

2024 Annual Performance Report – Wastewater (CLI-ECA 076-W601)

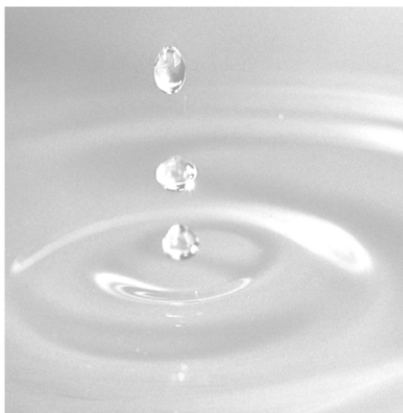
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Project No. 2407034



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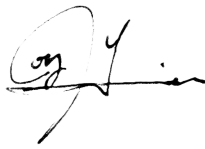
Certification

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1. Introduction

The following summarizes the performance of the City of Welland’s Sewage Collection System from January 1 to December 31, 2024, in accordance with Consolidated Linear Infrastructure Environmental Compliance Approval (CLI-ECA) #076-W601, Schedule E, Section 4.6. The CLI-ECA was issued August 1, 2023 by the Ministry of the Environment, Conservation and Parks (MECP). This annual report will be available to the public by request and will be posted on the City’s website by June 1, 2025.

1.1. Wastewater System Description

The City of Welland (City) owns and operates the Welland Municipal Sewage Collection System, including roughly 240km of sewer mains (see **Table 1-1** below) and two small sewage pump stations (on Fitch St and on Prince Charles Drive). The system collects wastewater flows from customers and conveys it to transmission infrastructure (i.e., trunk sewers and five sewage pumping stations) owned and operated by the Niagara Region. The transmission system directs flow to the Region’s Welland Wastewater Treatment Plant (WWTP), which also receives flows from the Town of Pelham and the southern part of City of Thorold.











The City was originally serviced by a combined sewer system that conveyed sanitary and storm flows to the Welland River. In the 1960s, a combined trunk sewer system was built adjacent to the river to intercept dry weather flow and convey it to the Welland WWTP. Overflow structures were constructed at strategic locations to relieve the system and limit the potential for basement flooding. Since that time, the City has separated most of its sewers, creating both sanitary and storm systems. There are still some remaining combined sewers, however, they comprise a small fraction of the system as summarized in **Table 1-1** and illustrated in **Figure 1-1**. The system is considered ‘partially separated’ as many private foundation drains and roof drains are still connected to sanitary. These connections greatly increase wet weather flow to the system, contributing to system overflows during significant storm events. The City is making efforts to disconnect these sources of inflow.

Table 1-1: City of Welland Sanitary Sewer System

System Pipe	Length(km)
Sanitary Sewer Gravity Main	238.5
Sanitary Forcemain	1.1
Combined Sewer Gravity Main	2.0
Total	241.6

Note: Length data from Welland GIS 2024

Sanitary System

-  Region Pump Station
-  City Pump Station
-  Welland WWTP
- Welland Sewer Main**
-  Sanitary
-  Combined
-  Region SAN Sewer
-  Region SAN Forcemain
-  Watercourse
-  Assessment Parcel
-  Municipal Boundary

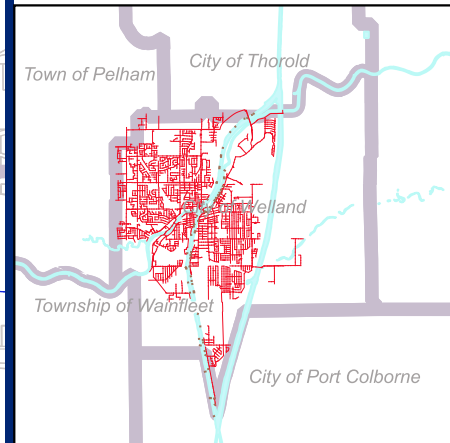
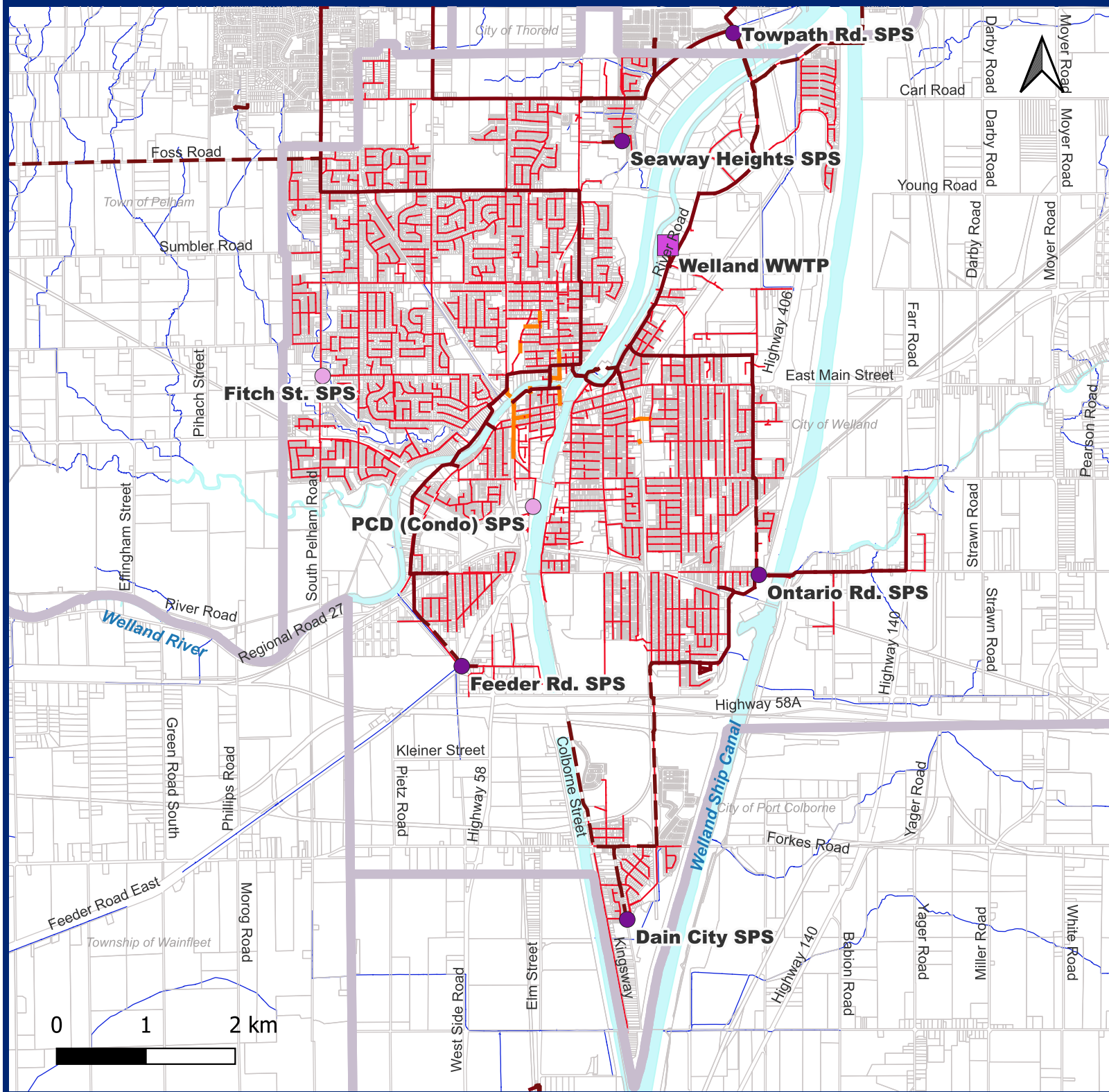


Figure 1-1
**City of Welland
Sanitary Sewer System**

1.2. Combined Overflow Sites

Figure 1-2 illustrates 17 locations where wastewater flow may overflow from the sanitary system to the Welland River to avoid basement flooding during high flow conditions. There are 16 ‘internal’ system overflows from the sanitary to the storm system (denoted by letters); these primarily discharge to the Welland River, with several ultimately flowing to the Welland Canal. Table 1-2 lists the collection system overflow locations, though not all are active. The requirements for reporting combined sewage overflows are outlined in CLI-ECA #076-W601 Schedule E Section 4.2.

Table 1-2: Combined Overflow Sites

Name	Combined Sewer Storage AssetID	Point of Entry to Receiving body of water	Reporting Data
0. River & Downs	436256SO01	Welland River at River Rd and Downs St	Modelled
1. River & McAlpine	436244SO01	Welland River at River Rd south of Almond St	Modelled
2. River & McMaster	436129SO01	Welland River at River Rd and McMaster Ave	N/A
3. River & Evan (Burgar)	436117SO01	Welland River at River Rd and Evan St	N/A
4. Hellems	426195SO01	Welland River at Dorothy St and Court House Ln	Modelled
5. King & Court House Ln	426175SO01	Welland River at Cross St and Court House Ln	Modelled
6. Merritt & Lock (Aqueduct)	426157SO01	Welland River at Merritt St and Lock St	Modelled
7. Shotwell & Riverbank	426136SO01	Welland River at Shotwell St and Riverbank St	Modelled
8. Niagara North	426146SO01	Welland River at Niagara St and Riverbank St	N/A
9. Niagara South	426145SO01	Welland River at Niagara St and Mill St	Modelled
10. Denistoun	426114SO01	Welland River at Denistoun and Highriver Trail	Modelled
11. Prince Charles South	416193SO01	Welland River at Prince Charles Dr N and West Main St	Modelled
12. First Ave East	416186SO01	Welland River at Prince Charles Dr N and Colbeck Dr - NE pipe	Modelled
13. First Ave West	416186SO02	Welland River at Prince Charles Dr N and Colbeck Dr - SW pipe	Modelled





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Name	Combined Sewer Storage AssetID	Point of Entry to Receiving body of water	Reporting Data
14. Prince Charles North	416184SO01	Welland River at Prince Charles Dr N and Colbeck Dr - SW pipe	Modelled
15. Colbeck	416163SO01	Welland River at Colbeck Dr and Riverview Dr	Modelled
16. Maple & Riverside	416170SO01	Welland River at Riverside Dr and Maple Ave	Modelled
A. Major Brownleigh	446109SO01	Welland River south of 477 River Road (River 2400)	Modelled
B. Major White	446119SO01	Welland River south of 477 River Road (River 2400)	Modelled
C. Main Wallace	436195SO01	Welland River south of 477 River Road (River 2400)	Modelled
D. Main Lyons	446116SO01	Welland River south of 477 River Road (River 2400)	Modelled
E. Cameron Main	446116SO02	Welland River south of 477 River Road (River 2400)	Modelled
F. Main Golden	446136SO01	Welland River south of 477 River Road (River 2400)	Modelled
G. Cameron	446113SO01	Welland River south of 477 River Road (River 2400)	Modelled
H. Queen Bald	426122SO01	Welland River at Prince Charles Dr N and West Main St	Modelled
I. Hagar McAlpine	436089SO01	Evelyn Ditch (Hagar 2100)	Monitored
J. Hagar Wallace	436099SO01	Evelyn Ditch (Hagar 2100)	Monitored
K. Hagar Lyons	446019SO02	Evelyn Ditch (Hagar 2100)	Modelled
L. Hagar Camrose	446019SO01	Evelyn Ditch (Hagar 2100)	Monitored
M. Camrose Paul	446027SO01	Evelyn Ditch (Hagar 2100)	Modelled
N. Lincoln Coventry (L2)	436045SO01	Welland River at River Rd and Evan St	Monitored
O. Lincoln Plaza (L3)	436055SO01	Welland River at River Rd and Evan St	Monitored
P. Simpson Coventry (L1)	435949SO01	Evelyn Ditch (Hagar 2100)	Monitored

Sanitary System

-  Region Pump Station
-  City Pump Station
-  Welland WWTP
-  CSO Location

Welland Sewer Main

-  Sanitary
-  Storm
-  Combined
-  Region SAN Sewer
-  Region SAN Forcemain
-  Watercourse
-  Assessment Parcel
-  Municipal Boundary

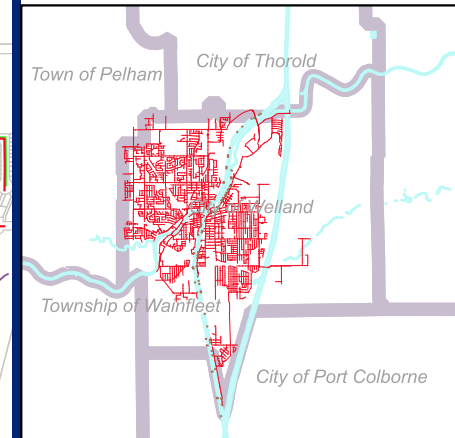
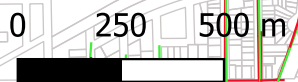
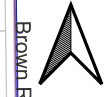
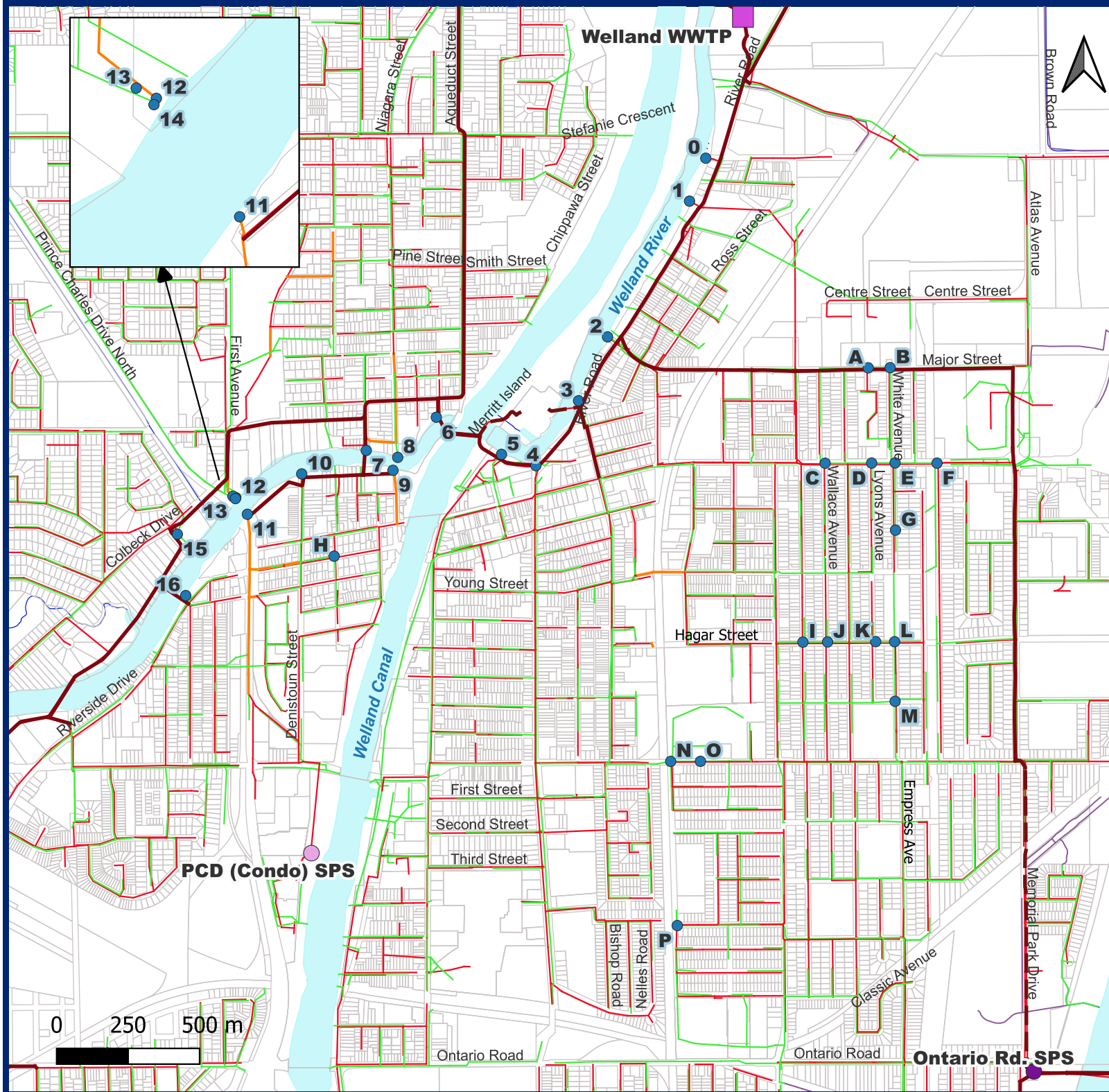


Figure 1-2
City of Welland
Collection System Overflow Sites



1.3. Lincoln-Coventry (“L-site”) Overflows

The City undertook sewer separation in the Ontario Road Sanitary Pump Station (SPS) catchment from the early 2000s to 2017. The “L-Site” overflows, as shown in **Figure 1-2** were plugged as part of the sewer separation works, and includes:

- N. L2 (Located at the intersection of Lincoln St. & Coventry Rd.)
- O. L3 (Located at the intersection of Lincoln St. & Wavell Ct.)
- P. L1 (located at the intersection of Simpson Ave. and Coventry Rd.)

However, high wet weather flows exceeded the newly separated wastewater system capacity after separation. To protect the system against the risk of basement flooding, the “L-site” overflows were reinstated in 2007. The ECA amendment was initially applied in 2007 (#5086-6WKNPW) and subsequently extended in 2011 and 2016 (#1567-8PQKJ3). The most up-to-date CLI-ECA #076-W601, issued August 1, 2023, allows for the temporary operation of the L-site overflows until March 15, 2027. An extension to permit continued operation may be required if the City is not able to implement system improvements that will adequately mitigate basement flooding risks.

1.4. Empress Sewer Diversion/Evelyn Ditch

In 2016, the City obtained approval for the construction of sanitary sewage infrastructure related to diverting the Empress Avenue storm sewer away from the Lyons Creek Holding Reservoir and into the Evelyn Ditch (ECA number #7515-ABCJYS, approved August 10, 2016). The Empress Storm sewer occasionally receives overflows when the sanitary system surcharges.

In Welland, three (3) Hagar area and one (1) Lincoln area overflows contribute sanitary flows to the Empress Avenue storm sewer system (see **Figure 1-2**) as follows:

- I. Hagar & McAlpine (located at the intersection of Hagar St. & McAlpine Ave.)
- J. Hagar & Wallace (located at the intersection of Hagar St. & Wallace Ave.)
- L. Hagar & Camrose (located at the intersection of Hagar St. & Camrose Ave.)
- P. L1 (located at the intersection of Simpson Ave. and Coventry Rd.)

The City’s Engineering Team continues to investigate and monitor this area of the collection system to identify direct storm connections to the sanitary sewer.

2. Previous Action Items

The City has an ongoing commitment to reduce inflow and infiltration (I&I) across the system and is prioritizing its efforts in catchments that are known to have impactful I&I issues. The City’s *2020 Pollution Prevention Control Plan Update and Wastewater Master Servicing Plan* (PPCP, GM BluePlan Engineering Ltd., 2022) recommended a 20-year capital plan to address existing system issues and long-term growth needs and identified the estimated cost and timing of each recommended project.

Table 2-1 lists the priority I&I areas and other recommended activities from the PPCP and identifies work that has been completed for each area. Those areas denoted with an asterisk (*) were identified as areas that require further flow monitoring data collection to confirm the extent and severity of peak wet weather flows.

Table 2-1: Identified Priority Areas for I&I Reduction

No.	Area	Recommended Actions	Action Status
1	Broadway	<ul style="list-style-type: none"> Deepen Broadway trunk and upgrade to 600 mm. 	<ul style="list-style-type: none"> Complete.
		<ul style="list-style-type: none"> Reconfigure local sewer on Perenack Ave, Marshall Ave, St George St, Santone Ave, Clifford Ave. 	<ul style="list-style-type: none"> Scheduled in 9-year forecast.
		<ul style="list-style-type: none"> Reduce I/I to limit flows to 340 L/s in the Broadway trunk. 	<ul style="list-style-type: none"> I/I investigation study complete. Remediation activities are ongoing.
2	Ontario Rd SPS Catchment	<ul style="list-style-type: none"> Upgrade Ontario Road sewer to 900 mm from Ontario Road SPS to Empress Ave. 	<ul style="list-style-type: none"> Ontario Road Sewer from SPS to King Street is scheduled to be constructed in 2025 & 2026
		<ul style="list-style-type: none"> Upgrade Empress Ave sewer to 600 mm from Ontario Road to Sutherland Ave. 	<ul style="list-style-type: none"> Replaced with Southworth St. Scheduled in the 9-year forecast.
		<ul style="list-style-type: none"> Upgrade Sutherland Ave sewer to 600 mm from Empress Ave to Southworth Ave. 	<ul style="list-style-type: none"> Replaced with Southworth St. Scheduled in the 9-year forecast.
		<ul style="list-style-type: none"> Extend Ontario Road sewer to accommodate the full buildout of the Union Carbide lands. Investigate further options for Region funding or ownership for relevant sections of the proposed trunk sewer. 	<ul style="list-style-type: none"> Ontario Road Sewer from SPS to King Street is scheduled to be constructed in 2025 & 2026.
		<ul style="list-style-type: none"> Reduce I&I in Lincoln-Coventry area and Ontario South to facilitate decommissioning of L-sites and facilitate growth. 	<ul style="list-style-type: none"> I&I Investigation Study Complete. Remediation activities are ongoing.
		---	<ul style="list-style-type: none"> ADDITIONAL NOTE: Commercial Street Master Servicing Plan completed to verify all infrastructure updates in the catchment.

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No.	Area	Recommended Actions	Action Status
3	Dain City	<ul style="list-style-type: none"> Upgrade East Forks sewer to 300 mm from proposed development tie into Crescent Drive. 	<ul style="list-style-type: none"> Project complete (2022).
4	Plymouth Road*	<ul style="list-style-type: none"> Collect additional data to confirm flows. 	<ul style="list-style-type: none"> Additional flow data collected.
		<ul style="list-style-type: none"> Reduce I&I to limit trunk flows to 395 L/s. 	<ul style="list-style-type: none"> I&I investigation study complete. Remediation activities are ongoing.
		<ul style="list-style-type: none"> 370 m of 900 mm inline storage to improve system resiliency to wet weather flows if I&I reduction target is not met. 	<ul style="list-style-type: none"> Not started. Investigation to commence once I&I remediation is complete.
5	Feeder Road SPS Catchment*	<ul style="list-style-type: none"> Collect additional data to confirm flows. 	<ul style="list-style-type: none"> Additional flow data collected.
		<ul style="list-style-type: none"> Reduce I&I by 25% to limit flows to 125L/s. 	<ul style="list-style-type: none"> I&I investigation study complete. Remediation activities are ongoing.
		<ul style="list-style-type: none"> Upgrade Feeder Road SPS Storage to 1,400 m³ if I&I target is not met. 	<ul style="list-style-type: none"> Not started. Investigation to commence once I&I remediation is complete.
6	Prince Charles Drive South*	<ul style="list-style-type: none"> Collect additional data to confirm flows. 	<ul style="list-style-type: none"> Additional flow data collected.
		<ul style="list-style-type: none"> Reduce I&I to limit trunk flows to 120 L/s. 	<ul style="list-style-type: none"> I&I investigation study complete. Remediation activities are ongoing.
		<ul style="list-style-type: none"> 250 m of 375 mm sewers to improve system resiliency to wet weather flows if I&I reduction target is not met. 	<ul style="list-style-type: none"> Not started. Investigation to commence once I&I remediation is complete.
7	Clare Ave and Fitch St SPS*	<ul style="list-style-type: none"> Upgrade Fitch St trunk sewer to mitigate basement flooding in the upstream Clare Ave sewer if I&I target is not met. 	<ul style="list-style-type: none"> Not started. Investigation to commence once I&I remediation is complete.
		<ul style="list-style-type: none"> Complete Clare Ave I&I Program, pre and post monitoring prior to implementing upgrade. 	<ul style="list-style-type: none"> I&I investigation study complete. Remediation activities are ongoing.
		<ul style="list-style-type: none"> Study to decommission the City-owned Fitch St SPS. 	<ul style="list-style-type: none"> Scheduled to commence in 2025
		<ul style="list-style-type: none"> Upgrade 1000 m of existing 375 mm sewers on Clare Ave to 450 mm to improve resiliency to basement flooding. 	<ul style="list-style-type: none"> Depends on results of Fitch St Decommissioning Study.
8	Woodlawn Road*	<ul style="list-style-type: none"> Collect additional data to confirm flows. 	<ul style="list-style-type: none"> Additional flow data collected.
		<ul style="list-style-type: none"> Reduce I&I to limit trunk flows to 395 L/s. 	<ul style="list-style-type: none"> I&I investigation study complete. Remediation activities are ongoing.
		<ul style="list-style-type: none"> 1000 m of 450 mm sewers on Trelawn Parkway to improve system resiliency to wet weather flows if I&I reduction target is not met. 	<ul style="list-style-type: none"> Scheduled in the 9-year forecast.
9		<ul style="list-style-type: none"> Collect additional data to confirm flows. 	<ul style="list-style-type: none"> Not started.

No.	Area	Recommended Actions	Action Status
	Daimler Parkway*	<ul style="list-style-type: none"> Upgrade 500 m of sewer on Daimler Parkway to at least 450 mm to support developments to the east of Hwy 406. 	<ul style="list-style-type: none"> Depends on development timing.
		<ul style="list-style-type: none"> 150 m of new 250 mm sewer crossing Highway 406 to service the southern lands of the Hunter's Pointe development. 	<ul style="list-style-type: none"> Depends on development timing.
		<ul style="list-style-type: none"> Upgrade 340 m of sewer on Oxford Rd to 250 mm to support the Hunter's Pointe development. Confirm servicing to Hunter's Pointe is needed prior to design. This project must precede Daimler Parkway sewer upgrades. 	<ul style="list-style-type: none"> Depends on development timing.
10	Seaway Heights*	<ul style="list-style-type: none"> Collect additional data to confirm flows. 	<ul style="list-style-type: none"> Additional flow data collected.
		<ul style="list-style-type: none"> Reduce I&I to limit flows to the SPS to 130 L/s. 	<ul style="list-style-type: none"> I&I investigation study complete. Remediation activities are ongoing.

Other longer-term projects identified are summarized in **Table 2-2**.

Table 2-2: Further Recommended Strategies for Implementation

No.	Recommended Actions	Action Status
11	<ul style="list-style-type: none"> Complete Chippawa Park sewer separation. 	<ul style="list-style-type: none"> Not started.
12	<ul style="list-style-type: none"> City-wide I&I Program to manage I&I outside of priority areas. 	<ul style="list-style-type: none"> Additional flow data collected for Major Street Area outside of priority area. I&I investigation will be started once priority I&I remediation complete.
13	<ul style="list-style-type: none"> Conduct study on Welland River inflows through CSO structures. 	<ul style="list-style-type: none"> Not started.
14	<ul style="list-style-type: none"> Continue objective-oriented flow monitoring strategies and programs through the City-wide flow monitoring program. 	<ul style="list-style-type: none"> Annual flow monitoring program to focus on priority areas.
15	<ul style="list-style-type: none"> Develop and enforce policy for new subdivision flow monitoring and acceptance criteria, with support from the Region. 	<ul style="list-style-type: none"> Plan will be developed once MECP monitoring guidelines are published.
16	<ul style="list-style-type: none"> Optimize inspection programs to maintain assets in a state of good repair including: <ul style="list-style-type: none"> CCTV of sewers Manholes & laterals in priority areas first Forcemain inspection and testing Pump station drawdown performance testing 	<ul style="list-style-type: none"> CCTV of Sewers optimization complete Manholes and laterals optimization complete. Focus on structures in priority areas identified in I&I studies. Not started. Not started.
17	<ul style="list-style-type: none"> Hire additional staff positions to support existing needs, growth, and level of service goals. 	<ul style="list-style-type: none"> Positions are being created as required; pending budget approval.

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No.	Recommended Actions	Action Status
18	<ul style="list-style-type: none">Continue long-term annual investments in system rehabilitation and replacement based on the City's Asset Management Plan, managing and prioritizing work based on the capital plan and priority areas.	<ul style="list-style-type: none">Asset Management Plan is reviewed and revised as required; capital budget and forecast are based on AMP needs as well as operational needs, results of studies, etc.
19	<ul style="list-style-type: none">CSO Inspection and Maintenance	<ul style="list-style-type: none">Structures inspected as needed. Future SOP to be developed in wastewater O&M manual.
20	<ul style="list-style-type: none">Sewer separation – King St, private storm connections should be removed	<ul style="list-style-type: none">Not started. Exact project scope to be determined.
21	<ul style="list-style-type: none">Sewer Separation - Niagara/Shotwell/Fell	<ul style="list-style-type: none">Mostly complete. Small section of sewer to be separated.
22	<ul style="list-style-type: none">Sewer Separation - PCD South	<ul style="list-style-type: none">Project cannot start until West Main Regional Trunk is complete.
23	<ul style="list-style-type: none">Sewer Separation - Niagara South	<ul style="list-style-type: none">Scheduled to be completed with regional bridge construction on Niagara Street (2027).
24	<ul style="list-style-type: none">Downspout Inspection Program for direct connections to sanitary system	<ul style="list-style-type: none">Ongoing through Sewage Water Alleviation Program (SWAP).

3. System Monitoring & Overflows

3.1. Methodology

The total CSO volume is reported for all monitored overflows and estimated for unmonitored overflows using the City’s existing wastewater hydraulic model, which allows for a dynamic wet weather RTK simulation of the system. Overflow events are summarized daily based on a 24hr overflow duration and a 12-hr overflow inter-event time. The system flows and overflows for 2024 were modelled using the following data:

- Available precipitation records at Region Rain Gauges;
- Available Welland River levels as provided by Niagara Peninsula Conservation Authority. This data allows for the modelling of CSO discharge from CSO outfalls that may be surcharged due to submersion.

For further detail on the dynamic wet weather RTK model development and assumptions, please refer to the *Welland Wastewater Model Update Report (GM BluePlan Ltd., 2017)* document and the *Welland 2020 Pollution Prevention Control Plan (PPCP) (GM BluePlan Ltd., 2020)*. The model was most recently updated in 2022 by GEI Canada Ltd. (formerly GM BluePlan) using City’s 2020-2021 flow monitoring program.

The monitored and modelled overflow volumes were used to estimate pollutant loadings utilizing a typical concentration methodology. Typical concentrations were reviewed using 100 water quality samples provided by the City from the City Sampling Program in 2000, and samples taken from 30 locations throughout the sanitary/combined system from 2019 to 2024. Samples that were taken at ditches and outfalls where sanitary flows are combined and diluted with stormwater were excluded, resulting in 30 remaining samples taken at CSO points. To provide a representative typical concentration of CSO water quality parameters, the geometric means of the total suspended solids (TSS), biological oxygen demand (BOD), total phosphorus (TP), total Kjeldahl nitrogen (TKN), and *E.Coli* concentrations were calculated; these are summarized in **Table 3-1**.

Table 3-1: Typical Concentrations of Water Quality Parameters

TSS (mg/L)	BOD (mg/L)	TP (mg/L)	TKN (mg/L)	<i>E.Coli</i> (cfu/100ml)
80.3	14.3	0.64	80.3	68,319

Using the above methodology, the modelled and monitored CSO volumes and pollutant loading estimations are summarized in **Table 3-2**.

Table 3-2: 2024 Modelled and Monitored Overflows and Spills

Overflow Name	Modelled/ Monitored	Combined Sewer Storage AssetID	Overflow Dates (yyyy-mm- dd)	Duration (hrs)	Volume (m ³)	Mean Mass Loading (kg)				Mean Mass Loading (CFU)
						TSS	BOD	TP	TKN	E.Coli
0. River & Downs	Modelled	436256SO01	2024-07-10	2.0	3.9	0.3	0.1	<0.1	<0.1	2.63 x10 ⁹
1. River & McAlpine	Modelled	436244SO01	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2. River & McMaster	N/A	436129SO01	-	-	-	-	-	-	-	-
3. River & Evan (Burgar)	N/A	436117SO01	-	-	-	-	-	-	-	-
4. Hellems	Modelled	426195SO01	2024-01-09	10.0	14,524.6	1166.3	208.0	9.3	60.8	9.92 x10 ¹²
4. Hellems	Modelled	426195SO01	2024-01-26	5.0	7,220.8	579.8	103.4	4.6	30.2	4.93 x10 ¹²
4. Hellems	Modelled	426195SO01	2024-04-03	9.0	15,874.6	1274.7	227.3	10.2	66.4	1.08 x10 ¹³
4. Hellems	Modelled	426195SO01	2024-04-11	4.0	1,608.1	129.1	23.0	1.0	6.7	1.10 x10 ¹²
4. Hellems	Modelled	426195SO01	2024-04-12	7.0	10,261.2	823.9	146.9	6.6	42.9	7.01 x10 ¹²
4. Hellems	Modelled	426195SO01	2024-05-27	2.0	391.2	31.4	5.6	0.3	1.6	2.67 x10 ¹¹
4. Hellems	Modelled	426195SO01	2024-06-29	4.0	3,472.1	278.8	49.7	2.2	14.5	2.37 x10 ¹²
4. Hellems	Modelled	426195SO01	2024-07-10	12.0	34,714.3	2787.5	497.0	22.3	145.3	2.37 x10 ¹³
5. King & Court House Ln	Modelled	426175SO01	2024-01-09	4.0	279.2	22.4	4.0	0.2	1.2	1.91 x10 ¹¹
5. King & Court House Ln	Modelled	426175SO01	2024-01-26	1.0	1.2	0.1	<0.1	<0.1	<0.1	8.36 x10 ⁰⁸
5. King & Court House Ln	Modelled	426175SO01	2024-04-03	3.0	287.3	23.1	4.1	0.2	1.2	1.96 x10 ¹¹
5. King & Court House Ln	Modelled	426175SO01	2024-04-12	3.0	211.2	17.0	3.0	0.1	0.9	1.44 x10 ¹¹
5. King & Court House Ln	Modelled	426175SO01	2024-07-10	9.0	2,710.3	217.6	38.8	1.7	11.3	1.85 x10 ¹²
6. Merritt & Lock (Aqueduct)	Modelled	426157SO01	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7. Shotwell & Riverbank	Modelled	426136SO01	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8. Niagara North	N/A	426146SO01	-	-	-	-	-	-	-	-
9. Niagara South	Modelled	426145SO01	2024-01-09	10.0	1,434.6	115.2	20.5	0.9	6.0	9.80 x10 ¹¹
9. Niagara South	Modelled	426145SO01	2024-01-26	6.0	603.0	48.4	8.6	0.4	2.5	4.12 x10 ¹¹
9. Niagara South	Modelled	426145SO01	2024-04-03	11.0	1,610.4	129.3	23.1	1.0	6.7	1.10 x10 ¹²
9. Niagara South	Modelled	426145SO01	2024-04-11	4.0	327.1	26.3	4.7	0.2	1.4	2.23 x10 ¹¹
9. Niagara South	Modelled	426145SO01	2024-04-12	9.0	992.0	79.7	14.2	0.6	4.2	6.78 x10 ¹¹

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Overflow Name	Modelled/ Monitored	Combined Sewer Storage AssetID	Overflow Dates (yyyy-mm- dd)	Duration (hrs)	Volume (m ³)	Mean Mass Loading (kg)				Mean Mass Loading (CFU)
						TSS	BOD	TP	TKN	E.Coli
9. Niagara South	Modelled	426145SO01	2024-05-27	3.0	133.0	10.7	1.9	0.1	0.6	9.09 x10 ¹⁰
9. Niagara South	Modelled	426145SO01	2024-06-29	4.0	442.9	35.6	6.3	0.3	1.9	3.03 x10 ¹¹
9. Niagara South	Modelled	426145SO01	2024-07-10	14.0	2,734.7	219.6	39.2	1.8	11.4	1.87 x10 ¹²
10. Denistoun	Modelled	426114SO01	2024-01-09	11.0	2,404.4	193.1	34.4	1.5	10.1	1.64 x10 ¹²
10. Denistoun	Modelled	426114SO01	2024-01-26	6.0	1,003.3	80.6	14.4	0.6	4.2	6.85 x10 ¹¹
10. Denistoun	Modelled	426114SO01	2024-04-03	11.0	2,552.8	205.0	36.5	1.6	10.7	1.74 x10 ¹²
10. Denistoun	Modelled	426114SO01	2024-04-11	4.0	536.7	43.1	7.7	0.3	2.2	3.67 x10 ¹¹
10. Denistoun	Modelled	426114SO01	2024-04-12	10.0	1,606.1	129.0	23.0	1.0	6.7	1.10 x10 ¹²
10. Denistoun	Modelled	426114SO01	2024-05-27	3.0	217.7	17.5	3.1	0.1	0.9	1.49 x10 ¹¹
10. Denistoun	Modelled	426114SO01	2024-06-29	5.0	769.6	61.8	11.0	0.5	3.2	5.26 x10 ¹¹
10. Denistoun	Modelled	426114SO01	2024-07-10	14.0	4,306.9	345.8	61.7	2.8	18.0	2.94 x10 ¹²
11. Prince Charles South	Modelled	416193SO01	2024-01-09	9.0	1,674.4	134.5	24.0	1.1	7.0	1.14 x10 ¹²
11. Prince Charles South	Modelled	416193SO01	2024-01-26	127.0	807.9	64.9	11.6	0.5	3.4	5.52 x10 ¹¹
11. Prince Charles South	Modelled	416193SO01	2024-04-03	12.0	2,132.7	171.3	30.5	1.4	8.9	1.46 x10 ¹²
11. Prince Charles South	Modelled	416193SO01	2024-04-11	4.0	351.0	28.2	5.0	0.2	1.5	2.40 x10 ¹¹
11. Prince Charles South	Modelled	416193SO01	2024-04-12	89.0	1,261.9	101.3	18.1	0.8	5.3	8.62 x10 ¹¹
11. Prince Charles South	Modelled	416193SO01	2024-05-27	2.0	131.0	10.5	1.9	0.1	0.5	8.95 x10 ¹⁰
11. Prince Charles South	Modelled	416193SO01	2024-06-29	4.0	517.6	41.6	7.4	0.3	2.2	3.54 x10 ¹¹
11. Prince Charles South	Modelled	416193SO01	2024-07-10	13.0	3,483.6	279.7	49.9	2.2	14.6	2.38 x10 ¹²
12. First Ave East	Modelled	416186SO01	2024-07-10	6.0	4.9	0.4	0.1	<0.1	<0.1	3.37 x10 ⁹
13. First Ave West	Modelled	416186SO02	2024-01-09	5.0	2,808.9	225.5	40.2	1.8	11.8	1.92 x10 ¹²
13. First Ave West	Modelled	416186SO02	2024-01-26	4.0	725.4	58.2	10.4	0.5	3.0	4.96 x10 ¹¹
13. First Ave West	Modelled	416186SO02	2024-04-03	8.0	3,790.2	304.3	54.3	2.4	15.9	2.59 x10 ¹²
13. First Ave West	Modelled	416186SO02	2024-04-12	4.0	3,171.4	254.7	45.4	2.0	13.3	2.17 x10 ¹²
13. First Ave West	Modelled	416186SO02	2024-06-29	1.0	148.3	11.9	2.1	0.1	0.6	1.01 x10 ¹¹
13. First Ave West	Modelled	416186SO02	2024-07-10	11.0	11,229.5	901.7	160.8	7.2	47.0	7.67 x10 ¹²
14. Prince Charles North	Modelled	416184SO01	2024-07-10	6.0	511.0	41.0	7.3	0.3	2.1	3.49 x10 ¹¹
15. Colbeck	Modelled	416163SO01	2024-01-09	5.0	4,668.9	374.9	66.8	3.0	19.5	3.19 x10 ¹²

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Overflow Name	Modelled/ Monitored	Combined Sewer Storage AssetID	Overflow Dates (yyyy-mm- dd)	Duration (hrs)	Volume (m ³)	Mean Mass Loading (kg)				Mean Mass Loading (CFU)
						TSS	BOD	TP	TKN	E.Coli
15. Colbeck	Modelled	416163SO01	2024-01-26	4.0	1,058.0	85.0	15.1	0.7	4.4	7.23 x10 ¹¹
15. Colbeck	Modelled	416163SO01	2024-04-03	8.0	5,591.3	449.0	80.1	3.6	23.4	3.82 x10 ¹²
15. Colbeck	Modelled	416163SO01	2024-04-12	5.0	4,184.3	336.0	59.9	2.7	17.5	2.86 x10 ¹²
15. Colbeck	Modelled	416163SO01	2024-06-29	1.0	250.9	20.1	3.6	0.2	1.0	1.71 x10 ¹¹
15. Colbeck	Modelled	416163SO01	2024-07-10	11.0	16,442.1	1320.3	235.4	10.6	68.8	1.12 x10 ¹³
16. Maple & Riverside	Modelled	416170SO01	2024-01-09	1.0	11.1	0.9	0.2	<0.1	<0.1	7.55 x10 ⁰⁹
16. Maple & Riverside	Modelled	416170SO01	2024-04-03	2.0	136.8	11.0	2.0	0.1	0.6	9.34 x10 ¹⁰
16. Maple & Riverside	Modelled	416170SO01	2024-04-12	1.0	9.0	0.7	0.1	<0.1	<0.1	6.17 x10 ⁹
16. Maple & Riverside	Modelled	416170SO01	2024-07-10	8.0	1,577.1	126.6	22.6	1.0	6.6	1.08 x10 ¹²
A. Major Brownleigh	Modelled	446109SO01	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B. Major White	Modelled	446119SO01	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C. Main Wallace	Modelled	436195SO01	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D. Main Lyons	Modelled	446116SO01	2024-07-10	1.0	262.4	21.1	3.8	0.2	1.1	1.79 x10 ¹¹
E. Cameron Main	N/A	446116SO02	-	-	-	-	-	-	-	-
F. Main Golden	Modelled	446136SO01	2024-07-10	6.0	471.4	37.9	6.7	0.3	2.0	3.22 x10 ¹¹
F. Main Golden	Modelled	446136SO01	2024-09-25	1.0	1.0	0.1	<0.1	<0.1	<0.1	6.89 x10 ⁸
G. Cameron	N/A	446113SO01	-	-	-	-	-	-	-	-
H. Queen Bald	Modelled	426122SO01	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I. Hagar McAlpine	Monitored	436089SO01	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
J. Hagar Wallace	Monitored	436099SO01	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
K. Hagar Lyons	Modelled	446019SO02	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
L. Hagar Camrose	Monitored	446019SO01	2024-01-21	1.0	0.0	<0.1	<0.1	<0.1	<0.1	2.87 x10 ⁷
L. Hagar Camrose	Monitored	446019SO01	2024-01-22	1.0	0.0	<0.1	<0.1	<0.1	<0.1	2.87 x10 ⁷
L. Hagar Camrose	Monitored	446019SO01	2024-01-23	22.7	0.5	<0.1	<0.1	<0.1	<0.1	3.46 x10 ⁸
L. Hagar Camrose	Monitored	446019SO01	2024-01-26	6.3	101.6	8.2	1.5	0.1	0.4	6.94 x10 ¹⁰
L. Hagar Camrose	Monitored	446019SO01	2024-02-27	1.0	0.0	<0.1	<0.1	<0.1	<0.1	2.87 x10 ⁷
L. Hagar Camrose	Monitored	446019SO01	2024-03-06	1.2	0.6	0.1	<0.1	<0.1	<0.1	4.35 x10 ⁸
L. Hagar Camrose	Monitored	446019SO01	2024-06-20	1.0	1.5	0.1	<0.1	<0.1	<0.1	1.02 x10 ⁹

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Overflow Name	Modelled/ Monitored	Combined Sewer Storage AssetID	Overflow Dates (yyyy-mm- dd)	Duration (hrs)	Volume (m ³)	Mean Mass Loading (kg)				Mean Mass Loading (CFU)
						TSS	BOD	TP	TKN	E.Coli
L. Hagar Camrose	Monitored	446019SO01	2024-07-10	1.7	34.2	2.7	0.5	<0.1	0.1	2.34 x10 ¹⁰
M. Camrose Paul	Modelled	446027SO01	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N. Lincoln Coventry (L2)	Monitored	436045SO01	2024-01-26	4.0	199.8	16.0	2.9	0.1	0.8	1.36 x10 ¹¹
N. Lincoln Coventry (L2)	Monitored	436045SO01	2024-04-12	1.3	13.4	1.1	0.2	<0.1	0.1	9.14 x10 ⁹
N. Lincoln Coventry (L2)	Monitored	436045SO01	2024-06-20	1.6	44.6	3.6	0.6	<0.1	0.2	3.05 x10 ¹⁰
N. Lincoln Coventry (L2)	Monitored	436045SO01	2024-07-10	2.0	104.5	8.4	1.5	0.1	0.4	7.14 x10 ¹⁰
N. Lincoln Coventry (L2)	Monitored	436045SO01	2024-12-22	1.0	0.0	<0.1	<0.1	<0.1	<0.1	4.10 x10 ⁶
N. Lincoln Coventry (L2)	Monitored	436045SO01	2024-12-25	1.0	0.0	<0.1	<0.1	<0.1	<0.1	4.10 x10 ⁶
O. Lincoln Plaza (L3)	Monitored	436055SO01	2024-01-09	2.7	45.7	3.7	0.7	<0.1	0.2	3.12 x10 ¹⁰
O. Lincoln Plaza (L3)	Monitored	436055SO01	2024-01-26	2.5	112.2	9.0	1.6	0.1	0.5	7.67 x10 ¹⁰
O. Lincoln Plaza (L3)	Monitored	436055SO01	2024-04-03	1.3	1.1	0.1	<0.1	<0.1	<0.1	7.26 x10 ⁸
O. Lincoln Plaza (L3)	Monitored	436055SO01	2024-04-12	3.1	494.9	39.7	7.1	0.3	2.1	3.38 x10 ¹¹
O. Lincoln Plaza (L3)	Monitored	436055SO01	2024-06-20	2.4	166.9	13.4	2.4	0.1	0.7	1.14 x10 ¹¹
O. Lincoln Plaza (L3)	Monitored	436055SO01	2024-07-10	7.4	682.7	54.8	9.8	0.4	2.9	4.66 x10 ¹¹
P. Simpson Coventry (L1)	Monitored	435949SO01	2024-01-09	5.0	197.9	15.9	2.8	0.1	0.8	1.35 x10 ¹¹
P. Simpson Coventry (L1)	Monitored	435949SO01	2024-01-26	8.4	816.3	65.5	11.7	0.5	3.4	5.58 x10 ¹¹
P. Simpson Coventry (L1)	Monitored	435949SO01	2024-04-03	3.3	27.1	2.2	0.4	<0.1	0.1	1.85 x10 ¹⁰
P. Simpson Coventry (L1)	Monitored	435949SO01	2024-04-12	6.4	433.6	34.8	6.2	0.3	1.8	2.96 x10 ¹¹
P. Simpson Coventry (L1)	Monitored	435949SO01	2024-06-20	3.7	459.9	36.9	6.6	0.3	1.9	3.14 x10 ¹¹
P. Simpson Coventry (L1)	Monitored	435949SO01	2024-06-29	2.0	0.6	0.1	<0.1	<0.1	<0.1	4.30 x10 ⁸
P. Simpson Coventry (L1)	Monitored	435949SO01	2024-07-10	8.9	909.2	73.0	13.0	0.6	3.8	6.21 x10 ¹¹
Total					185,498	14,895	2,656	119	776	3.32 x10¹²

3.2. Summary of Spill/Overflow Events

The system overflow volume totaled 185,498 m³ in 2024, over 21 events across the entire year:

- January 9, 2024
- January 21, 2024
- January 22, 2024
- January 23, 2024
- January 26, 2024
- February 27, 2024
- March 6, 2024
- April 3, 2024
- April 11, 2024
- April 12, 2024
- May 5, 2024
- May 27, 2024
- June 20, 2024
- June 21, 2024
- June 29, 2024
- July 10, 2024
- July 15, 2024
- September 25, 2024
- October 15, 2024
- December 22, 2024
- December 25, 2024

The greatest overflow volumes occurred in January (40,700 m³), April (57,470 m³), and July (105,010 m³). The high winter/spring overflows can be attributed to rain on snow events while the summer overflows are the result of seasonal rainfall events. This is consistent with the findings in previous years as noted in the *2024 Assessment of conformance to Procedure F-5-5* document (GEI Canada Ltd., 2025). The overflow at Hellems was estimated to have the greatest discharge volume with a total of 88,067 m³ in 2024.

Of the active overflows, the following did not overflow under the 2024 rainfall events:

- 1. River & McAlpine
- 6. Merritt & Lock (Aqueduct)
- 7. Shotwell & Riverbank
- 12. First Ave East
- A. Major Brownleigh
- B. Major White
- C. Main Wallace
- E. Cameron Main
- G. Cameron
- H. Queen Bald
- I. Hagar McAlpine
- J. Hagar Wallace
- K. Hagar Lyons
- M. Camrose Paul

3.3. Spill and Overflow Reduction

The City's *2020 Pollution Prevention Control Plan Update and Wastewater Master Servicing Plan* (GM BluePlan Engineering Ltd., 2022) recommended a 20-year capital plan to address existing system issues and long-term growth needs and identified the estimated cost and timing of each recommended project. It is necessary to reduce wet weather flow volume over time to accommodate development and growth without increasing overflows. This can be achieved through targeting reduction in inflow and infiltration (I&I) across the system, with initial focus on identified priority areas.

The City will continue to develop its 20-year capital plan to incorporate projects that address wet weather flow issues and long-term growth requirements, with the long-term goal of eventually eliminating CSOs to the environment. Progress made on the PPCP recommendations are summarized in the *2024 Assessment of conformance to Procedure F-5-5* document (GEI Canada Ltd., 2025).

It is recommended that the City continue to maintain its PPCP and track progress of completion of past PPCP action items.

4. System Condition & Performance

The Public Works staff that maintain and operate the collection system are certified and undergo mandatory training to maintain or upgrade their license. These workers keep the system functioning properly as intended. Contractors are hired on an occasional basis to perform any work that requires specialized equipment or training.

4.1. Condition Overview

Closed-circuit television (CCTV) inspections show that most of the City's sanitary system is in fair to poor condition. Where CCTV inspections are not available, condition is estimated based on age and expected service life. The average age of the collection system is about 50 years and portions are approaching the end of their expected service lives. The City continues to upgrade the collection system through capital design and construction projects. Preventive maintenance and rehabilitation activities can help to extend asset life while waiting for more fulsome upgrades.

4.2. Performance Overview

The City's sanitary system is performing as designed. As described in previous Sections, the City has been proactive in undertaking system modelling, capital upgrades, and condition assessments to ensure the sanitary system continues to operate effectively. Although overflows do occur in the collection system, the system was designed to operate in this manner and the City has processes and procedures in place to deal with overflows when they occur.

The City has several ongoing projects that seek to identify and remove sources of inflow and infiltration into the wastewater collection system, with additional projects planned in future years. Implementation of these projects will create new flow capacity in the existing system, reducing the frequency of overflow events and allowing the City to better manage the impacts of wet weather. Such projects are ongoing and are being implemented using a "per-catchment" approach that prioritizes the areas of greatest concern within the system.

4.3. Operating Issues and Corrective Actions

Operating issues that were investigated in the collection system last year are summarized in **Table 4-1**. Most of the recorded problems involved private sanitary laterals. When residents phone the City to report these issues, Public Works staff respond and may use CCTV to search for locations of blockages and/or structural defects. Flushing and rodding are used to clear debris from laterals to restore service.

Sanitary sewer surcharges are usually caused by blockages in mains or laterals but can also occur during extreme wet weather when inflow and infiltration increase sewer flows. If sewer overflows occur, samples of the flow are collected and tested, and results are reported to the MECP.

Table 4-1: Summary of Collection System Operating Issues

Activity	Work Orders
Sanitary Main Surcharge Event	3
Sanitary Overflow Sampling	2
Sanitary Lateral CCTV Inspection	255
Sanitary Lateral Flushing & Rodding (Emergency)	177
Sanitary Lateral Flushing & Rodding (Preventive)	2

5. System Calibration, Maintenance, Inspection & Repair

Insufficient maintenance of infrastructure can lead to increased asset lifecycle costs, premature failure, and generally lower levels of service related to that asset. For the sanitary system, this often means reduced capacity and increased risk of system overflows to the environment or basement flooding. Procedures for proactive inspection and upkeep of the system enable better optimization of available budget and improve service rather than reactive responses to system failures or disruptions. The following provides an overview of some of the inspection, maintenance, and repair activities that were completed in 2024 to operate the sanitary collection system.

5.1. Calibration Activities

A variety of instruments are used to monitor the operation of the collection system; examples include flow monitors, wet well level sensors, and portable gas detectors. These instruments are calibrated annually to verify their continued accuracy and suitability.

Equipment is tested by third-party contractors as per the manufacturers' specifications.

5.2. Maintenance Activities

The City uses software to manage work orders for maintenance activities. Planned maintenance is scheduled based on recommended best practices and staff experience. Various unplanned activities also occur and are tracked using this system.

Public Works staff maintain a list of priority areas within the system that require extra flushing due to site configurations or operational constraints. The pump stations require regular preventive maintenance to keep station components in optimal condition and function. A summary of the maintenance related work orders is shown in **Table 5-1**.

Table 5-1: Summary of Maintenance Activities

Activity	Work Orders
Sanitary Main Flushing	12
Sanitary Forcemain Flushing	4
Pump Station Maintenance & Repair	3

5.3. Inspection Activities

Regular inspection activities are essential for detecting and addressing issues in the system. Public Works staff inspect pump stations each month to confirm proper pump operation, inspect for build-

up of debris or grease in wet wells, check the stations for signs of vandalism or for any grounds maintenance needs, and identify any other operational issues to be addressed. The backup generator at each pump station is also inspected and tested monthly to ensure proper function in case of power failure.

Table 5-2: Summary of Inspection Activities

Activity	Work Orders
Sanitary Main CCTV Inspection	9
Sanitary Main Inspection	1
Maintenance Hole Inspection	2

The City hires a contractor to perform an annual flushing and inspection program. Approximately 20% of the collection system assets are inspected each year, and the City uses a risk-based assessment process to identify and prioritize the assets most requiring flushing and inspection. Using this risk-based approach, pipes that are in worsening condition or that are more critical for overall system performance are reviewed more frequently than pipes that are in good condition or that offer more minor service. The contractor uses closed-circuit television (CCTV) cameras to assess pipe condition and identify structural or operational deficiencies. These deficiencies are prioritized for rehabilitation through sewer relining, open cut repair, or other measures.

5.4. Repair Activities

Deficiencies identified through inspection are repaired on an as-needed, priority basis. Public Works staff complete most standard repairs, such as pipe spot repairs, sanitary lateral repairs, cleanout repairs, maintenance hole frame & cover installation, or parging repairs, while those repairs requiring specialized equipment or training will be completed by a contractor.

Table 5-3: Summary of Repair Activities

Activity	Work Orders
Sanitary Mainline Repair	5
Maintenance Hole Repair/Replace	34
Maintenance Hole Raise / Lower	1
Sanitary Forcemain Repair	1
Sanitary Lateral Repair/Replace	65
Sanitary Lateral Cleanout Repair	28
Equipment Breakdown	2

6. Wastewater Complaints

Complaints or requests for service from the public are useful as a metric of system performance and can help in identifying deficiencies that might otherwise go unnoticed. Residents may report issues such as odours, damaged infrastructure, construction-related problems, suspected sewer blockages, or emergency spills. In each case, the issue is logged, investigated, and resolved if possible.

In 2024, the City received seven wastewater collection-related complaints, including two odour complaints. For each complaint, Public Works staff visited the location to investigate, resolved the issue to the best of their abilities, and responded to the complainant regarding the outcome.

7. System Alterations

Table 7-1 summarizes the City’s capital projects that involved alterations to the municipal wastewater collection system.

Table 7-1: Alterations to the Authorized Wastewater System

Project Name	Project Description	File Year
Development - Dain East Phase 2, 3 & 4 Subdivision	Installation of new storm sewers, sanitary sewers, and watermain.	2023
Development - Superior Street Subdivision	Installation of new storm sewers, sanitary sewers, and watermain on Superior Street, Michigan Street, and Bay Avenue.	2023
Development - Glenwood Condominium	New sanitary sewers and watermain on Glenwood Avenue and Stanley Street for the extension of services to new Condominiums on the south end of Glenwood Parkway.	2023
Development - Laugher Avenue Sanitary Sewer	New sanitary sewers on Laugher Avenue from 40 m east of Southworth Street to west 45m west of Classic Avenue and discharging to the existing sanitary sewers on Afton Avenue.	2023
Development - 201 Ontario Road Sanitary Sewer Extension	Proposed storm and sanitary connection for new development at 201 Ontario Road, including the extension of existing sanitary and storm sewers on Ontario Road.	2023
Capital - ENG 2021-24 Fourth, Fifth, and Sixth Street Sanitary Sewer Replacement	The construction of new storm and sanitary sewers on Canal Bank Street, Fourth Street, Fifth Street, Sixth Street, Rice Lane and Patsy Avenue.	2024
Capital - Colbeck Drive Sewer Extension	Extension of the existing sanitary sewer on Colbeck Drive, between Riverview Drive and Prince Charles Drive.	2024
Development - Dain West Phase 1 Subdivision	Installation of new storm sewers, sanitary sewers, watermain, and construction of a stormwater management pond.	2024
Development - Harvest Oak Extension Subdivision	Installation of new storm sewers, sanitary sewers, and watermain.	2024
Development - Murdoch Estates Phase 2 Subdivision	Installation of new storm sewers, sanitary sewers, watermain, construction of a dry pond, and realignment of Draper's Creek by constructing a new channel on the development lands.	2024