Belleville Sewage Collection System

2023 Annual Report

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1. Introduction

2023 marks the first year of annual reporting under the City of Belleville's Consolidated Linear Infrastructure (CLI) Environmental Compliance Approval (ECA) for the Belleville Sewage Collection System [1]. The ECA document will be referenced throughout the text of this report. The CLI-ECA is administered by Ontario's Ministry of the Environment, Conservation and Parks (MECP) under the Ontario Water Resources Act and Environmental Protection Act [2]. It is the City's permission and set of conditions for operating, maintaining, and altering the sewage collection system in Belleville. Schedule E, section 4 of the CLI-ECA lays out reporting requirements including an annual performance report submitted to the MECP by March 31st each year, made available to the public on the City's website. This report has been created to satisfy that requirement.

2. Background Information

The Belleville Sewage Collection System is a Class III wastewater facility. The system is owned and operated by the Corporation of the City of Belleville and consists of approximately 225 km of sewers and 13 sewage pumping stations. Two of these pumping stations are operated on the City's behalf by the Ontario Clean Water Agency (OCWA) and are reported on by OCWA in a separate annual report submitted to the MECP. The entire system drains to the Belleville Water Pollution Control Plant, operated under ECA #2178-B2ZLM8, which provides secondary treatment and disinfection prior to discharge.

Table 1: System Information

CLI-ECA Number	151-W601
System Owner	The Corporation of the City of Belleville
Certificate of Classification [3]	1459
Facility Class [3]	III

The sewage pumping stations (SPS) in the sanitary system are:

- West Moira SPS
- Forest Hill SPS
- Symington SPS
- Moira Lea SPS
- Millennium SPS
- Sherwood SPS
- Bridge Street West SPS
- Avonlough SPS
- College Street East SPS
- Cascade SPS
- Cannifton Road Small Bore System
- Dundas/Palmer SPS (OCWA)
- Front Street SPS (OCWA)

3. Monitoring and Analysis

Schedule E, Section 4.6.3 of the CLI-ECA requires that the annual report include a summary of all required monitoring data, if applicable, along with an interpretation of the data and conclusions drawn from this about the need for future modifications to the system or operations. Currently, there are few requirements for monitoring in the sewage collection system.

3.1. Sampling at Sewer Overflow Locations

In 2023, staff collected samples required per Schedule E, section 3.4 (b) Monitoring. The requirement was to take at least one grab sample at each Combined Sewer Overflow (CSO) or Sanitary Sewer Overflow (SSO) location and analyze for the following parameters:

- Biochemical oxygen demand (BOD)
- Total suspended solids (TSS)
- Total phosphorus (TP)
- Total Kjeldahl nitrogen (TKN)
- E. Coli

The CSO and SSO points are listed in Table B4 and Table B5 of the CLI-ECA. Samples were collected at the nearest maintenance access to each of these structures. This data will help set a baseline to calculate loadings of solids, nutrients, E. coli and biochemical oxygen demand in case of a future emergency discharge. The results from the sampling are summarized in Table 2.

Table 2: Results from samples taken at combined and sanitary sewer overflow points. Note that the NDOGEC result listed under E. Coli for two sample points means "No Data, Overgrown With E. Coli".

Sample Point	Type	BOD [mg/L]	TSS [mg/L]	TP [mg/L]	TKN [mg/L]	E. Coli [cfu/100mL]
Dundas/Coleman Junction Structure	CSO	167	374	3.77	25.5	NDOGEC
Front Street SPS	CSO	213	243	4.54	28.4	NDOGEC
Moira Lea Court	SSO	325	206	4.60	40.5	86 000
Dundas/Palmer SPS	SSO	148	195	3.10	25.8	60 000
Sherwood SPS	SSO	3460	6300	7.20	65.6	90 000
Cascade SPS	SSO	294	200	4.21	38.5	68 000

For 5 of the 6 sample points, the analytical results for each parameter are typical of medium to high strength untreated domestic wastewater according to Metcalf & Eddy [4]. The Sherwood SPS overflow is an outlier, with higher concentrations for each parameter of interest. It should be recognized that one data point captures only a single moment, however the contributing sewer catchment area is primarily residential which makes this result unusual. Staff plan to re-sample this location in 2024 to determine whether this data was skewed based on other factors like an unusual discharge to the sanitary sewer or sampling error.

3.2. Other Required Monitoring

There was no other required monitoring in 2023. It is anticipated that monitoring as part of future operations will be informed by the MECP's guidelines (expected 2024).

4. Operations and Maintenance

Schedule E, section 4.6.4 and 4.6.5 of the CLI-ECA requires that the annual report include a summary of operating issues and corrective actions taken, as well as calibration, maintenance and repairs carried out on parts of the system.

Operations can be generally considered to be split between pumping stations and sanitary mains. Normally, pumping station maintenance is conducted on a scheduled basis and in response to alarms or noted deficiencies. In addition to regularly scheduled work, maintenance on sanitary mains and appurtenances often results from response to customer requests and complaints.

4.1. Operating Issues and Corrective Actions

Each SPS is monitored continuously for alarms and operators are notified when there is an issue. Operators check for and troubleshoot or repair issues when responding to alarms and while conducting regularly scheduled checks. In 2023, there were 73 alarm calls for pumping stations. The majority of these were simple, requiring an inspection of the station, minor adjustment, and alarm reset. This includes various power failures and level alarms requiring a reset. Only events that were unusual and/or required a corrective action to resolve are described in Table 3.

Table 3: SPS Operating Issues and Corrective Actions

Date	SPS	Issue	Corrective Action
7/20/23	Sherwood	Power failure and issue with disconnect at pole.	Elexicon (electrical utility) repaired the issue, power restored.
2/16/23	Symington	Inlet check valve stuck open.	Unstuck valve. Later flushed and vacuumed grease to avoid a repeat.
4/15/23	Symington	Breaker tripped for a compressor motor.	Vacuumed out the well. Called an electrician to replace the breakers, and swapped out a motor.
4/2/23	Symington	Failed capacitor.	Replaced part.
7/19/23	Symington	Failed electric motor.	Replaced the failed motor with a new one.
7/13/23	Symington	Compressor failure.	Called an electrician to repair electrical panel, fix timer, re-set and test the station.
8/8/23	Symington	Water level high.	Repaired loose load switch.
8/18/23	Symington	Water level high.	Repaired loose load switch.
6/26/23	Moira St W	Pump controller failure.	Replaced mini cas controllers for two pumps.
2/3/23	Forest Hill	Low temperature.	Turned up heat.
2/6/23	Forest Hill	Low temperature.	Replaced broken heater.
4/1/23	Forest Hill	Motor not cycling properly, start contactor burnt out.	Electrician replaced the contactor, cycled ground rod, cleaned and reinstalled.
11/8/23	Forest Hill	Power failure.	Elexicon repaired one phase on external utility pole, and staff tested and restored the station.
11/9/23	Forest Hill	Compressor airline split.	Staff replaced the airline on motor #2 and restored function.
11/20/23	Forest Hill	Station shut off.	A faulty relay was replaced, and function was restored to the station.
4/9/23	Moira Lea	Pump leak and temperature control alarm.	Staff re-set the leak/temperature control, then checked oil and coolant, and tested the pump.
4/23/23	Cannifton Small Bore	Grinder pump run switch stuck “on”.	Staff replaced the pump with a newer model with correct wiring.

4.1.1. Calibration, Maintenance and Repairs

Each pumping station is checked on at least a weekly basis. Operators complete checks and perform maintenance on pumps, floats, alarms, levels, and similar items. Flow meter calibration is conducted by a third-party contractor. This was last completed in 2022. Other maintenance and repairs are described in Table 3 and Section 6.

Larger maintenance projects are scheduled through the capital budget process and implemented through consultants and contractors. None were completed in 2023.

4.2. Sanitary Mains

Sanitary mains are maintained both on a scheduled basis and in response to service requests from customers.

4.2.1. Operating Issues and Corrective Actions

There were no significant operating issues for sanitary mains in 2023. Staff responded to over 200 customer requests related to service laterals. These requests are normally received from customers concerned about a backup or unusual odours, and result in investigation by staff. Where possible, the lateral is rodded to restore flow. When this is not possible, or there is damage, repair or replacement is scheduled. Occasionally the issue can be related to a blockage in the sanitary main, in which case operators flush the main to release the flow.

4.2.2. Calibration, Maintenance and Repairs

Handheld monitoring equipment is calibrated by staff as recommended by the manufacturer, or before each use. This includes a pH probe, and a dissolved oxygen probe. There are no flow meters or other equipment installed in sanitary sewer mains that require calibration.

Maintenance is both planned and unplanned. In 2023, this included:

- Repair and replacement of maintenance hole frames and covers.
- Annual sewer flushing program, covering approximately 25% of the sanitary system.
- Flushing blockages.
- Flushing known problem areas for blockages.
- Customer requests for lateral rodding and repair.
- CCTV video inspection of sanitary mains (see section 7.2.1).

5. Customer Feedback

Most customer service requests are received initially as odour complaints or sewage backup complaints. These are discussed in Section 4.2.1.

Staff investigate complaints on a case-by-case basis. In 2023, one complaint was received regarding unusual odours coming from the sewer noticed inside a manufacturing facility. Staff investigated and found that on-site plumbing issues were allowing odours to enter the facility.

6. Alterations to the Authorized System

One alteration was approved and completed in the sewage collection system this year. A bubbler system was installed at Cascade SPS to reduce grease buildup and subsequent maintenance work. This was documented through a Form SS2.

There were no alterations to the system posing a Significant Drinking Water Threat in 2023.

7. Collection System Overflows and Mitigation

Each year we will summarize any overflows or spills of sewage, and efforts made to reduce overflows, spills, and bypasses.

7.1. Overflows and Spills of Sewage

There were no collection system overflows or spills during the reporting period.

7.2. Efforts to Reduce Overflows, Bypasses, and Spills

7.2.1. Completed and Planned Projects

In 2023 and 2024, work is being completed to assess the condition of up to 20% of the sanitary sewer system through CCTV inspections. Roughly $800,000 was allocated to CCTV inspections, with an additional $400,000 for the development of a relining program. This will be incorporated into asset management planning and help inform where to direct capital spending on sewer rehabilitation and replacement projects in future years. It is expected that this work can help reduce bypass volumes at the Belleville Water Pollution Control Plant by identifying possible inflow/infiltration areas.

The capital budget allocated for relining and replacement is $900,000, expected to be spent in 2024 and 2025.

7.2.2. Details of the Establishment and Maintenance of a PPCP

There were no requirements in the existing Pollution Prevention and Control Plan (PPCP) for action items in 2023. However, budget was approved for assistance in the implementation of the stormwater and sanitary sewer CLI-ECAs. One of the intended outcomes of the project, which is expected to conclude in 2026, is to update the PPCP in accordance with Schedule E, Section 8.2.2 of the CLI-ECA.

7.2.3. Conformance with Procedure F-5-1 and F-5-5

Conformance with Procedure F-5-1 and F-5-5 will be assessed through the City's ongoing CLI-ECA implementation project. This report is due in 2025.

7.2.4. Public Reporting

Work to reduce overflows, bypasses and spills is normally reported to the public through council meetings and the published minutes of these meetings as budgets are approved and contracts are awarded.

8. Summary and Conclusions

2023 was the first year of annual reporting under the City of Belleville's new CLI-ECA for the Belleville Sewage Collection System. This year, staff successfully responded to a variety of operational issues at sewage pumping stations and in the collection system to prevent negative impacts to people, property, and the environment. This included over 200 customer service calls to rod and repair sewer services, and over 70 responses to pumping station alarms. Overall, the system operates effectively, and significant work is planned for the next several years to fully implement the requirements of the CLI-ECA.

9. References

[1] "Environmental Compliance Approval For a Municipal Sewage Collection System, ECA Number: 151-W601, Issue Number: 2." Ontario Ministry of the Environment, Conservation and Parks, May 16, 2023.

[2] "Municipal Consolidated Linear Infrastructure Environmental Compliance Approvals." Ontario Ministry of the Environment, Conservation and Parks, Jun. 12, 2023. Accessed: Mar. 27, 2024. [Online]. Available: https://www.ontario.ca/page/municipal-consolidated-linear-infrastructure-environmental-compliance-approvals

[3] "Certificate of Classification, Belleville Wastewater Collection, Certificate Number 1459." Ontario Ministry of the Environment, Conservation and Parks, May 01, 2013.

[4] "Analysis and Selection of Wastewater Flowrates and Constituent Loadings," in *Wastewater Engineering Treatment and Reuse*, 4th ed., Metcalf & Eddy Inc., McGraw Hill, 2003, p. 1819.