION (Based on 2025 Dollars) - Note 3						0% <i>Not Included</i>
OPINION of PROBABLE CONSTRUCTION COSTS c/w CONTINGENCY Less HST						\$ 10,241,000



Solutions today | Tomorrow **IN** mind

   
www.CBCL.ca