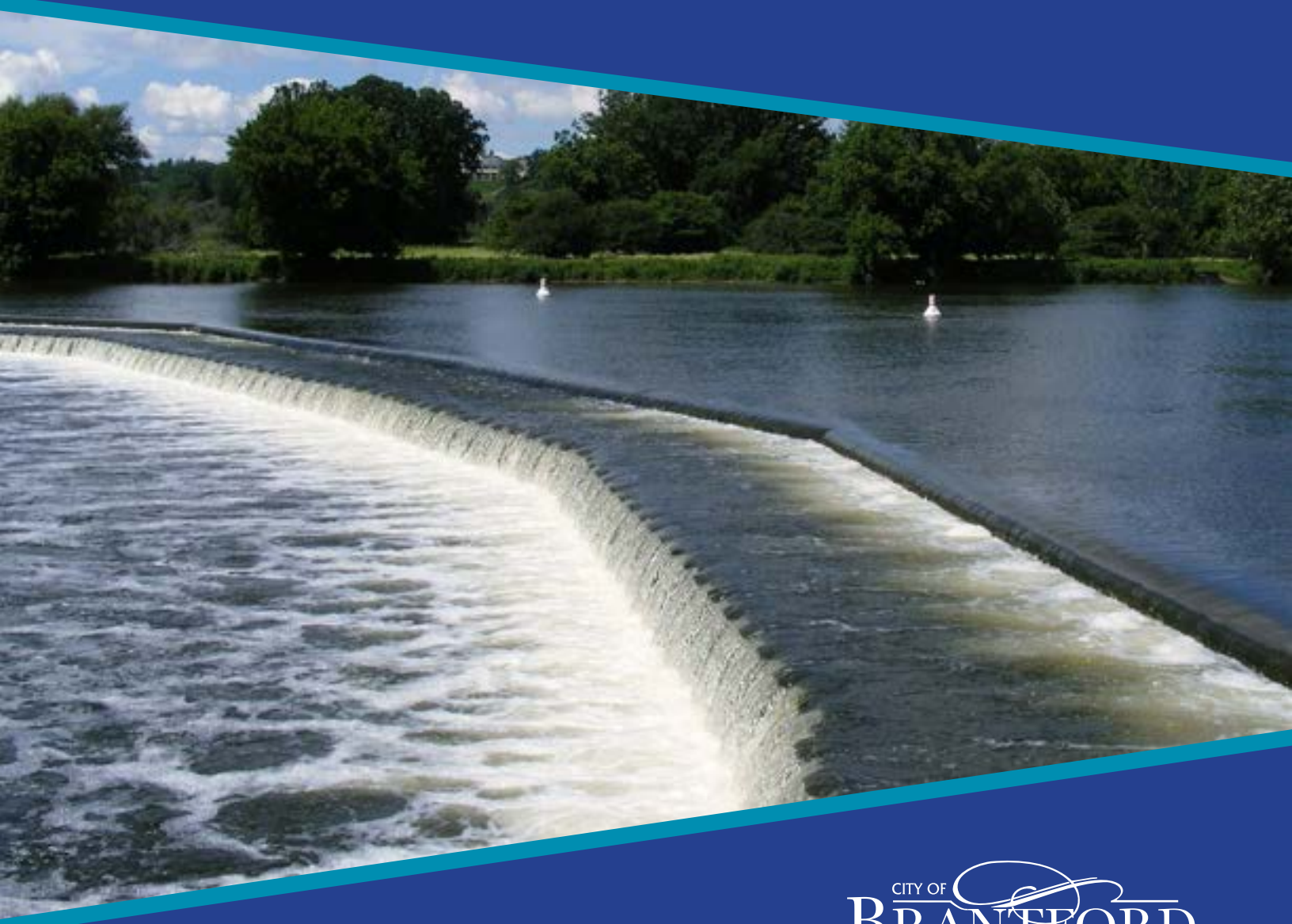
April 30, 2025

City of Brantford

Stormwater Management System

Annual Performance Report 2024

ECA No. 063-S701



CITY OF BRANTFORD

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System Owner

The Corporation of the City of Brantford

Reporting Period

January 1st, 2024 to December 31st, 2024

Report prepared by

The Corporation of the City of Brantford

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Glossary of Terms and Abbreviations

Contaminant: has the same meaning as defined in section 1 of the EPA.

CCTV: Closed Circuit Television

Conveyance Channel: Open channels that convey stormwater from one structure to another or directly to the water course

CCME: Canadian Council of Ministers of the Environment

Director: A person appointed by the Minister, pursuant to section 5 of the EPA for the purpose of Part II.1 of EPA (Environmental Compliance Approvals)

ECA: Environmental Compliance Approval issued by the Ministry of the Environment, Conservation, and Parks

Mainline Sewer: a pipe that collects wastewater from smaller laterals and conveys to a larger trunk sewer

Maintenance Hole (M/H): A structure that provides access to a sewer system for inspection, cleaning, maintenance, sampling, or flow monitoring

MECP: Ministry, of the Environment, Conservation and Parks

Ministry: The Ministry of the Minister and includes all employees or other persons acting on its behalf

OGS: Oil and Grit Separator

PWQO: Provincial Water Quality Objectives

pH: Measure of the alkalinity or acidity in water

SAC: Spills Action Centre

SDWT: Significant Drinking Water Threat

Spill: As defined in Part X of the Environmental Protection Act, is a discharge a) into the natural environment, b) from or out of a structure, vehicle or other container; or c) that is abnormal in quality or quantity in light of all of the circumstances of the discharge.

Stormwater: Rainwater runoff, water runoff from roofs, snowmelt, and surface runoff

STP: Sewage Treatment Plant, also known as Wastewater Treatment Plant ('WWTP')

SWMP: Stormwater Management Pond

Third Pipe Collection System: Sewage Works designed to collect and transmit foundation drainage and/or groundwater to a receiving watercourse

Total Ammonia Nitrogen (TAN): A measure of the amount of ammonia (nitrogen pollution) in water

Total Phosphorus (TP): An essential nutrient used by microorganisms for growth. Excess amounts can lead to environmental issues like algae over-growth

Total Suspended Solids (TSS): Suspended particles (organic and inorganic material) present in the water sample

Wastewater: Water that has been used and discharged by homes, businesses, and industries. Everything we flush down a toilet or pour down a drain, collectively

1.0 Introduction

This report has been prepared in accordance with the terms and requirements set out in the City of Brantford's Ministry of the Environment, Conservation and Parks (MECP) Environmental Compliance Approval (ECA) for a Municipal Stormwater Collection System #063-S701 Issue 3, issued on November 20th, 2024.

This report covers the period from January 1st, 2024, to December 31st, 2024, and will be made available on the City of Brantford's website by June 1st 2024. Hard copies will be made available by request by contacting the City of Brantford's Environmental Services Department.

ECA #063-S701 outlines the terms and conditions for operating the Stormwater Collection System. Schedule E, Section 5.2 of the ECA mandates the submission of an Annual Performance Report to the Director. This report includes monitoring data, operational challenges, inspections, maintenance, repairs, calibration, spills, public complaints and other operational information in respect to the system.

For the reporting period, City Staff worked diligently completing several maintenance, rehabilitation renewal projects to ensure the adequacy of the City's Stormwater Collection System. No Ministry of the Environmental, Conservation and Parks inspections occurred during this time.

2.0 Stormwater Management System Overview

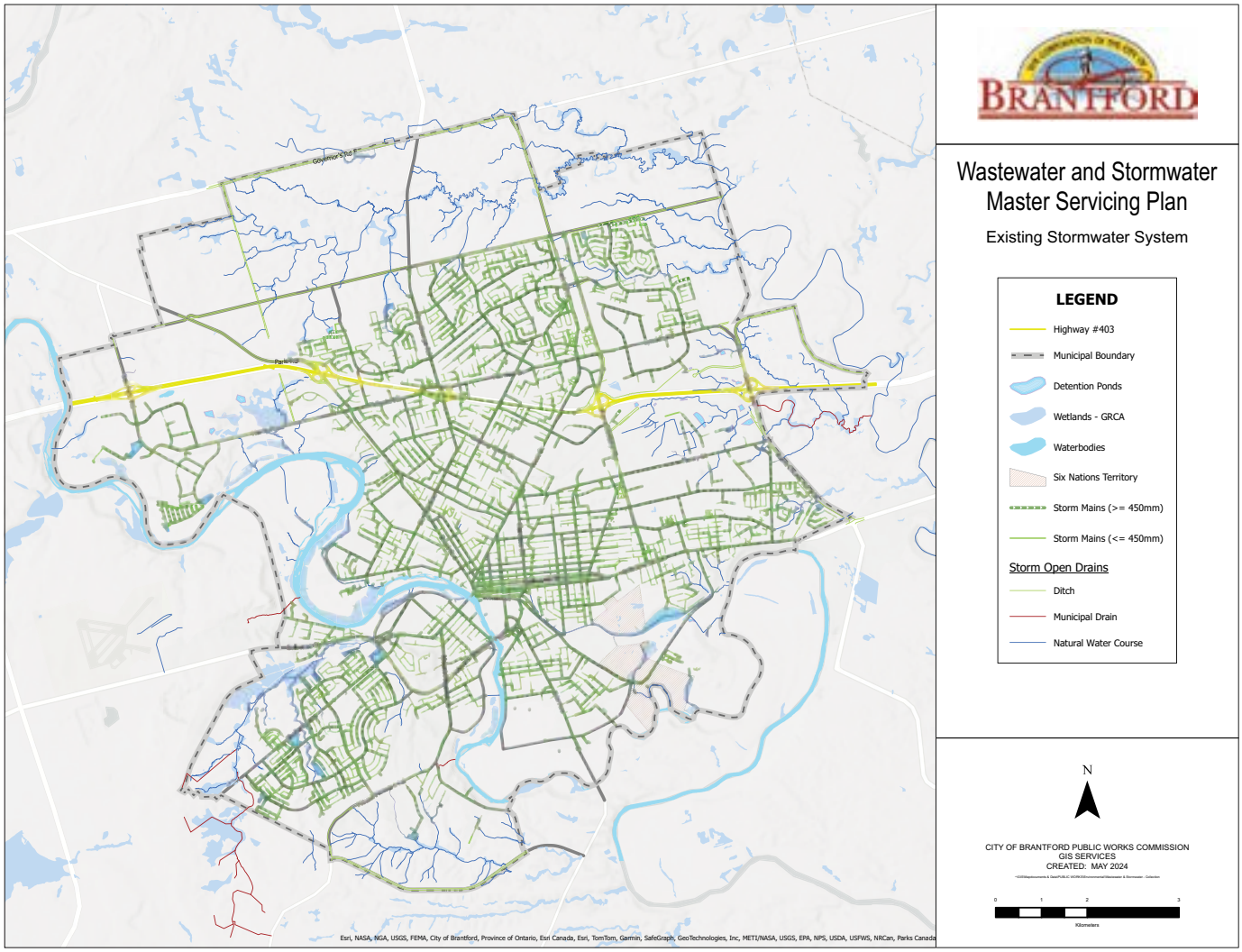
The Corporation of the City of Brantford ("The City") owns, maintains, and operates the Stormwater Collection System designed for the collections, transmission, and treatment of stormwater, consisting of approximately 430 kilometers of storm sewers, 228 kilometers of channels, ditches, culverts, 20 oil grit separator units (OGS), 23 stormwater management facilities, including catch basins and other related infrastructure that transmits stormwater to the Grand River, or its tributaries.

The entirety of the City is located within the Grand River Watershed, regulated by the Grand River Conservation Authority (GRCA). The majority of the City's stormwater system drains directly to the Grand River or its tributaries; Mohawk Lake, D'Aubigny Creek and Fairchild Creek. A significant portion of the northeastern segment of the City discharges to local creeks along the City's north and east boundaries to Fairchild Creek.

Within the Fairchild Creek catchment, there is a major ditch network along Hwy 403 and Wayne Gretzky Parkway that receives a large portion of Fairchild Creek catchment, conveying flows to the south east, and to the Garden Avenue Municipal Drain. The Mohawk Lake and canal is a receiving body for a substantial portion of the City's stormwater. Figure 1 provides an overview of the Stormwater Management System.

The Stormwater Management System operated under the authority of an Environmental Compliance Approval for a Municipal Stormwater Management System number 063-S701. Regulatory compliance, inspections and reporting are completed through the Ministry of Environment, Conservation, and Parks Guelph District Office.

Figure 1: An overview of the Stormwater Management System



3.0 Operational Performance

As per the ECA, this section's purpose is to provide a summary of significant operational problems encountered and any associated corrective actions that were implemented.

Stormwater management infrastructure is inspected on a routine basis to ensure it is performing as designed and operating effectively. Inspection and maintenance activities are recorded and retained for record retention purposes and the data is used to assess performance, compliance and identification of trends and anomalies that require further investigation and or remediation to maintain proper function of the system. Where issues are identified during inspections, work orders are generated for maintenance/repairs.

3.1 Operating Challenges and Corrective Actions

- The City's Water Treatment Plant experienced a gradual increase in quarterly nitrate sampling results exceeding half of the Maximum Acceptable Concentration or MAC, (MAC-10 mg/L, half MAC-5mg/L). The City voluntarily increased Point of Entry (POE) to the distribution system sample collection frequency to better understand the seasonal nitrate trends measured in the raw and treated water at the water treatment plant.
- No major trends in sediment loading were identified within the stormwater management system that would require immediate remediation or urgent project maintenance works.
- The Grand River and Fairchild Creek subcatchments showed levels of chloride that were generally above the CCME long-term exposure guideline of 120 mg/L for chloride. The average chloride concentrations in the Fairchild Creek catchment frequently approached the C.C.M.E. short-term guideline of 640 mg/L at several monitoring stations during the winter months. This appears to be related to the use of road de-icing salts. The City will explore initiatives aimed at reducing at-source road salt usage, in order to minimize chloride loading in the receiving watercourses.
- Most sampling locations within the City's monitoring program demonstrated hypereutrophic concentrations of phosphorus in the 2019 – 2023 averages as well as during the 2024 monitoring period. Future stormwater management infrastructure development and rehabilitation projects should focus on designs that have the capacity to filter and fix phosphorus from stormwater to help address the hypereutrophic concentrations of phosphorus observed in the City.

4.0 Monitoring Program Information

The City's Environmental Services Department was responsible for conducting stormwater monitoring within the Stormwater Management System during the reporting period.

Table 1 includes a summary of the monitoring program details.

Monitoring Details	
No. of Water Quality Monitoring Stations	36
Monitoring Level	Level 1-3
Key Receivers Monitored	D'Aubigney Creek, Grand River, Fairchild Creek
Name of Laboratories Used	Wastewater Compliance Lab and E3 Laboratories Inc. (Accredited)

The City of Brantford is committed to maintaining high standards in water quality and has an established monitoring program that focuses on key creek and stormwater drainage locations. The period of 2024 – 2025 will bring notable adjustments to the Brantford Stormwater Monitoring Program. In response to the recommendations outlined in the Brantford Stormwater Monitoring Plan Recommendations Report (LGL, July 2024), modifications to the sampling frequency and locations are being implemented. City staff are actively working to adapt to these evolving monitoring requirements to ensure the continued effectiveness of the program.

Since the Recommendations Report was not published until mid-summer 2024, a gradual change in monitoring locations and frequency may lead to a gradual adjustment in the monitoring locations and frequency. This could introduce some variability in the data for the monitoring years 2024 and 2025. Prior to 2024, routine monitoring was conducted on a monthly basis using a rotating 4-week schedule, alongside targeted wet-weather sampling that followed an event-based timeline. The revised monitoring program, initiated in July 2024, now operates on a seasonal framework aimed at capturing one baseflow sample and two rainfall response samples each season. Importantly, winter rainfall response samples are interpreted to include snowmelt samples. Given the limited baseline of wet-weather sampling available at each monitoring station, data from rainfall and base sampling have been combined for seasonal comparisons in this report. As the new methodology for monitoring progresses and additional rainfall sample data becomes available, future analyses will evolve towards evaluating current-year data against the previous five-year averages as well as comparing base and rainfall response values. For reference, the seasons are defined as follows: Spring (March 20 – June 20), Summer (June 21 – September 21), Fall (September 22 – December 20), and Winter (December 21 – March 19). Samples are collected from a diverse range of sources, including stormwater manholes, open watercourses, and outfalls.

5.0 Monitoring Results Analysis

LGL Limited was retained by the City to develop the City's Stormwater Monitoring Plan in response to requirements of ECA No. 063-S701. LGL Limited completed the analysis of the City's previous 6 years of stormwater monitoring sample results to produce recommendations for future monitoring programs.

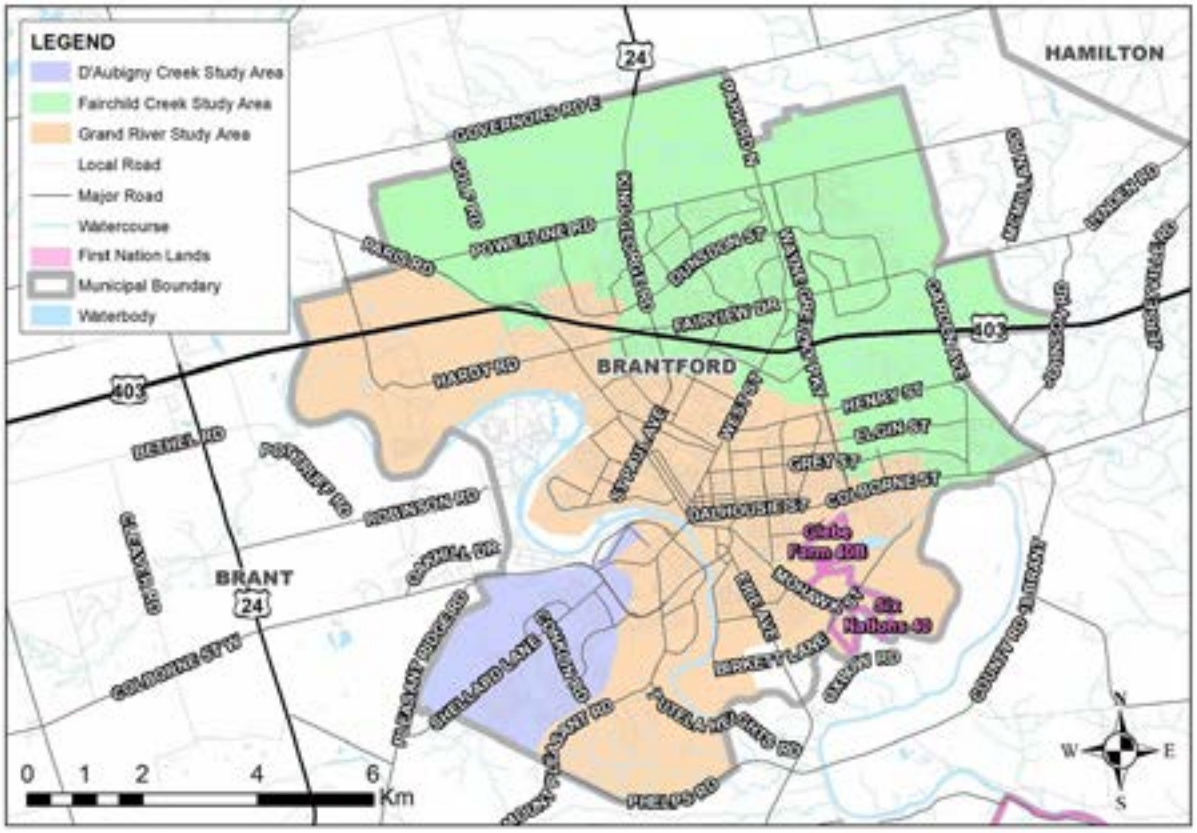
The City operated a wide-ranging monitoring and sampling program, and results were based on the measured criteria that are relevant to evaluate the performance of stormwater management infrastructure as well as health of receiving watercourses.

Throughout 2024, going into-2025, the City and LGL Limited will continue to develop the Stormwater Monitoring Plan to meet the requirements of the ECA. The City is awaiting the release of the Ministry's monitoring guidance documents to fulfil this obligation.

5.1 Catchment Areas being Monitored

Within the City of Brantford's municipal boundary there are three (3) Subwatersheds that have been identified, see Figure 2.

Figure 2: City of Brantford Subwatersheds



5.1.1 The Grand River

The Grand River is the largest Canadian watershed that flows into Lake Erie, with over 6,800 square kilometers of catchment area. It is one of the richest agricultural regions in Canada with approximately 70% of the watershed actively farmed (GRCA 2014). Large urban centres represent approximately 7% of the watershed and wetlands and forest cover approximately 20% of the watershed. For the reporting year, there were 4 SWMF and 5 OGS units that formed part of the Authorized System, each outlet into the Grand River.

The reach of the Grand River through Brantford is identified through the Land Information Ontario (Stations GU-3002-GRA and GU-3001-GRA) database as a warmwater thermal regime. Species at risk fish were identified in the reach throughout the monitoring area through LIO and DFO's species at risk mapping including threatened Black Redhorse (Moxostoma duquesnei), Silver Shiner (Notropis photogenis), and Eastern Sand Darter (Ammocrypta pellucida). Additionally, several species at risk mussels were identified through DFO mapping as within or potentially within this reach of the Grand River to include special concern Rainbow Mussel (Villosa iris), Wavy-rayed Lampmussel (Lampsilis fasciola), and Mapleleaf (Quadrula quadrula), and endangered Round Pigtoe (Pleurobema sintoxia).

Mohawk Lake is a waterbody that exists southeast of the downtown core and receives most of its drainage from downtown and the most heavily developed areas of central Brantford. The Mohawk Lake drainage area is characterized by East Ward Creek that conveys urban drainage east through Mohawk Lake and through the Beach Road Dam before flowing into the Grand River. The Mohawk Lake subcatchment has future restoration and drainage improvement plans including adding wetland vegetation to further improve water quality treatment of runoff from the downtown core.

5.1.2 D'Aubigny Creek

D'Aubigny Creek is a coldwater tributary originating in the D'Aubigny Swamp, a Provincially Significant Wetland that travels 8 km through swamp areas and finally D'Aubigny Creek Park before entering the Grand River approximately 700 m upstream of Grant Island (GRCA 2017). For the reporting year, there were 6 SWMF and

2 OGS units that are a part of the Authorized System, and each outlet into D'Aubigny Creek. Brown Trout (Salmo trutta), Brook Trout (Salvelinus fontinalis) and Rainbow Trout (Oncorhynchus mykiss) were all identified within the middle to upper reaches of D'Aubigny Creek during surveys completed in 1994 (Phillips Planning and Engineering Ltd. 1995). The presence of these species further supports D'Aubigny Creek's status as a coldwater tributary, though more recent records were not readily available.

5.1.3 Fairchild Creek

Fairchild Creek is a largely agricultural subwatershed with headwaters based in the Beverly Swamp Wetland Complex, a Provincially Significant Wetland. Fairchild Creek flows from this wetland complex south-southwest towards Brantford, where it eventually outflows into the Grand River near Onondaga. There are 14 SWMF and 6 OGS units that are a part of the Authorized System, each outlet into Fairchild Creek.

In 2016, the Grand River Conservation Authority (GRCA) completed a subwatershed characterization study on Fairchild Creek and found that winter average chloride, TSS, and phosphorus concentrations were all over the CCME long-term guidelines. Winter chloride concentrations were 129.3 mg/L, with other seasonal values recorded below 75 mg/L. TSS concentrations were above 25 mg/L in 83.3% of samples collected. Phosphorus concentrations were above the PWQO threshold of 0.03 mg/L in 98.1% of samples collected (MECP 1994).

Fairchild Creek has been found to contribute more TSS and phosphorus to the Grand River per square kilometer than any other major tributary in the watershed (GRCA 2016). Only approximately 20% of Fairchild Creek has been evaluated for thermal regime by the Ontario Ministry of Natural Resources and Forestry (OMNRF), with a majority (87.8%) of the areas identified as warmwater habitat, 12.2% was identified as coldwater habitat, and <0.1% identified as coolwater habitat (GRCA 2016).

5.2 Supporting Information for Monitoring Results

The City's Stormwater Monitoring Program locations were analyzed to determine the closest upstream and downstream locations for each of the stormwater infrastructure to be monitored under the ECA requirements.

LGL Limited conducted the analysis of the stormwater sample results obtained during the previous 5 years of baseline monitoring and completed specific analysis of the 2024 monitoring period. The obtained stormwater monitoring results were compared to the Provincial Water Quality Objectives (PWQO) and Canadian Council of Ministers of the Environment (CCME) – Standards for the Protection of Aquatic Life.

The majority of Stormwater Management Facilities did not have monitoring stations directly upstream and downstream thus limiting the ability to allow for evaluation of the performance of individual facilities.

Alternatively, to assess the overall performance of the Stormwater Management System, analysis of water-course health was applied to the three subwatershed areas: D'Aubigny Creek, Grand River and Fairchild Creek.

Through 2024, the City along with LGL Limited worked to develop a Stormwater Monitoring Plan with the goal of improving the current monitoring programs to address ECA requirements more acutely and implement a monitoring framework that can be leveraged to take decisive action to improve water quality in the City of Brantford. This will be a collaborative process that will integrate feedback and concerns from a variety of stakeholders and community members, including the MECP.

5.3 Analysis of Overall Performance

Analysis of overall performance can be confirmed through the Stormwater Monitoring Program, visual inspections and formal Condition Assessments of Stormwater Management Infrastructure. The City completes inspections and formal Condition Assessments of Stormwater Management Infrastructure on a routine basis as identified in the Stormwater Operation & Maintenance (O&M) Manual.

Although the Stormwater Sampling Program completed by the City does not have any direct inlet/outlet sampling locations relative to any of the stormwater infrastructure identified within the ECA, there are robust and detailed data available to assess the health of local watercourses and highlight specific stormwater events of concern for further investigation in the subsequent sections of this report. There are

no major issues with the operation of the system; all stormwater infrastructure is working as designed or plans have been established to improve their condition, based on the condition assessments and water quality analysis within this report.

5.4 Analysis of Water Quality in Watershed

TThe analysis of water quality in the watershed included comparing the 2024 monitoring year to the previous 5 years of background trending data to determine if the 2024 monitoring year demonstrated different characteristics relative to the historical baselines and to contextualize historical watershed health indicators.

Water quality in watercourses within the City of Brantford is highly variable depending on the subwatershed. Many of the PWQO and CCME water quality guideline exceedances are likely independent of the performance of SWMPs and/or OGS units. Given the design intent of SWMF, their treatment capacity, health of local watercourses and the monitoring program completed by the City, the analysis focuses on the following water quality criteria:

- total suspended solids;
- chlorides;
- phosphorus;
    - During the 2024 monitoring season there were issues with the WWC lab processing of total phosphorus, so samples after August 14 were omitted from analysis and reporting.
- conductivity;
- dissolved oxygen; and pH.

Water quality criteria such as chloride, phosphorus, conductivity, dissolved oxygen and pH may not be directly indicative of the functional capacity of SWM infrastructure, however highlighting areas of potential concern will enable the City to improve water quality using holistic strategies that consider on-line SWMF's.

Stormwater management infrastructure is generally designed to control and remove total suspended solids (TSS), though it also can lower total phosphorus concentrations and have a buffering/dilution effect on chloride and pH.

This report is intended to address the performance of stormwater infrastructure (stormwater ponds, OGS units, conveyance systems) within ECA No. 063-S701 Issue No. 3 (ECA, MECP 2024) through analysis of response variables typically associated with freshwater watercourse health (chloride, pH, TSS, TP, DO and conductivity). The monitoring locations utilized by the City of Brantford do not allow for specific evaluation of the performance of SWM ponds and OGS units individually, so analysis of watercourse health was applied to three subwatershed areas: D'Aubigny Creek, Grand River and Mohawk Lake and Fairchild Creek. Water quality in watercourses within the City of Brantford is highly variable depending on the subwatershed. Many of the P.W.Q.O. and C.C.M.E. water quality guideline exceedances are likely independent of the performance of stormwater management ponds and/or OGS units.

5.4.1 Total Suspended Solids

The main purpose of Stormwater Management Facilities is to capture and retain suspended solids.

Therefore, TSS concentrations represent the primary water quality indicator for the performance of stormwater management infrastructure.

Suspended solids within D'Aubigny Creek were at or below 24.5 mg/L throughout samples completed in 2024, reflecting a very low-turbidity watercourse without any sediment-loading events observed that may be indicative of poor stormwater infrastructure performance. The only exception was a sample of 113 mg/L collected at D'Aubigny Natural – the upstream reference location in the spring. It has been noted that a stormwater management facility is under construction upstream of the D'Aubigny Natural station and may have led to this relatively average high value (single sample from July 19, 2024 of 416 mg/L). The City will consider adding an additional station upstream of D'Aubigny Natural as development continues to progress within the watershed.

The subcatchment draining directly to the Grand River did not demonstrate any increases greater than 25 mg/L in 2024 compared to baseline, with a maximum value of 57 mg/L in Hardy Road Creek in the fall.

In the Fairchild Creek subwatershed: Abbott Court, Evolve Creek, F-35, F-36, Garden Avenue and McMillan Road all observed rainfall events causing rises in TSS concentrations of over 25 mg/L. Of these increased suspended solids values: Abbott Court, Evolve Creek and Garden Avenue should be locations where specific consideration is given to determining potential sources of elevated suspended solids loading through a review of stormwater infrastructure and potential development activities within the catchment areas. SWM facility 07F002DP should be closely monitored as vegetation establishes along the banks to ensure that it will function in its full intended capacity for the 2025 monitoring season and into the future.

No major trends in sediment loading were identified that would require immediate remediation or urgent project maintenance works.

5.4.2 Chlorides

Chlorides in urban waterways are predominately caused by the application of road salts, and are not readily filtered by soil or plants (Haake and Knouft 2019). Naturally high chloride levels in stormwater can also result from a variety of sources, including natural weathering of soils and rocks, atmospheric deposition. Stormwater management facilities, specifically wet ponds, can offer some buffering of peak chloride concentrations in runoff during the colder months through dilution within the volume of the pond, but this is not the design intent of the facilities. Stormwater ponds can also retain relatively high chloride concentrations into warmer months, causing higher chloride loading during months where road salts are not actively applied to the contributing catchment areas (Lam et al. 2020). The best way to limit chlorides from entering watercourses is to limit their use as much as possible or use an alternative solution to winter road conditions such as sand, where possible. Measures to reducing the use of road salts and educating the public to reduce their use of deicing salts should be applied throughout the City. Overall performance of the Stormwater Management System, analysis of watercourse health was applied to the three subwatershed areas: D'Aubigny Creek, Grand River and Fairchild Creek.

Chloride concentrations in D'Aubigny Creek were relatively low (<78.6 mg/L) at the natural/upstream sample station throughout the year, and the downstream location only exceeded the CCME long term value (120 mg/L) for the protection of aquatic life during the winter 2019-2023 average (146.9 mg/L). The average results are slightly higher than the previous year's monitoring. It is a concerning trend, especially as development to the southeast of D'Aubigny Creek continues to be built out and new stormwater infrastructure comes online within the subcatchment. D'Aubigny Creek represents a coldwater tributary to the Grand River, providing valuable habitat to biota that are limited to these coldwater areas of the watershed.

In the subcatchment, draining directly to the Grand River, high chloride concentrations were observed throughout the study area. Apart from Brant Park, average chloride at the majority of monitoring stations and seasons exceeded the 120 mg/L long-term value for the protection of aquatic life. GRA-09 exceeded the CCME short-term threshold of 640 mg/L for the 2024 samples. This is consistent with the 2019-2023 sample trends for GRA-09 which indicated that chlorides exceeded the CCME short-term threshold of 640 mg/L for all seasons.

Like the Grand River subcatchment, the Fairchild Creek watershed consistently demonstrated average chloride concentrations exceeding the CCME long term guideline (120 mg/L) in 2024, with the only exceptions being the spring to fall monitoring at King George Road Creek and all season McMillian Road. Average chloride concentrations often exceeded the CCME short term guideline (640 mg/L) at many monitoring stations in the winter, likely from the application of road de-icing salts. The range of chloride concentrations in 2024 were between 39.3 mg/L (McMillan Road in spring) and 955 mg/L (Johnson Road in winter). The lowest chloride concentrations occurred, predictably, in the northern headwaters of Fairchild Creek, areas with the lowest urbanization and development in their upstream catchment area. These values are not atypical for a medium-sized urbanized City in southern Ontario, but efforts should continue to limit the use and application of road salts.

5.4.3 pH

pH values outside of the PWQO for the protection of aquatic life (6.5 – 8.5) can reduce habitat quality and cause biological impairments to freshwater biota. There is little effect that stormwater management infrastructure can have on pH, aside from a buffering effect of potentially acidic or alkaline inflows into the ponds – like the interaction between chloride concentrations and stormwater management ponds. All values of pH measured (2019 – 2023 averages and 2024 averages) within each of the subcatchments were within the PWQO (6.5 – 8.5), apart from the Brant Park location in spring 2024 (8.74), WTP-intake spring 2024 (8.57) and D'Aubigny Natural in summer 2024 (8.65). The presence of subsurface limestone (hard water) and interactions with the groundwater table throughout the Grand River contributing catchment areas can lead to a relatively higher pH.

5.4.4 Total Phosphorus

Although it is not always an explicit design intent, stormwater management ponds can reduce total phosphorus concentrations in water as it moves through the facility (Nayeb Yazdi et al. 2021). Stormwater management strategies that utilize treatment-train approaches and maximize vegetation in the facilities (in-facility wetland cells, bioretention) can increase the efficacy of phosphorus retention within the facility. Phosphorus is the limiting nutrient to primary productivity in southern Ontario, and excess phosphorus can result in eutrophication, hypoxic conditions and potentially algae blooms in slower moving watercourses or ponds.

Most sampling locations within the City's monitoring program demonstrated hyper-eutrophic concentrations of phosphorus in the 2019 – 2023 averages as well as during the 2024 monitoring period. Future stormwater management infrastructure development and rehabilitation projects should focus on designs that have capacity to filter and fix phosphorus from stormwater to help address the hyper-eutrophic concentrations of phosphorus observed in the City.

5.4.5 Dissolved Oxygen

Dissolved oxygen is an essential component of freshwater ecosystems required to support fish and other aquatic biota, and the capacity for water to sustain higher concentrations of dissolved oxygen is dependent on water temperature (Harvey et al. 2011). Stormwater management ponds can have a significant impact on water temperature, as the wet ponds are typically fully exposed to the sun and effluent is historically skimmed from the top of the pond, though more modern stormwater management designs have integrated bottom-draw outlets and cooling trenches to combat the thermal impacts of stormwater management ponds.

Dissolved oxygen concentrations throughout each subwatershed were consistent with historical averages as well as the historical thermal regimes of the watersheds, where data were available (GRCA 2016).

D'Aubigny Creek continues to demonstrate a coldwater thermal regime, while the Grand River and Fairchild Creek watersheds demonstrate a thermal regime that can consistently support a warmwater fishery. Some reaches of the Grand River and Fairchild Creek subcatchments demonstrate DO concentrations required to support coldwater fish.

5.4.6 Conductivity

Conductivity is a measure of the inorganic dissolved solids in water and can be used as a proxy measurement to determine the overall loading of dissolved ionic elements in water. Typical ions that contribute to conductivity levels are chloride, nitrate, sulfate, and phosphate anions, as well as sodium, magnesium, calcium, iron, and aluminum cations.

Conductivity ranged from 484 – 911 µS/cm in D'Aubigny Creek, 405 – 2324 µS/cm in the Grand River, and 51 – 2758 µS/cm in the Fairchild Creek watershed in 2024.

6.0 Interpretation of Environmental Trends

LGL Limited was retained by the City to complete data analysis and interpretation of environmental trends based on previous stormwater monitoring information and data for the previous five (5) years (2019-2023), and specific analysis of the 202 monitoring period in response to requirements of ECA No. 063-S701. LGL's detailed stormwater quality monitoring report is included as an appendix to this report, and high-level trends and recommendations have been integrated within this report.

City data was used to examine trends in chloride, total suspended solids, pH, phosphorus, conductivity and dissolved oxygen, where applicable. City monitoring locations focused on capturing drain and stream conditions near stormwater management infrastructure, with a watershed approach that involved monitoring confluence points along the watershed. Data was sorted by receiving watercourse to contextualize historical watershed health indicators. GRCA data was also accessed and used to examine trends in precipitation and air temperature in the Grand River.

7.0 Calibrations & Maintenance of Monitoring Equipment

This section provides a summary of calibrations and maintenance performed on all stormwater monitoring equipment used in the Environmental Services Lab. The City has a formal instrumentation calibration and maintenance program performed on all laboratory equipment to track the performance and accuracy of all instrumentation. Accuracy verification and calibration of monitoring devices are completed annually by a Third-Party Certified Contractor. Table 2 provides a summary of monitoring equipment and the calibration results.

Table 2: Laboratory Equipment Calibration and Maintenance Schedule

Analyzer	Equipment Description	Date Calibrated	Results	Note
YSI ProQuatro (JC082072)	Multimeter used for field analysis.	Not Applicable	Passed	New device received in December 2024, comes calibrated.
Hanna Multimeter	Multimeter used for field analysis.	Jan 24, 2024	Passed	Decommissioned and replaced by YSI ProQuatro.

8.0 Inspections, Maintenance and Repairs

The following section provides an overview of some of the inspection, major maintenance activities and capital upgrades carried out on the stormwater Management system for the reporting year.

8.1 Inspections

Inspections are critical for detecting and addressing issues promptly within the Stormwater Management System, preventing environmental contamination and ensuring regulatory compliance. The City maintains routine inspection programs to identify potential issues early, maintain integrity and performance of the system while minimizing risks to public health and the environment.

Table 3: Summary of Major Inspection Activities

Type of Activity	Inspection Frequency	Number Completed	Description
Storm CCTV Inspections	7-10 years	~37.25 km	• Completed under the CCTV Sewer Inspection Program, includes maintenance holes. • Storm sewers are flushed prior to CCTV. • Deficiencies identified from inspections will be prioritized and addressed by City or a Contractor.
Brick Manhole Inspections	1 per year	24	• Visual inspection.
Stormwater Management Pond Inspections	3 times per year	54	• Visual inspection.
Stormwater Outfall Inspections	1 per year	266	• Visual inspection.
Catchbasin Inspections	5-7 years	2967	• CCTV / Zoom Camera inspection.
OGS Inspections	3 times per year	67	• Visual inspection and sediment measurements to determine cleanout frequency.
Storm Inlet Inspections	2 times per year	425	• Visual inspection.
GRCA Dike Inspection	1 per year	2	• Visual inspection.
Sluice gate inspections	1 per year	440	• Visual inspection.

8.2 Maintenance and Repairs

The City uses preventative maintenance software to manage work orders for all scheduled and unscheduled maintenance activities. Scheduled maintenance work orders are derived from manufacturer operation and maintenance manuals, supplemented by Staff expertise. The work order system efficiently records non-routine and unplanned maintenance activities. Operations Staff document the actions taken, and then subsequent follow-up work is planned and executed to ensure comprehensive maintenance coverage.

Table 4 shows a summary of major maintenance and repair activities completed for the Stormwater Management System. Appendix A includes a table summarizing capital projects completed, on-going, and future for the reporting period.

Table 4: Summary of Major Maintenance and Repair Activities

Type of Activity	Inspection Frequency	Number Completed	Description
Storm Sewer Relining	As required	~0.5 km	• Repairs part of road reconstruction projects.
Ditch Slope Reinstatement	As required	~2.5 km	• Repairs based on condition assessments.
Maintenance Hole Repairs and Replacements	As required	2	• Includes new frame and cover installations, spray lining, parging to stop roots, fill voids and reduce infiltration.
Storm Mainline Repairs	As required	6	• Completed based on CCTV Inspection Program.
OGS Cleanouts	1 per year	7	• Cleanout frequency based on sediment design capacity.
Catchbasin Cleanouts	5 to 7 years	3630	• Inspections completed after cleanout • Includes ROW and off-set catch basin cleaning.
Catchbasin Repairs and Replacements	As required	31	• Excavations, repairs, lead pipe repairs, and replacements.
Storm Sewer Flushing / Cleaning	As required	!37.25 km	• Flushing completed under the CCTV Inspection Program.
SWMP Cleanouts and Repairs	10 years	1	• Sediment removal and cleanout along with repairing/rehabilitating deficiencies identified.
Creek Maintenance	As required	26	• Tree and garbage removal.
Culvert Replacements	As required	1	• Repairs based on condition assessments.

9.0 Complaints & Responses

The City of Brantford receives customer complaints through the City's Customer Service Call Centre, or sometimes complaints are directed to individual Departments. During the reporting period, a total of 217 complaints were received in regards to both the storm sewer and sanitary collection systems. Table 5 provides a summary of complaints received during the reporting period and steps taken to address the complaints.

Table 5: Summary of Complaints and Actions Taken

Type of Compliant(s)	Complaints	Actions Taken
Stoppage/Back-ups	157	• All complaints were investigated and addressed by City Staff. • Some incidents were identified as private plumbing issues (no issues identified on the City side), but the City performed the work to clear the stoppage/backup. • Some incidents identified issues on the City side, which resulted in maintenance / repairs.
Odour Complaints	13	• All complaints were investigated and addressed by City Staff. • Some incidents were identified as private plumbing issues (no issues identified on the City side). • Some incidents identified stoppages/back-up issues, which resulted in maintenance / repairs.
Catchbasin Complaints	9	• All complaints were investigated and addressed by City Staff.
Drainage System Complaints	90	• All complaints were investigated and addressed by City Staff. • Types of complaints include: flooding, catch basin and maintenance hole repairs/maintenance in ROW, fallen trees, garbage, creek/stream complaints related to the drainage system.

10.0 Spill(s) or Abnormal Discharge Event(s)

10.1 Spills and Abnormal Discharges

All incoming spill incidents were managed by the Environmental Services Department. Efforts to contain such spills were typically executed using absorbent materials and booms with the impact on the environment frequently reported to be minimal or non-existent.

Industrial firewater spills were handled by installing booms and employing vacuum trucks to manage and re- move/divert the firewater, resulting in minor or no reported environmental impacts were observed. The MECP's Spills Action Center (SAC) and/or MECP Environmental Officers assigned were regularly kept informed, as required. A complete summary of these spill incidents can be found in Table 6.

Table 6: Summary of Spills and Abnormal Discharge Events

Number	Date(s)	Location/ Receiver	Description of Spill / Event	Estimated Duration (Hr)	Estimated Volume (L)	Actions Taken
1	07-10-24 07-11-24 07-16-24	Outfall 03F001OF Open Drain that eventually discharges to Fairchild Creek	• Industrial facility stormwater runoff found to be above stormwater by-law limits	Unknown	Unknown	• Industry notified SAC • Industry installed additional covered storage tanks in prone areas. • Industry implemented best management practices to help mitigate runoff concerns. • In process of improving treatment process.
2.	07-16-24	Wastewater Treatment Plant By-pass Outfall (Sewer Gravity Main: EP568-EP569SF) that discharges to Grand River	• Wastewater Treatment Plant by-pass due to overwhelming influent volumes received during a significant rain event	1 Hour, 35 Minutes	Approximately 7,551 m^3	• SAC was notified. • Downstream users notified.

Number	Date(s)	Location/ Receiver	Description of Spill / Event	Estimated Duration (Hr)	Estimated Volume (L)	Actions Taken
3.	08-06-24	Outfall 17G009OF/ Open Drain that discharges directly to Grand River	• Non-hazardous dye from City owned ice rink melt was discharged to a private storm drain.	Unknown	Unknown	• Inspection undertaken on facility. • Spill containment measures installed at outfall. • Sewer Use By-law Inspection completed at facility. • Spills training presentation was prepared in response to this event and all City run facilities received training.
4.	08-24-24	Outfall 11M001OF/ Open Drain that eventually discharges to Grand River	• Vehicle fire caused impacts to stormwater outlet.	Unknown	Unknown	• Spill containment measures installed at outfall. • Storm sewer line was cleaned to remove additional fire water and foam before outfall.
5.	09-12-24	Outfall 03F001OF/ Open Drain that eventually discharges to Fairchild Creek	• Industrial fire caused minimal impacts to stormwater outlet.	Unknown	Unknown	• Plug was installed to outlet to prevent discharge of contaminated fire water. • Industry repaired shut off valve to private stormwater management pond.

Number	Date(s)	Location/ Receiver	Description of Spill / Event	Estimated Duration (Hr)	Estimated Volume (L)	Actions Taken
6.	09-25-24	Outfall 34G182OF/ Open Drain that eventually discharges to Grand River	• Engine oil was dumped in private catch basin. • Minor impact to receiving stormwater management pond.	Unknown	Unknown	• Spill containment installed at outfall and cleanup operations undertaken. • Warning letter was issued to property owner.
7.	10-08-24	Outfall 06M222OF/ Open Drain that eventually discharges to Grand River	• Plaza fire caused minimal impacts to stormwater outlet.	Unknown	Unknown	• Spill containment measures installed at outfall.
8.	12-09-24	Outfall 07F016OF / Stormwater Pond that eventually discharges to Fairchild Creek	• Oil slick reported entering stormwater settling pond on Adams Blvd.	Unknown	Unknown	• Spill containment measures installed at outfall. • Remediation company was deployed to remove material. • Monitoring and remedial efforts continued into 2025.
9.	12-12-24	Outfall 10F002OF / Open Drain that eventually discharges to Fairchild Creek	• Residential sanitary to storm cross connection.	Unknown	Unknown	• Smoke testing confirmed cross connection. • Monitoring and corrective efforts continued into 2025.

Table 7: Efforts Made to Reduce Spills or Abnormal Discharge Events

Activity	Description	Assessment of Effectiveness
Sewer Use By-law Program	• Regulates the discharge of sewage entering the City's Collection Systems. • Education and outreach program designed to inform dischargers about the City of Brantford's stormwater system and what they can do to help reduce impacts to the environment. • Monitor, control and reduce the impact of spills.	• Successfully contributed to the GRCA Children's Water Festival. 4th grade classes from schools in Brantford, Brant and Six Nations were educated on the different storm water and sanitary systems within Brantford. • 27 Industrial Inspections, 3 Automotive Shop Inspections and 44 Restaurant Inspections successfully completed in 2024. All issues were immediately addressed and future inspection timelines based on inspection results. • 1 new Compliance Agreement and 5 new Compliance Agreement Amendments were created in 2024 to help bring industry discharge to within bylaw limits.
Stormwater Monitoring Program	• Routine monitoring of stormwater at various locations in the City's drainage network, including baseline and wet-weather sampling. • Results are used as baseline benchmark data.	Over 350 samples taken in 2024, providing valuable background stormwater quality trending data which allowed staff to identify areas of concern for investigation activities.
I&I Source Investigation and Remediation Program	• Quantifying I&I and planning for the remediation. • and long-term performance of the collection system. • Includes CCTV inspections of private laterals in targeted areas. • Smoke testing and dye testing, as required.	• 29 sanitary flow monitoring devices installed in the sanitary collection system. • 33 stormwater flow monitoring devices. installed in the stormwater collection. • Remedial actions on-going.
CCTV Sewer Inspection Program	• Employs the use of proactive closed-circuit television (CCTV) inspections to identify Cross Connections / Illegal Connections. • Reducing I&I by identifying sanitary sewers in poor condition requiring rehabilitation.	Program effectively identifies sanitary lateral cross connected to the storm sewer system for remediation.

Activity	Description	Assessment of Effectiveness
Private Sewer Lateral Replacement Grant Program	• Annual Program. • The Private Sewer Lateral Replacement Grant Program assists residents with the cost of replacing old sanitary sewer laterals on private property, or the disconnection of weeping tile systems from sanitary.	Successfully relined 31.5km of storm sewers, increasing the performance and extending the life of the storm sewer network.
Sewer Lateral Rehabilitation and Repairs Program	• Annual Program. • The Sewer Lateral Rehabilitation and Repairs Program covers the costs for replacing sanitary laterals (City side) identified in poor condition by the CCTV Inspection Program.	Unable to assess effectiveness since no CSO's or emergency situations requiring the Overflow Tanks has occurred.
Sewermain Relining Program	• Relining sewers identified during CCTV in need of repair. • Reducing I&I to improve the sewer collection system	• Successfully relines sewers, increasing the performance and extending the life of the storm sewer network.
ROW Reconstruction Capital Projects	• Capital projects include the replacement of sanitary and storm sewers in the ROW and laterals to property line.	Improve performance of the existing collection system by increasing capacity, extending service life, and reducing I&I.
WWPS Capital Upgrades	• Identified WWPS upgrades include construction of new Emergency Sanitary Overflow Storage Tanks to allow for diversion of sewage in an emergency event – eliminating the potential for CSO.	Unable to assess effectiveness since no CSO's or emergency situations requiring the Overflow Tanks has occurred.
WWPS Contingency Plans	• The City is currently in the progress of completing Contingency Plans for WWPS – 3 Plans complete thus far. • Outcome of assignment is delivery of a practical plan for maintaining station flows thereby mitigating risk when planned or unplanned station outages and disruptions occur.	Unable to assess effectiveness, Contingency Plan has not been required.

11.0 Summary of Pre-Authorized Alterations to the System

During the reporting period there were no Director Notifications required.

Table 8 provides a summary of Stormwater Management System Alterations approved during the reporting period and alterations classified as Significant Drinking Water Threats. Some alterations may be approved in one year, but construction may not be completed until the following reporting year.

Table 8: Summary of Stormwater Management System Alterations

Alteration Type	No. of Alterations	No. of Alterations that Pose Significant Drinking Water Threat
Pre-Authorized Separate Sewers, Ditches, Culverts	2	0
Pre-Authorized Stormwater Management Facilities	7	1
Pre-Authorized Third Pipe Collection System	0	0
Previously Approved Works	0	0
Schedule C Works	0	0

11.1 Alterations that Pose Significant Drinking Water Threats

For the reporting period, one project was identified under the Stormwater Management System ECA as Significant Drinking Water Threats.

Further details regarding projects identified as Significant Drinking Water Threats can be found in the Annual Significant Drinking Water Threat Assessment Report for Proposed Alterations prepared prior to October 21st each year.

11.2 Major/Significant Alterations

For the reporting period, the major/significant alterations completed to the Stormwater Management System ECA included:

- Mohawk Lake Channel Rehabilitation Project for the design of a Stormwater Management Feature within the Mohawk Lake Channel. The works involve deepening the canal bottom to be reconstructed to provide online-linear treatment through water quality enhancement feature #1 and water quality enhancement feature #2.
- Southwest Community Park located at 346 Shellard Lane. The project includes pre-authorized alterations to the Stormwater Management System; construction of swales, storm sewers, and one Oil-Grit Separator. An Amendment to the City's current Stormwater Management CLI ECA #063-S701 was required to allow for the construction of two pre-authorized stormwater detention tanks for water quality and quantity control.
- Arrowdale Park Project located at 282 Stanly Street. The project includes pre-authorized alterations to the Municipal Stormwater Management System; construction of storm sewers, bioswales, and two stormwater management dry ponds to water quality and water quantity control.
- West Brant Heights Ph 2/3 Subdivision includes townhouses and single-family home community by Lindvest currently under construction at 346 Shellard Lane, Brantford. Included pre-authorized alterations to the Municipal Stormwater Management System; construction of storm sewers, and a stormwater management pond will provide water quality and quantity control.

12.0 Other Relevant Documents

12.1 Stormwater Master Plan

The City of Brantford completed a Master Servicing Plan (MSP) Update to 2051 in November 2021.

The objective of the MSP is to provide a comprehensive plan that incorporates all facets of the management, expansion and funding of the water, wastewater and stormwater systems for the entire City to the year 2051. This document reviewed in detail plans to 2051 and more broad implications beyond 2051.

12.2 10-Year Capital Project Forecast – 2023

The City of Brantford maintains a 10-year capital forecast which incorporates upcoming projects for the period of 2023 – 2032. Within this capital forecast are projects that will assist in eliminating infrastructure that has reached the end of its lifecycle and upgrade compromised materials to the latest design standards.

9 includes a summary of capital programs and upgrades for the Stormwater Management System.
A full detailed overview of the City's 10-Year Capital Forecast can be found on the City's website.

13.0 References

1. 2024 Annual Significant Drinking Water Threat Assessment Report for Proposed Alterations, written by Source Water Protection Department

2.2024 Calibration Reports

3. Cartegraph Work Orders and Service Requests

4. Customer Relationship Management (CRM) System Requests

5. Stormwater Management Operation & Maintenance (O&M) Manual

Detailed summary reports that present information regarding maintenance, inspection, monitoring data, etc. are available upon request by contacting the Environmental Services Department.