Peel Region

2023

Clarkson Wastewater Treatment Plant annual report

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Clarkson Wastewater Treatment Plant annual report

The Regional Municipality of Peel (Peel) is committed to providing a high level of service in the collection, treatment, and management of wastewater. Peel diligently monitors its sewer network and operates its treatment processes effectively to meet or surpass discharge quality criteria, to protect the environment now and into the future.

Our commitment

- Protecting and preserving the environment, including the prevention of pollution, through effective operation and management of the Wastewater Systems that incorporates quality assurance and control practices
- Acting promptly and responsibly in addressing incidents or conditions that pose a risk to the public or environment
- Collaborating with internal and external stakeholders to ensure our services consider their environmental and quality concerns

If you have any questions about this report, please contact the Wastewater Compliance team at 905-791-7800 extension 4685 or email at publicworkscustserv@peelregion.ca.

Executive summary

The Clarkson Wastewater Treatment Plant (WWTP) is located at 2307 Lakeshore Road West in Mississauga, on the shore of Lake Ontario. The plant is designed to treat an average flow of 350 MLD (million liters per day). The Clarkson WWTP is a Class 4 wastewater treatment facility under Ontario Regulation 129/04. This WWTP is operated under Environmental Compliance Approval (Approval) number 0729-9KBNNY.

This report summarizes the monitoring results for the Clarkson WWTP required by the Approval and describes the operational performance to ensure production of quality effluent.

In 2023, Peel met all the capacity and effluent limits prescribed in the Approval. The annual average daily flow to the plant was **238 million litres**, which is **68%** of the rated capacity specified in the Approval.

Throughout 2023, the Clarkson WWTP met the effluent concentration limits for Total Suspended Solids (TSS), Carbonaceous Biochemical Oxygen Demand ($CBOD_5$), Total Phosphorous (TP), Total Ammonia Nitrogen (TAN), and *E. coli*, and maintained pH within the range of 6.0 to 9.5, as prescribed in the Approval. The requirements and results are detailed in Section 4.2 of this report.

There were no bypasses in 2023 at the Clarkson WWTP and three spill events, as described in section 4.11.

In 2023, the Clarkson WWTP generated **10,139** dry tonnes of sludge cake; **4,504** dry tonnes were sent to nearby G. E. Booth WWTP for incineration and **5,357** dry tonnes were sent for beneficial use. The results are detailed in section 4.9 of this report.

2023 Summary

Peel Region

Brampton, Caledon, and Mississauga

1.5 million residents

175,000 businesses

provided with water and wastewater services

Clarkson Wastewater Treatment Plant

$3.9 million
Capital improvement expenditure

35%
of the Region's total wastewater **treated at Clarkson**

87
billion litres treated in 2023

Equivalent to volume of

95
Olympic size swimming pools

3,340
samples analyzed

100%
approval effluent limits met

100%
of wastewater underwent **complete treatment**

1.6 GJ
(gigajoules)
energy used per million litres of wastewater treated

$30
of chemicals used **per million litres** of wastewater treated

Glossary of terms and abbreviations

Activated sludge: Sludge containing aerobic microorganism that help to break down organic compounds.

Final effluent: The treated wastewater that has undergone all treatment steps, including disinfection, when prescribed.

Influent: The untreated wastewater or raw sewage coming into the sewage treatment plant from the collection system.

Limit: Value prescribed in Approval for key parameters that the plant must meet in order to stay in compliance. Limits are slightly less restrictive than objectives.

ML: megalitres. 1 megalitre equals 1 million litres.

MLD: megalitres per day

m^3: cubic meters. 1 cubic metre equals 1000 litres.

Objective: Value prescribed in Approval for key parameters that the plant is designed to meet. Consistently not meeting objectives means that the plant is not being effective and long-term remedial actions are needed. Sampling results that are over objective but under limit are considered in compliance.

Parameter: Chemical substances (such as phosphorus or oxygen), microbiological indicators (such as *E. coli*) or physical characteristics (such as pH or temperature) that are measured or sampled and analyzed in order to assess the performance of a plant. Some parameters have limits in the Approval.

Rated capacity: Average annual daily influent flow that the plant is designed to handle.

Residual: Remaining amount of a substance after treatment processes are completed.

Twinning: Constructing a parallel pipe to provide additional capacity and to allow for condition assessment and rehabilitation of the existing pipe to extend its useful life.

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.

WWTP: Wastewater treatment plant.

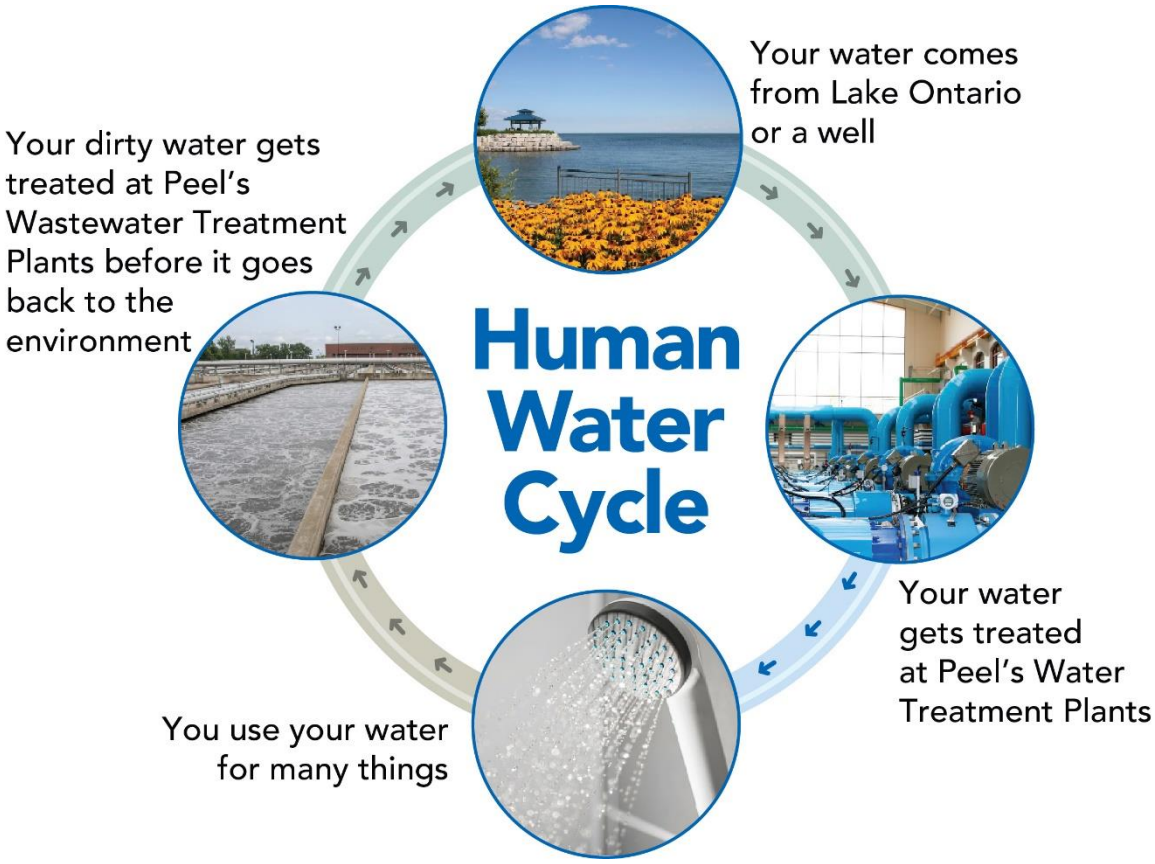
1. Water management in Peel Region

Peel owns and operates the water and wastewater systems that serve its population. This includes water treatment, storage and distribution, and wastewater collection, pumping and treatment.

Peel has two drinking water sources: Lake Ontario and groundwater wells in Caledon. Peel retains services of the Ontario Clean Water Agency (OCWA) under a contract to operate, maintain and manage the lake-based drinking water treatment facilities and its water storage and pumping system. Peel operates the groundwater-based water treatment systems and distribution watermain networks. Similarly, on the wastewater side, OCWA is contracted to operate the large wastewater treatment plants on the shore of Lake Ontario, while Peel Region operates the wastewater collection system, pumping stations, and the treatment facility in the community of Inglewood, in the Town of Caledon.

This water cycle, shown in Figure 1, starts when source water is pumped into our water treatment plants and undergoes treatment to meet the Ontario Drinking Water Quality Standards. Treated drinking water is distributed through a network of pipes, storage facilities and pumping stations to homes and businesses. Used water goes down the drains into the wastewater collection system, where a series of pipes collect and convey wastewater to the treatment plants. Although a predominantly gravity-based network, pumping stations are needed to move wastewater from low lying areas. Wastewater undergoes multi-stage treatment to comply with the strict provincial and federal standards before release to the environment. Peel is committed to high standards of treated wastewater quality since it gets discharged into Lake Ontario, which is the source of drinking water for Peel and many neighbouring municipalities.

Figure 1. Water and Wastewater Cycle



For more information, refer to the annual wastewater reports for our other wastewater systems and our annual water quality reports to learn about water treatment and distribution.

2. Introduction

Wastewater systems in Ontario are governed by the Ministry of the Environment, Conservation and Parks (the Ministry) and are also subject to federal legislation.

The purpose of a wastewater treatment system is to remove solids and nutrients to minimize impact from the effluent on the receiving waterbody. The Environmental Compliance Approval (Approval), issued under the Environmental Protection Act, is a facility-specific document through which the Ministry sets discharge quality limits for that facility based on the sensitivity of the receiving waters. To comply with the Approval, Peel Region prepares an annual report covering the operation and overall performance of the wastewater system.

This report provides a performance summary for the period from January 1 to December 31, 2023, for the Clarkson Wastewater Treatment Plant (WWTP), to fulfill the annual performance reporting requirements set out in the Approval number 0729-9KBNNY.

The Clarkson WWTP, a class 4 wastewater treatment facility under Ontario Regulation 129/04, is located at 2307 Lakeshore Road West in Mississauga and operated on behalf of Peel by the Ontario Clean Water Agency (OCWA). Today, along with the G.E. Booth WWTP, Clarkson WWTP provides wastewater treatment for a population base of over 1.5 million customers. The Clarkson WWTP consists of conventional and biosolids treatment processes and is designed to treat (referred to as rated capacity) an average flow of 350 MLD (million liters per day).

2.1 Compliance

The Approval is a facility-specific document and is the legal instrument that sets requirements for municipal system owners and operating agencies with regards to operation and management, level of treatment, monitoring and recording, routine and event reporting, and effluent quality notification. In accordance with the Approval, major changes to treatment process or equipment are communicated to the Ministry.

Peel ensures that the final effluent produced, and activities associated with wastewater treatment comply with the Approval and related legislation. Peel follows best practices in resource planning, process documentation and emergency preparedness.

The Ministry performs periodic inspections on all wastewater systems, comprised of facility visits and review of information and data for the inspection period. Inspection scope generally covers procedural documentation review, staff competency, process operation and monitoring, and corrective actions to operational events. Peel is committed to ensuring environmental protection and compliance with legislative requirements. We maintain transparency by reporting all findings of potential non-compliance incidents and outcomes of internal assessment to the Ministry Local district office.

2.2 Monitoring

Peel monitors the effluent quality to ensure it meets limits prescribed in the Approval. Peel has an extensive sampling and monitoring program to assess the influent wastewater, ensure effective treatment processes, and assess the quality of treated wastewater being discharged to protect Lake Ontario. Sampling for various microbiological, chemical, and physical parameters is performed by Ministry-licensed wastewater operators at various sampling points throughout the process and submitted to an accredited laboratory for analysis.

Clarkson WWTP is controlled through a computerized supervisory control and data acquisition (SCADA) system that is monitored 24 hours per day, 7 days a week. Online analyzers continuously monitor the wastewater quality prior to release. Any significant process upset generates an alarm so staff can investigate and take appropriate actions to restore normal operational conditions. The plant

is equipped with stand-by power generators to ensure critical equipment can continue to operate in the event of a power failure.

3. Plant process overview

Wastewater is collected from homes and industry through a system of underground sewer pipes known as the **collection system**. The vast majority of wastewater collected in the Region flows by gravity to one of the two WWTPs on the shore of Lake Ontario, Clarkson and G.E. Booth WWTPs. The Clarkson WWTP also receives hauled liquid sewage, which is pumped into the inlet chamber upstream of the raw sewage screens.

When untreated wastewater (influent) enters the treatment process, it goes through **preliminary treatment**, where **screens** remove large objects like wipes and personal hygiene products and a vortex removes small grit particles. Figure 2 illustrates the wastewater treatment process.

The wastewater then enters **primary treatment** tanks (clarifiers), where it flows slowly, allowing heavier suspended solid particles to settle at the bottom and lighter material (such as grease and scum) to float to the top. Treatment aids such as phosphorus removal chemical may be added at this stage. The floating material and settled sludge are skimmed by large moving collectors and then pumped to the digesters for treatment. The remaining water flows to aeration tanks for secondary treatment.

Secondary treatment occurs in two stages to convert organic solids that remain floating to settleable material. The first stage happens in large **aeration tanks** where air is bubbled up via diffusers to provide oxygen so that the microorganisms in the wastewater will break down the nutrients and organic matter. The second stage happens in **secondary clarifiers**, where the microorganisms settle to the bottom. The sludge from the bottom is collected and pumped to the **solids handling process** for treatment and a portion of the sludge is returned to the aeration tanks to supplement the microorganism population.

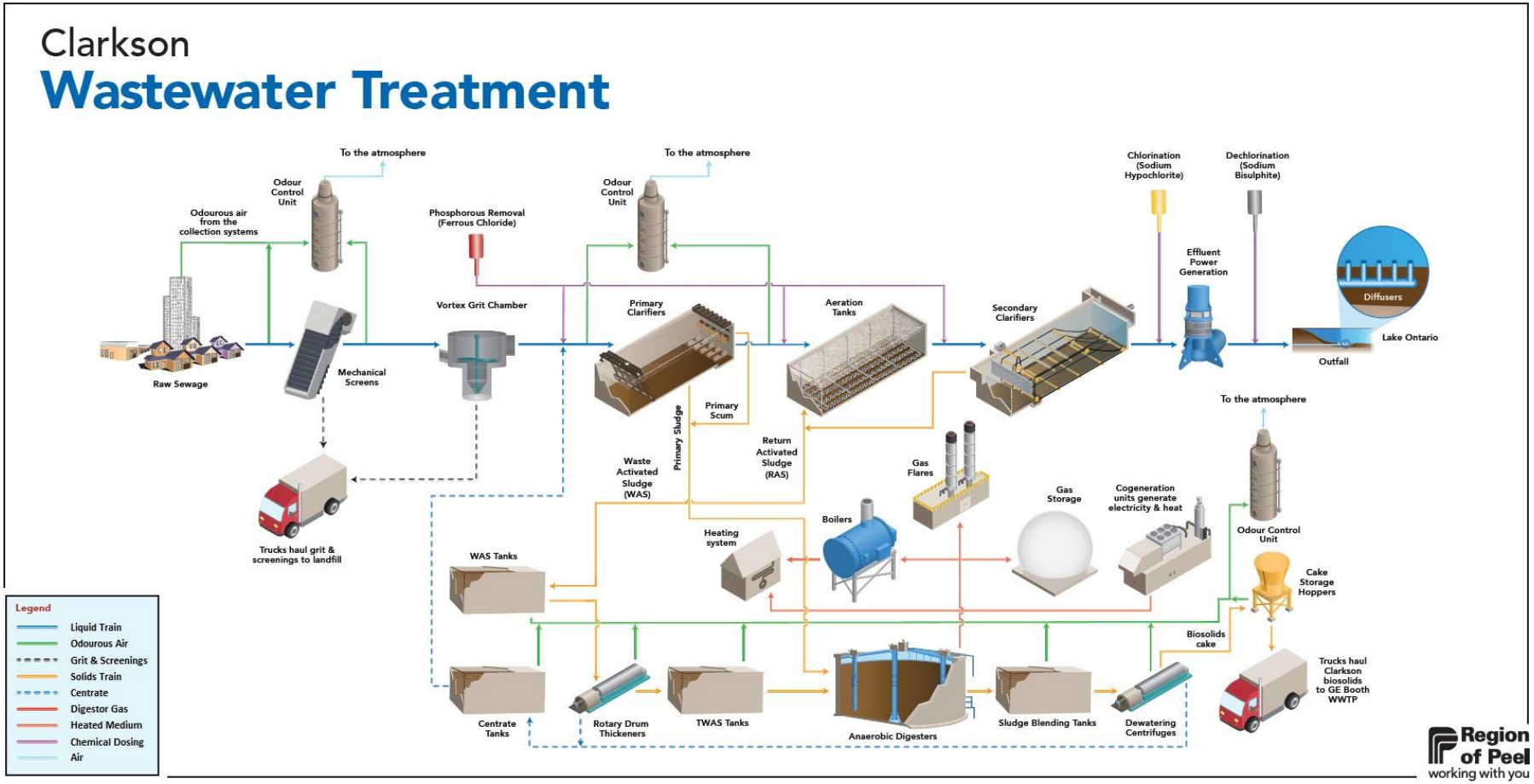
Treated wastewater (effluent) is **disinfected** seasonally (from June 1 to September 30) using liquid chlorine (sodium hypochlorite) to reduce pathogen content to acceptable levels. Chlorine needs time to exert its disinfection action. This contact time occurs while the effluent travels through the 2.2 km long outfall pipe. Any trace chlorine remaining in the effluent is removed using a dechlorination agent (sodium bisulphite) added near the end of the outfall pipe,

prior to release of the final effluent (disinfected effluent) to Lake Ontario. Final effluent quality is tested to confirm compliance with the limits set out in the Approval.

Sludge collected from the secondary treatment process is sent to the **solids handling process** where it is thickened, digested (together with sludge from the primary treatment process) and dewatered. To aid in thickening and dewatering, a chemical compound called polymer is added. Stabilization occurs through anaerobic (in the absence of oxygen) digestion, followed by dewatering. Digestion reduces the total solids, destroys pathogens, and makes the sludge easier to dewater. Gas generated from the anaerobic sludge digestion process is collected and used as a fuel for the hot water boilers and co-generation unit to generate power for use within the Clarkson WWTP.

Once stabilized, the sludge material (called sludge cake) generated at the Clarkson WWTP is hauled offsite for final disposal. Sludge cake is hauled to one of several receivers: the nearby G.E. Booth WWTP for incineration, a landfill, or directed for beneficial use application. Peel is moving towards maximizing the beneficial use of its biosolids.

Figure 2. Clarkson wastewater treatment process



4. Operational performance

4.1 Summary of influent monitoring data

This section summarizes the influent characteristics for Clarkson WWTP. Table 1 summarizes monthly influent volumes and monthly average concentrations of analytical parameters for 2023. For a description of what each test parameter means, see Appendix A – Summary of tested wastewater parameter information.

Table 1. Influent flow and monthly average sampling results

Month	Maximum daily flow (MLD) [1]	Average flow (MLD)	BOD_5 (mg/L)	$CBOD_5$ (mg/L)	TKN (mg/L)	TP (mg/L)	TSS (mg/L)
January	446.0	237.6	278	266	33	4.7	267
February	533.7	243.0	279	255	32	5.1	245
March	551.2	281.0	282	230	28	4.4	218
April	522.4	266.6	301	286	31	4.6	324
May	414.9	248.5	322	279	31	4.4	223
June	450.4	236.6	310	269	32	4.6	247
July	482.4	246.5	309	261	30	4.5	264
August	368.2	241.8	297	256	39	5.0	268
September	407.5	234.4	300	280	40	5.5	291
October	340.1	210.3	290	245	40	5.2	237
November	363.2	203.4	262	230	39	5.1	248
December	491.1	211.3	210	200	36	4.4	182
Annual	N/A	238.4	287	255	34	4.8	251

[1] Highest daily average of the month

Many factors affect changes in volume of wastewater flow to treatment plants. These include precipitation (through inflow and infiltration of storm water into the wastewater collection system), existing ground moisture saturation, residential water usage practices, and industry activity. Table 2 provides a summary of flows and contaminant concentrations for the past six years. The concentrations are impacted by flows, as increased flows can dilute contaminants. When analysing trends, it is important to look at long term values for both flows and contaminant loading.

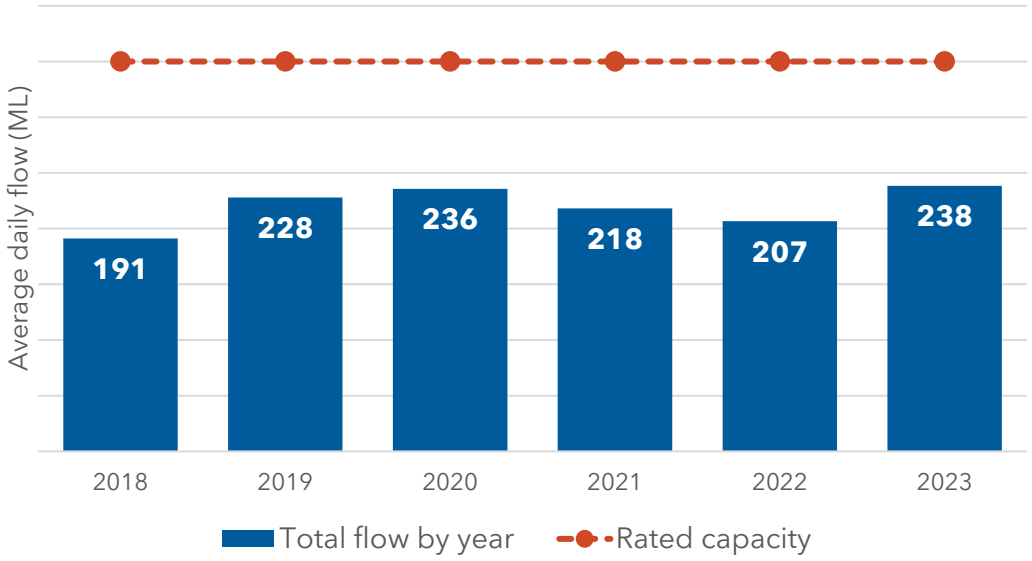
Table 2. Historical annual average influent flow and sampling results

Year	Flow (MLD)	BOD_5 (mg/L)	$CBOD_5$ (mg/L)	TKN (mg/L)	TP (mg/L)	TSS (mg/L)
2018	191	200	177	30	4.3	293
2019	228	227	198	30	4.6	271
2020	236	218	201	33	4.8	242
2021	218	239	216	33	5.2	230
2022	207	277	256	35	5.2	260
2023	238	287	255	34	4.8	251

In 2023, the annual average flow was 238 MLD, representing 68% of the annual rated capacity. This is a 15% increase over the previous year and in line with the annual volume in 2020.

Figure 3 illustrates historical flow trends for 2018 to 2023.

Figure 3. Annual average flow 2018 to 2023



4.2 Summary of final effluent monitoring data

During the year 2023, the final effluent met all the Approval limits (either monthly or annual, as prescribed). A summary of final effluent test results and the Approval objectives (targets) and limits (requirements) are shown in Table 3. $CBOD_5$, TSS, TP, TAN, and *E. coli* monthly mean values were significantly under the limits throughout the year (or during limit period, for *E. coli*). For a description of test parameters, see Appendix A – Summary of tested wastewater parameter information.

The Approval requires disinfection from June 1 to September 30. During that time, chlorine residual and bisulphite residual are tested at sampling points representative of final effluent.

Table 3. Final effluent monthly average flow and sampling results

Month	Daily flow (MLD)	$CBOD_5$ (mg/L)	TSS (mg/L)	TP (mg/L)	TP loading (kg/day)	Total ammonia nitrogen (mg/L)	pH (pH units)	*E. coli* (CFU/100mL) [2]	Bisulphite residual [3] (mg/L)
Objective	N/A	15	15	0.8	N/A	Jun to Sep 6.0, Nov to Apr 17.0, May and Oct 8.0	6.5 to 9.0	N/A	Detectable (Jun 1 to Sep 30 only)
Limit	518	25	25	1	350	Jun to Sep 8.0, Nov to Apr 34.0, May and Oct 16.0	6.0 to 9.5	200 (Jun 1 to Sep 30 only)	Detectable (Jun 1 to Sep 30 only)
Compliance assessment basis [4]	Annual average	Annual average	Annual average	Monthly average	Annual average	Monthly	Single sample	Monthly geometric mean density	Single sample
January	238	3.6	6.7	0.7	172	1.7	6.8	6,700	N/A
February	243	3.3	6.1	0.5	130	3.2	6.8	5,659	N/A
March	281	2.9	4.1	0.3	89	0.6	6.8	5,017	N/A
April	267	3.3	4.3	0.4	115	0.6	6.8	3,672	N/A
May	249	2.5	4.6	0.4	112	0.6	6.8	208	1.59
June	237	2.2	3.9	0.6	145	1.1	6.7	19	1.30
July	247	2.1	3.3	0.4	95	1.7	6.8	34	2.26
August	242	2.3	3.2	0.6	140	2.5	6.8	31	1.98
September	234	2.6	3.4	0.5	118	5.6	6.8	7	1.60
October	210	2.5	2.9	0.6	128	1.4	6.7	1,450	1.70
November	203	2.8	4.8	0.4	76	1.7	6.7	992	N/A
December	211	2.6	4.2	0.4	87	4.2	6.7	1,560	N/A

[2] CFU/100mL = Colony forming units per 100 milliliters

[3] Approval includes residual chlorine objective of non-detectable and limit of 0.02 mg/L. If bisulphite residual is used as a surrogate to total residual chlorine, then detected levels of bisulphite residual in the sample shall be deemed to confirm absence or equivalent to 0.0 mg/L concentration level of total residual chlorine.

[4] For different parameters, compliance is assessed based on different time periods. Total phosphorus and total ammonia nitrogen are deemed in compliance if monthly average meets the limit; $CBOD_5$, TSS and flow are in compliance if annual average meets limit; bisulphite residual and pH are assessed on daily results. *E. coli* is assessed using a monthly geometric average.

Annual average	238	2.7	4.3	0.5	118	2.0	6.8	N/A	N/A

4.3 Deviations from monitoring schedule and next reporting year schedule

The wastewater influent and effluent must be sampled and tested in accordance with the requirements of the Approval. Each year, a sampling schedule is prepared to ensure all requirements are met. Table 4 and Table 5 show the sampling schedules for 2023 and 2024. See Appendix A – Summary of tested wastewater parameter information for parameter descriptions.

4.3.1 Sampling schedules for 2023 and 2024

Table 4. Influent monitoring program

Parameters	Sample type	Minimum frequency	2023 and 2024 frequency
BOD5	24 hours composite	Weekly	2 times per week
TSS	24 hours composite	Weekly	Daily
TP	24 hours composite	Weekly	Daily
TKN	24 hours composite	Weekly	Daily

Table 5. Final effluent monitoring program

Parameters	Sample type	Minimum frequency	2023 and 2024 frequency
$CBOD_5$	24 hours composite	Weekly	Daily
TSS	24 hours composite	Weekly	Daily
TP	24 hours composite	Weekly	Daily
TAN	24 hours composite	Weekly	2 times per week
TKN	24 hours composite	Weekly	2 times per week
Nitrate as nitrogen	24 hours composite	Weekly	2 times per week
Nitrite as nitrogen	24 hours composite	Weekly	2 times per week
E. coli	Grab	Weekly	2 times per week
Total residual chlorine or bisulphite residual	Grab or analyzer	Daily	Daily
pH [5]	Grab or probe or analyzer	Weekly	Daily
Temperature [5]	Grab or probe or analyzer	Weekly	Daily
Un-ionized ammonia [6]	As calculated	Weekly	2 times per week

[5] pH and temperature of the final effluent shall be determined in the field at the time of sampling for total ammonia nitrogen.
[6] The concentration of un-ionized ammonia is calculated using the total ammonia concentration, pH and temperature.

4.4 Operating issues and corrective actions

The Clarkson WWTP operates year-round, 24 hours a day. Occasional operating issues are encountered. Table 6 summarizes operating issues in the reporting period that temporarily affected the process or effluent quality and lists the corrective actions taken. This information is reported to the Ministry Inspector monthly. For a description of test parameters, see Appendix A – Summary of tested wastewater parameter information.

Table 6. Summary of operating issues and actions taken

Issue	Date	Causes	Corrective actions
Effluent pH lower than objective range	January 26, October 19	• Addition of high TAN digester centrate into the treatment process consumes alkalinity, reducing pH buffering capacity; • Increased use of phosphorus removal chemical (which has low pH) when addressing high total phosphorus	• Closely monitored pH and alkalinity; • Adjusted dosage of phosphorus removal chemical; • Caustic soda solution was dosed when necessary to increase pH and buffering capacity
Effluent TP elevated	Multiple dates throughout the year	• Disruption of phosphorus removal chemical supply in January led to a decrease in chemical dosing to manage available supply; • High sludge levels in primary tanks; • Addition of decant solution from digesters (during digester maintenance) to the treatment process increased TP loading; • High raw sewage TP loading; • One batch of phosphorous removal chemical was of unusually low strength	Adjusted plant process and reduced sludge depth in primary tanks
Plant flow exceeded rated capacity	Multiple days from February to April	High precipitation and snow melt	No adverse impact. Plant processes were monitored to ensure effective treatment

4.5 Maintenance activities

4.5.1 Repair and maintenance

To keep the Clarkson WWTP in good operating order, major plant components must be inspected and maintained on a regular basis. Table 7 provides a summary of planned and emergency repairs and maintenance activities carried out during the reporting period.

Table 7. Summary of repairs and maintenance activities

Process	Maintenance activity
Preliminary treatment	• Overhauled two fine screens and replaced or repaired associated components • Overhauled scrubber at Headworks • Overhauled two grit vortexes, classifier and conveyor system and replaced associated equipment
Primary treatment	• Replaced aging sludge and scum pipes and valves • Repaired travelling bridge on one of the primary tanks • Inspected a digester and overhauled mixers, replaced or repaired electrical components • Overhauled an air channel blower
Secondary treatment	• Overhauled an aeration blower • Inspected aeration tank and final clarifier and repaired all drives and scum collector in final clarifier • Replaced or realigned associated components as required • Repaired one return activated sludge pump, one waste activated sludge pump and one scum pump • Replaced and realigned return activated sludge piping and installed components in the system • Rebuilt two mixers in aeration tanks
Solids handling	• Overhauled biosolids scrubber • Inspected a cake hopper and repaired or replaced associated components • Overhauled one rotary drum thickener and feed pump, and one pump for thickened waste activated sludge • Overhauled one cake pump and repaired/replaced all components of the system • Overhauled one centrifuge, rebuilt polymer pump and electrical components
Other works	• Overhauled boilers and replaced or repaired associated heating piping and pumps in the conditioning facility and incinerator building

Process	Maintenance activity
	• Overhauled one pump at Avonhead pumping station (that feeds directly to the plant) • Installed two new pumps in ground water pits • Replaced exhaust fan in blower building and HVAC in phosphorous removal chemical dosing building

4.5.2 Operating resources

The Approval requires Peel to ensure that the plant and all equipment used to achieve compliance are properly operated and maintained. This includes providing adequate funding. Peel funds operational activities and process chemicals to maintain daily operation, as well as capital activities to ensure future system performance.

In 2023, $2.6 million was spent on process chemicals at Clarkson WWTP, such as sodium hypochlorite, polymer, sodium bisulphite, and phosphorus removal chemical (see introduction and Appendix A – Summary of tested wastewater parameter information for description of use of each of these process chemicals), with an overall cost of $30.18 per million litres of wastewater treated. This is a 19% increase over the previous year. This is due to both an increase in volume of certain chemicals used and to cost increases.

Water and wastewater treatment are among the highest energy users in Peel Region. In 2023, 1.6 gigajoules of energy were used per million litres treated. Energy rates vary slightly from year to year; in 2023, the rate was comparable to the average over the past 5 years.

Energy usage and performance of energy intensive equipment is monitored, and Peel continues to research ways to optimize and reduce energy use through energy-saving opportunities during design of capital improvement and construction projects.

4.5.3 Capital expenditure information

Peel staff determine priorities to eliminate unnecessary capital spending while maintaining infrastructure. Table 8 shows a summary of the major capital expenditures at Clarkson WWTP in the previous year.

Table 8. Summary of capital costs

Activity	2023 Expenditures	
Condition assessment and studies	$	415,479
Equipment repair and replacement, conventional plant	$	2,221,787
Equipment repair and replacement, biosolids processes	$	1,274,129
Total		$3,911,396

4.6 Effluent quality assurance and control measures

Sampling data

- Licensed operators perform **in-house testing** of multiple parameters for process control
- Primary treatment efficiency **sampling program**
- Samples are analyzed by an **accredited laboratory**
- All **process data** is captured electronically
- SCADA real-time data capture and monitoring, data historian, and reporting tools for the collection and analysis of data

Operational control

- **Operational facility sheets** capture data that can be used to determine, trend and diagnose problems
- **Dissolved oxygen profiling** to ensure completion of CBOD removal and complete nitrification
- **Calibration of critical equipment** is performed with required frequency
- **Equipment redundancy** to increase equipment availability and effective response to failures and unplanned emergencies
- Multiple **SCADA** stations throughout the facility ensures operators have ready access to real-time conditions and control of plant equipment
- Internal **standard operating procedures** complement operations and maintenance manuals
- **Document control system** for proper and effective record-keeping

- **Wastewater contingency plan** to address emergency situations in the interest of meeting final effluent limits and prevent impacts to the environment

Preventive maintenance

- **Reliability centered maintenance program** reduces emergency repairs, shifting toward proactive control
- Inventory of equipment is captured in a **computerized maintenance management system**, improving the ability to manage assets
- A major **maintenance program** focuses on replacing or refurbishing aging assets

Competent staff

- **Operator licences** (issued under 0. Reg. 129/04) are verified monthly
- **Comprehensive operator training** includes classroom, online and hands on training
- **Overall Responsible Operator** readily available to provide direction during operational challenges and emergency situations
- **Compliance and process staff** for system oversight
- **Process and energy optimization staff** for managing cost efficiency, energy savings and environmental stewardship

Management oversight

- **Regular process and compliance meetings** between the owner and the operating authority
- **Monthly operations staff meetings** provide training and discussion on topics including health and safety, compliance, and operational and maintenance activities

4.7 Monitoring equipment calibration and maintenance

Equipment used to monitor wastewater influent and effluent flows must be checked and maintained to ensure it is reading accurately. This is achieved through annual calibration and maintenance of flow meters, completed by a third-party vendor. For 2023, final effluent flow meters were found to be within acceptable limits.

4.8 Efforts made to achieve design capacity and objectives

The flows to Clarkson WWTP are consistently well below rated capacity (as demonstrated in section 4.1); therefore, no additional measures are required to achieve design capacity.

Throughout 2023, the effluent consistently met the Approval limits (requirements) and objectives (targets) for $CBOD_5$, TSS, TP, TAN and *E. coli* (when prescribed). For a description of test parameters, see Appendix A – Summary of tested wastewater parameter information. The only parameter for which the objective was not met at times was pH. There were two days when the pH was outside the objective range of 6.5 to 9.0 pH units. On those days, the pH limit was still met. The causes and how the process was managed are detailed in section 4.4.

Section 4.6 describes the many programs and measures in place to ensure that objectives are consistently achieved, and environmental impacts are minimized.

In 2023, Peel completed Environmental Assessments for the wastewater treatment facilities to provide additional treatment capacity and meet Master Plan flow projections to 2041. The Clarkson WWTP Notice of Completion was submitted for final public review in Fall 2023.

Wastewater collection system

Peel has undertaken proactive long-term actions in the collection system to meet future needs.

Peel's strategy for offsetting wastewater flows from the east side of Mississauga and Brampton includes several major collection system initiatives, with an overall 10-year capital budget of approximately $420 million. Twinning of the East Brampton and West sanitary trunk sewer is now complete and operational and will provide additional capacity and allow for condition assessment and rehabilitation of the existing trunk sewer to extend its useful life. Peel recently completed a condition assessment of the existing East Brampton sanitary trunk sewer and working with Peel's consultant on the development of the 30% design to support planned rehabilitation work. Several significant wastewater condition assessment and rehabilitation initiatives were initiated or continued in 2023, including condition assessments of portions of the West Trunk Sewer, portions of the Brampton Centre Sub-Trunk, Airport Trunk, Upper Mimico Sub-Trunk, Mullet Creek Sub-Trunk Sewer, 407 Diversion Trunk Sewer, and Meadowvale Trunk

Sewer to name a few. The Maintenance Hole rehabilitation program with the completion of additional construction contracts.

The goal of these projects is to assess and rehabilitate sanitary infrastructure to meet target levels of service, which in turn improves system resiliency and longevity, and reduces site-specific infiltration, such as leaking pipe joints. The East Trunk Sewer and Energy Dissipation Chamber Rehabilitation Class Environmental Assessment and Detailed Design were completed in 2022, and the project is currently midway through construction. This project was also awarded combined federal and provincial funding.

Peel is also proposing additional collection system initiatives to facilitate diversion and storage to alleviate extraneous flows related to inflow and infiltration. More details can be found in the Sanitary Sewage Collection System annual report at peelregion.ca/wastewater/#reports.

Industrial wastes

Peel also protects the wastewater collection system (and thus WWTPs) from industry impacts. Peel's Wastewater Bylaw (53-2010) sets concentration limits for discharges to the sanitary sewer, which subsequently protects the WWTPs from industry impacts, and provides information on agreements and spills to the environment. The bylaw applies to the Industrial, Commercial, and Institutional (ICI) sectors as well as residences and establishes penalties for offences of up to $100,000 for businesses.

All ICI facilities are inspected by Peel staff at a minimum once every 2 years, resulting in over 5,000 inspections being completed annually. The inspections are used to assess the discharges from the facility and its compliance with the bylaw as well as the effect on the wastewater collection and treatment systems. Upon discovery of a spill into the sanitary sewer, or notification from an industry of a release, WWTPs are notified so staff can implement protective actions.

4.9 Sludge generation and disposal

The treatment process removes solids from the wastewater stream in the form of sludge, which is processed on site, as described in section 3. Table 9 shows the total monthly and annual sludge volumes generated at the Clarkson WWTP.

In 2023, a total of 10,139 dry tonnes of sludge cake was generated. This represents a 7% increase in sludge production compared to the previous year. All sludge is sent offsite for disposal: 4,504 dry tonnes were incinerated at G.E. Booth WWTP and 278 dry tonnes were shipped to landfill. The remaining 5,357 dry tonnes (53%) of the sludge generated, were sent for beneficial use such as land application, land reclamation, or conversion into soil amendment products.

Anaerobic digestion reduces pathogens and stabilizes the sludge. To recover this valuable resource, a change in the sludge disposal strategy was made in 2022 with the intention of sending about 50% of the sludge produced at Clarkson WWTP to beneficial use.

It is difficult to predict the change in sludge production for the following year as there has not been a clear trend in the last several years. Based on a predicted population increase of 1%, and no significant expected changes to flows or processing, no significant changes in sludge generation are expected for the next year.

Table 9. Summary of sludge volume generated in different processes and its disposal

Month	Sludge cake incinerated at G.E. Booth (dry tonnes)	Sludge cake transported to landfill (dry tonnes)	Sludge cake to beneficial use (dry tonnes)	Total sludge cake generated (dry tonnes)
January	478	157	281	916
February	354	121	204	679
March	695	0	214	909
April	719	0	118	837
May	366	0	421	788
June	646	0	223	869
July	65	0	808	873
August	440	0	450	889
September	10	0	809	819
October	0	0	961	961
November	217	0	670	887
December	513	0	199	712
Annual daily average	12	1	15	28
Annual total	**4,504**	**278**	**5,357**	**10,139**
Annual percentage	**44.4%**	**2.8%**	**52.8%**	**N/A**

4.10 Summary of complaints

The Approval requires that Peel log, investigate and resolve all resident complaints. Peel attempts to contact all customers and satisfactorily address their concerns and enquiries. A database is used to record details including information collected from the customer on the nature of the enquiry and action taken by Peel. There were no complaints received in 2023 relating to the facility.

4.11 Bypasses, overflows, spills and abnormal discharge events

Occasional weather events such as heavy rainfall and spring snow melt can result in flow rates that are higher than those for which the plant was designed and burden the treatment process. These challenges, as well as the need for planned maintenance and construction activities, may result in a discharge to the environment of a portion of wastewater that has not undergone all treatment processes, outside of normal operating conditions, in what is referred to as a bypass event.

4.11.1 Bypasses

A bypass is an intentional diversion of excess wastewater around one or more wastewater treatment processes. The bypassed portion of wastewater undergoes part of the treatment process followed by disinfection and gets re-combined with the fully treated flow prior to release into Lake Ontario at the approved discharge location and sampling point. Final effluent is sampled and tested during bypass events to assess its quality.

Occasionally, a planned bypass is necessary to repair an essential part of the treatment process or during construction. In those cases, Peel submits a request to the federal and provincial governments to perform the bypass, including a plan to minimize its impact.

While not desirable, emergency bypasses may be necessary during high flow events to prevent spills and flooding at the WWTP and backups within the sewer system that can cause basement flooding and spills to the environment. Bypasses are also essential to protect the plant core biological treatment process (microorganisms that treat the sewage) from being washed out, which would

prevent the plant from functioning properly and potentially causing long-term treatment impacts until the biological community is re-established.

Most bypasses in Peel are *secondary bypasses*, whereby the diverted wastewater receives primary treatment, bypasses secondary treatment, and receives a high degree of disinfection.

There were no bypasses in 2023.

4.11.2 Overflows

An overflow is a controlled discharge of wastewater to the environment from a designed location at the plant other than the approved final effluent outfall. **There were no overflow events** during the reporting period.

4.11.3 Spills

A spill is an unplanned discharge to the environment from any location that is not specifically designed for this purpose. **There were three spill events** during the reporting period. A summary is provided in Table 10.

Table 10. Summary of spill events

Date	SAC Reference Number	Description	Action Taken in Response
May 25	1-3H7R8	Spill of chlorinated final effluent (used as water for internal processes) from underground pipe, spilling into catch basin	The leak was stopped by isolating the valve. VAC truck removed any liquid remaining in catch basin
June 9	1-3IYHW1	Spill of potable water from a watermain leak	The leak was stopped by isolating the valve and main was repaired
June 20	1-3K4CH5	Incomplete dechlorination of final effluent due to simulator issue which underdosed the dechlorinating chemical	Dosing was switched to manual control during investigation. The root cause was an electronic component, which was replaced

4.12 Notice of Modifications to Sewage Works

The Approval allows for certain pre-authorized modifications to be made to the facility. The Ministry requires each modification to be documented on a *Notice of Modification to Sewage Works* form which is retained and made available to the Ministry during inspections.

One *Notice of Modification to Sewage Works* was submitted to the Ministry during 2023 for use of sodium hydroxide to assist with maintaining pH within the objective range.

Repair and maintenance activities are exempt from the documentation requirements and may be performed as needed to maintain the WWTP in good working condition. These were summarized in section 4.5.

4.13 Status of the proposed works

Peel undertakes construction projects to upgrade or enhance the WWTP to meet demands related to industrial and commercial growth in Peel that may alter incoming wastewater volume or loading, and to integrate new technologies. Future construction plans proposed by Peel are submitted to the Ministry for engineering review. Approved installations and modifications are listed in the *Proposed Works* section of the Approval. Approved installations and modifications are listed in the Proposed Works section of the Approval. All the previously proposed works have been completed.

5. Performance management programs

5.1 Ministry inspections

Wastewater system inspections are performed periodically by the Ministry to ensure systems are operating as required and complying with the terms and conditions of their Approvals. Performance data is reviewed against the compliance objectives and limits. The inspections also verify that Peel meets sampling, testing and treatment standards and staff competency requirements. Additional inspections can be triggered through a variety of factors such as frequency of events or inconsistent system performance (e.g., increased number of spills or reportable incidents), in response to a complaint or concern, or as part of a follow-up from prior non-compliances.

There was no Ministry inspection of the Clarkson WWTP in 2023.

Appendix A – Summary of tested wastewater parameter information

Dissolved oxygen (DO): Amount of oxygen dissolved in water. It is essential for the survival of aquatic plants and animals. In the wastewater treatment process, DO is required by the microorganisms to break down the organic material present. A lower DO value suggests a greater amount of organic matter present in the sample.

Total biochemical oxygen demand (BOD_5): Amount of DO used by microorganisms to break down organic material present in a wastewater sample, measured as DO decrease over a 5-day period. A higher BOD_5 value means greater amount of organic matter present in the sample, which can cause deplete DO in receiving waters.

Carbonaceous biochemical oxygen demand ($CBOD_5$): Amount of DO needed by microorganisms to break down carbonaceous (carbon rich) organic material present in a wastewater sample over a 5-day period.

Alkalinity: Water's resistance to the effect of acids added to water.

Total phosphorous (TP): An essential nutrient used by microorganisms for growth. TP comes from a variety of sources including fertilizers, detergents, domestic wastewater, and wastewater from industrial processes. Excess phosphorus in waterbodies can promote algae blooms.

Total suspended solids (TSS): Suspended particles (organic and inorganic material) present in the water sample. TSS can include sediment, sand, silt, plankton, and algae. High concentration of TSS can interfere with the disinfection process and can also lower the quality of the receiving waterbody.

Total Kjeldahl nitrogen (TKN): Sum of ammonia nitrogen and the amount of nitrogen present in organic form. High TKN can be toxic to aquatic life.

Total ammonia nitrogen (TAN): The amount of ammonia in wastewater. Sources of ammonia include domestic, industrial, or agricultural pollution, primarily from fertilizers, animal and plant decomposition, and animal waste.

Nitrite, nitrate: An intermediate nitrogen species in the cycle of nitrogen removal from wastewater.

pH: A measure of the alkalinity or acidity in wastewater, which can indicate chemical or industrial pollution.

Temperature: Temperature of the wastewater sample measured at the time of collection. Higher wastewater temperatures allow for more efficient treatment at biological treatment plants.

Sodium hypochlorite: Liquid chlorine used for disinfection of treated wastewater. To minimize chlorine effects on the receiving waters, the effluent is dechlorinated before being released into Lake Ontario.

Sodium bisulphite: Used to neutralize the chlorine present in final effluent after disinfection. This is done to minimize chlorine effects on the receiving waters.

***E. coli*:** An indicator of fecal contamination in effluent. Most species of this bacteria are harmless to humans; however, some strains can be pathogenic (cause disease).

Appendix B – Frequently asked questions

Where does water go after it is used?

After you use water to wash dishes and clothes, brush your teeth, shower or flush the toilet, the used water (wastewater) that goes down your drains flows through a series of underground sewer pipes to the wastewater treatment plants.

The wastewater is treated to remove contaminants and kill disease-causing microorganisms before being discharged into the environment. Peel operates three wastewater treatment plants (WWTP): G.E. Booth WWTP and Clarkson WWTP, both discharging into Lake Ontario, and the Inglewood WWTP, discharging into the Credit River. These three plants serve the cities of Mississauga and Brampton and the Town of Caledon.

View Peel Region's wastewater video for more information on how wastewater is treated.

Why am I experiencing a sewage odour outside my house?

The sewage odor outside your house could be from a variety of sources. It could be that the sewer is backed up close to your property. If your property is located close to a lake, algal blooms also cause odours. Other sources of odour might include: scheduled treatment plant maintenance coupled with prevailing winds, nearby farming activities, or odours from waste management facilities or industries.

If you are noticing odours near your property, please call Peel Region at 905-791-7800.

Why am I experiencing a sewage odour inside my house?

If you notice an odour of sewage coming from a drain in your house, it is recommended to pour a cupful of bleach into the drain, let it sit for 10 to 15 minutes and then rinse it down with plenty of water. If this does not resolve the odour problem, please call Peel Region at 905-791-7800 for further investigation.

What is the difference between a storm sewer and sanitary sewer?

Wastewater that goes down drains inside homes and buildings enters the sanitary sewer system, which sends it to a wastewater treatment facility for treatment before it is released to the environment. Sanitary sewer systems in Mississauga, Brampton and Caledon are maintained by Peel Region.

Rainwater and melting snow are called storm water. Stormwater enters storm grates on the road and enters the storm sewer pipes that run beneath the roadways. These pipes discharge the storm water to local waterways, like streams, creeks, and lakes. The majority of storm sewer is maintained by the local municipality – the cities of Brampton and Mississauga and the Town of Caledon. Peel maintains storm sewers on regional roads.

Refer to the Peel Region website for more information about wastewater and storm water.

What happens to industrial wastewater?

Some companies treat their own wastewater and release it directly into the environment or into Peel Region's sanitary sewer (wastewater collection system). Wastewater released into the sanitary sewer joins all other wastewater collected (from households and building drains) and flows to one of the wastewater treatment plants. Industrial wastewater can be hazardous or contain substances that may damage sewer infrastructure or upset the treatment process. Therefore, all wastewater released and all businesses that release it into Peel sewers must comply with Peel's Sewer Use Bylaw (Wastewater Bylaw). To ensure compliance, industrial facilities are examined by inspectors from Peel's Environmental Control department. Thousands of inspections are completed each year.

What must not be disposed down the toilet or poured down the drain?

It is important to understand that what goes down the drain or the toilet may have negative impacts on the wastewater system and the environment. Fats, oils, and grease should never be poured down the drain because these materials are known to cling to pipe walls. Over time, their accumulation can build up to such high levels that the sewer can become blocked. Another reason to avoid disposing fats, oils, and grease into drains or toilets is that it is not effectively

broken down during the wastewater treatment process. Instead, Peel recommends that edible household fats, oils and grease (FOG) should be collected and properly disposed as per the FOG disposal at home instructions. To learn more about Peel's community recycling centres' web page.

It is also important not to dispose items down the toilet that could get stuck in or damage the sewer systems. Sticks, rags, paper towels, personal hygiene products, diapers, disposable wipes, household hazardous waste and pharmaceuticals should not be disposed by simply flushing down the toilet. Any unused or expired pharmaceuticals can be returned to your local pharmacy. For more information on how to properly dispose of items that damage the wastewater refer to idontflush.ca

What causes a sanitary sewer backup?

Most sewer backups occur when sewer pipes get blocked. Sewer pipes can become clogged with excess fats, oils, greases, food wastes, coffee grounds, hair, toilet paper, soap residue, or inappropriate materials being flushed down the toilet or drain. Even sanitary wipes that are labelled "flushable" will in fact clog pipes, sewers, and screens at the treatment plants. To help reduce sanitary sewer blockages and prevent backups, it is recommended to properly dispose of these items and other materials that can harden or settle within the sewer pipes.

Sanitary sewer backups can also occur when tree roots grow into or through sewer lines. These roots may be from trees that are outside your property boundaries. The only solution to this problem is to cut away the roots and then replace the pipeline.

If you notice a sewer backup in your home, call Peel Region at 905-791-7800 extension 4409, or 1-888-919-7800 for residents in Caledon. If the problem area is determined to be on private property, there is a flat fee for the service call.

More information about wastewater and storm water is available on the Peel Region webpage.

How safe is the treated wastewater that is released into Lake Ontario?

To meet environmental compliance criteria in Ontario, all wastewater must be treated before being returned to the environment. Peel operates and maintains three wastewater treatment facilities, G.E. Booth, Clarkson, and Inglewood, under strict regulations and the effluent discharged into the environment must meet location-specific, provincial, and federal standards.

Which pipes are mine and which are Peel Region's responsibility?

See the information at homeowner and regional responsibilities of wastewater infrastructure.

What is optional water and sewer line insurance program?

The pipes on the private side of the property line belong to the property owner. Sometimes these pipes may get damaged or blocked, which can result in costly plumbing bills. Peel endorses a voluntary pipe insurance program. For more information can be found on the insurance program web page.

How can I find out what work is taking place in my neighbourhood?

Peel maintains an interactive mapping tool on our website where the public can see the status of current and upcoming water projects that could result in water interruption. At this site, you can sign up to receive email notices with project updates.

Similarly, we publish a summary of water outages. If you are unexpectedly without water, you can check this site to learn what is happening and view the answers to frequently asked questions.

Other sources for more information about wastewater and related issues

Peel Region
working with you

Peel Region
10 Peel Centre Dr., Brampton ON L6T 4B9
Wastewater-related questions:
Phone: 905-791-7800 extension 4685
Website: peelregion.ca/wastewater
E-mail: Publicworkscustserv@peelregion.ca
Water and Sanitary Sewer and Septic Protection Plans:
Peel Wastewater Bylaw or Service line warranties

Ontario

Ministry of the Environment, Conservation and Parks
Public Information Centre
Phone: 416-325-4000
Toll-Free: 1-800-565-4923
Website: ontario.ca/environment

Canada

Environment and Climate Change Canada
Inquiry Centre
Phone: 819-997-2800
Toll-Free:1-800-668-6767
Website: ec.gc.ca